

Manual of Petroleum Measurement Standards Chapter 17—Marine Measurement

Section 1—Guidelines for Marine Cargo Inspection

FIFTH EDITION, MARCH 2008



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Cargo Inspection**

Measurement Coordination Department

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Foreword

This revised Fifth Edition of API *MPMS* Chapter 17.1 updates the Fourth Edition, dated November 2001, by making the following modifications:

- former Appendices A and C have been removed in their entirety;
- former Appendix B was renamed Annex A;
- 11.1 and 16.1 now reference API *MPMS* Ch. 12 instead of Appendix A;
- 7.3.1 and 12.6.1 now reference API *MPMS* Ch. 17.9/IP HM 49 instead of Appendix C;
- API *MPMS* Ch. 17.9, *Vessel Experience Factor (VEF)* was added to the list of references;
- the VEF definition was modified to make reference to API *MPMS* Ch. 17.9 and “Vessel Load Ratio” and “Vessel Discharge Ratio” were removed;
- the Errata of June 2005 and its references have been removed as it relates to VEFs.

These changes have been made as a result of the publication of API *MPMS* Ch. 17.9, First Edition, November 2005, which provides a recommended practice for the calculation and application of VEFs.

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Suggested revisions are invited and should be submitted to the Standards Department, API, 1220 L Street, NW, Washington, D.C. 20005, standards@api.org.

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Introduction

These guidelines are intended to encourage uniform inspection practices for marine petroleum and chemical cargo quantity and quality control. Use of these guidelines also will simplify the making of agreements for transferring volumes of petroleum and chemical cargoes and will help ensure that the agreements can be clearly interpreted and executed between parties. The recommendations provided here, however, are not intended to interfere in any way with provisions contrary to these guidelines that may exist in any contract or applicable recommended practices of other regulatory or standards bodies; nor are they intended to interfere with safety and environmental considerations or local conditions. These guidelines are not promulgated as the only acceptable method of custody transfer measurement or inspection practices. Guidelines for the inspection of marine cargo are subject to ongoing reappraisal and periodic change.

Measurement and sampling activities to be performed on board a vessel shall be accomplished in the presence of, or with the express permission of, the vessel's master or other appropriate authority. Activities to be performed at the loading and discharge shore facilities shall be accomplished in the presence of, or with the express permission of, the appropriate shore supervisory personnel.

For reasons of safety, only appropriate and approved equipment should be used. Local jurisdictional regulations regarding loading and unloading also must be followed.

Chapter 17—Marine Measurement

Section 1—Guidelines for Marine Cargo Inspection

1 Scope

These guidelines specify the policy and minimum recommended practices for the manual and automatic measurement, sampling, and accounting for bulk quantities of crude oil (including spiked, blended, and reconstituted crude oil), petroleum products and chemicals that are transported on marine vessels. The activities described in these guidelines include actions by producers, buyers, sellers, terminal operators, vessel owners and their crews, customs authorities, independent inspectors, and other parties with an interest in measurements.

Certain vessel or terminal configurations and cargo characteristics, particularly chemicals, may require extensive procedures and calculation methods not covered in this chapter.

Cargo calculations should be performed independently by the responsible parties and/or by their authorized representatives. The results of the quality determinations and quantity calculations should be compared and any differences resolved without delay. Each party involved in a custody transfer is responsible within his domain for contributing to a reconciliation of vessel and shore quantities and for seeking explanations for any discrepancies.

Any discrepancies relating to quality determination and/or calculated quantities should be recorded and reported to all interested parties. This procedure may be accomplished by issuance of a Letter of Protest or Notice of Apparent Discrepancy. Every effort should be made to resolve discrepancies before the vessel departs.

The independent inspection report for the cargo custody transfer should be issued and distributed promptly.

These procedures are equally valid and applicable for either metric or customary units of measurement, provided that the same types of units are used consistently.

2 Normative References

The following documents are referenced in the text of this chapter.

API MPMS Chapter 1, *Vocabulary*

API MPMS Chapter 2, *Tank Calibration*

API MPMS Chapter 3, *Tank Gauging*

API MPMS Chapter 4, *Proving Systems*

API MPMS Chapter 5, *Metering*

API MPMS Chapter 6, *Metering Assemblies*

API MPMS Chapter 7, *Temperature Determination*

API MPMS Chapter 8, *Sampling*

API MPMS Chapter 9, *Density Determination*

API MPMS Chapter 10, *Sediment and Water*

API MPMS Chapter 11.1, *Volume Correction Factors*

API MPMS Chapter 12.1, *Calculation of Static Petroleum Quantities*

API MPMS Chapter 12.2, *Calculation of Liquid Petroleum Quantities Measured by Turbine or Displacement Meters*

API MPMS Chapter 17.2, *Measurement of Cargoes On Board Tank Vessels*

API MPMS Chapter 17.3, *Guidelines for Identification of the Source of Free Water Associated with Marine Petroleum Cargo Movements*

API MPMS Chapter 17.4, *Method for the Quantification of Small Volumes on Marine Vessels (OBQ/ROB)*

API MPMS Chapter 17.5, *Guidelines for Cargo Analysis and Reconciliation*

API MPMS Chapter 17.6, *Guidelines for Determining the Fullness of Pipelines Between Vessels and Shore Tanks*

API MPMS Chapter 17.8, *Guidelines for Pre-loading Inspection of Marine Vessel Cargo Tanks*

API MPMS Chapter 17.9, *Vessel Experience Factor (VEF)*

API RP 2003, *Protection Against Ignitions Arising Out of Static, Lightning, and Stray Currents*

API Publ 2026, *Safe Access/Egress Involving Floating Roofs of Storage Tanks in Petroleum Service*

API Publ 2217, *Guidelines for Confined Space Work in the Petroleum Industry* (out-of-print)

IMO ¹, *International Safety Guide for Oil Tankers and Terminals*

OCIFM ², *Inert Flue Gas Safety Guide*

3 Terms and Definitions

The following terms are used throughout API MPMS Ch.17:

3.1

API gravity

A means used by the petroleum industry to express the density of petroleum liquids. API gravity is measured by a hydrometer instrument having a scale graduated in degrees API. The relation between API gravity and relative density (formerly called specific gravity):

$$\text{API Gravity at } 60^{\circ}\text{F} = \frac{141.5}{\text{Relative Density } 60^{\circ}\text{F}/60^{\circ}\text{F}} - 131.5$$

3.2

automatic sampler

A device used to extract a representative sample from the liquid flowing in a pipe. The automatic sampler generally consists of a probe, a sample extractor, a flow meter, a controller, and a sample receiver.

3.3

ballast

The water that is taken on when a vessel is empty or partly loaded to increase draft to properly submerge the propeller and maintain stability and trim.

¹ International Maritime Organization, 4 Albert Embankment, London SE17SR, United Kingdom, www.imo.org.

² Oil Companies International Marine Forum, 27 Queen Anne's Gate, London, SW1H 9BU, England, www.ocimf.com.

3.4**Cargo Quantity Option Certificate**

A certificate signed by vessel and shore representatives acknowledging the amount of cargo intended to load. Generally, most product cargoes have a tolerance based on either supplier, receiver, or vessel capabilities. Each party involved with the loading shall agree to the quantity to be loaded.

3.5**crude oil washing**

See **tank washing**.

3.6**draft**

The depth of a vessel below the water line measured from the surface of the water to the bottom of the vessel's keel.

3.7**free water****FW**

The volume of water present in a container that is not in suspension in the contained liquid (oil). (See the definition of S&W.)

3.8**gross observed volume****GOV**

See **volumes**.

3.9**gross standard volume****GSV**

See **volumes**.

3.10**gross standard weight****GSW**

The total weight of all petroleum liquids and S&W (if any), excluding FW, as determined by applying the appropriate weight conversion factors to the GSV.

3.11**indicated volume**

See **volumes**.

3.12**inerting**

A procedure used to reduce the oxygen content of a vessel's cargo spaces by introducing an inert gas such as nitrogen or carbon dioxide or a mixture of gases such as processed flue gas.

3.13**innage gauge [dip (sounding)]**

The measured distance from the surface of the liquid to a fixed datum plate or to the tank bottom.

3.14**Letter of Protest or a Notice of Apparent Discrepancy**

A letter issued by any participant in a custody transfer citing any condition in dispute. This serves as a written record that the particular action or finding was questioned at the time of occurrence.

3.15**line fullness verification**

The activity of verifying the fill condition of the shore and vessel cargo transfer lines before and after a cargo transfer (see API MPMS Ch. 17.6).

3.16**list**

The leaning or inclination of a vessel, expressed in degrees port or starboard away from the vertical.

3.17**list correction**

The correction applied to the observed gauge or observed volume when a vessel is listing, provided that liquid is in contact with all bulkheads in the tank. Correction for list may be made by reference to the vessel's list correction tables for each tank or by mathematical calculations.

3.18**load on top**

Defined as both a procedure and a practice.

3.19**practice**

Load on top is the act of commingling on board quantity with cargo being loaded.

3.20**procedure**

Load on top is the shipboard procedure of collecting and settling water and oil mixtures, resulting from ballasting and tank cleaning operations (usually in a special slop tank or tanks), and subsequently loading cargo on top of slops and pumping the mixture ashore at the discharge port.

3.21**net standard volume****NSV**

See **volumes**.

3.22**net standard weight****NSW**

The total weight of all petroleum liquids, excluding S&W and FW, determined by deducting the S&W weight from the GSW.

3.23**observed reference height**

The distance actually measured from the tank bottom or datum plate to the established reference point.

3.24**on-board quantity****OBQ**

See **volumes**.

3.25**reference height**

The distance from the tank bottom or datum plate to the established reference point or mark.

3.26**reference point**

The point from which the reference height is determined and from which the ullage/innages are taken.

3.27**remaining on board****ROB**

See **volumes**.

3.28**sediment and water****S&W**

The non-hydrocarbon solid material and water in suspension in petroleum liquid. S&W is measured by the techniques described in API *MPMS* Ch. 10.1, Ch. 10.2, Ch. 10.3, Ch. 10.4, Ch. 10.5, Ch. 10.6, Ch. 10.7, Ch. 10.8 and Ch. 10.9.

3.29**slops**

Oil, oil/water/sediment, and emulsions contained in slop tanks or designated cargo tanks. The mixture usually results from tank stripping, tank washing, or dirty ballast phase separation.

3.30**stop gauge**

A pre-transfer determination of a specific volume of cargo represented by a specific tank level, which, when reached, results in cargo completion of the transfer. This determination may be done by either shore or vessel personnel.

3.31**tank washing**

Divided into the following two types of activities.

- a) Water washing involves the use of a high-pressure water stream to dislodge clingage and sediment from the bulkheads, bottom, and internal tank structures of a vessel.
- b) Crude oil washing involves the use of a high-pressure stream of the crude oil cargo to dislodge or dissolve clingage and sediment from the bulkheads, bottom, and internal tank structures of a vessel during the discharge operation.

NOTE Regulatory agencies require the vessel's tanks to be inerted during this tank cleaning method.

3.32**total calculated volume****TCV**

See **volumes**.

3.33**total observed volume****TOV**

See **volumes**.

3.34**trim**

The condition of a vessel with reference to its longitudinal position in the water. It is the difference between forward and aft drafts and is expressed "by the head" or "by the stern."

3.35**trim correction**

The correction applied to the observed gauge or observed volume when a vessel is not on an even keel, provided that the liquid is in contact with all bulkheads in the tank. Correction for trim may be made by referencing trim tables for each tank or by mathematical calculation.

3.36**ullage gauge (or outage)**

The measured distance from the cargo liquid surface to the reference point.

3.37**vessel experience factor****VEF**

A compilation of the history of the TCV vessel measurements, adjusted for OBQ or ROB, compared with the TCV shore measurements. (See API *MPMS* Ch. 17.9/IP HM 49 for details.)

3.38**volumes**

Defined as follows:

— **gross observed volume**

GOV

The total volume of all petroleum liquids and S&W, excluding FW, at observed temperature and pressure.

— **gross standard volume**

GSV

The total volume of all petroleum liquids and S&W, excluding FW, corrected by the appropriate volume correction factor (*Ctl*) for the observed temperature and API gravity, relative density, or density to a standard temperature such as 60 °F or 15 °C. If applicable, correct with pressure correction factor (*Cpl*) and meter factor.

— **indicated volume**

The change in meter reading that occurs during a receipt or delivery.

— **net standard volume**

NSV

The total volume of all petroleum liquids, excluding S&W and FW, corrected by the appropriate volume correction factor (*Ctl*) for the observed temperature and API gravity, relative density, or density to a standard temperature such as 60 °F or 15 °C. If applicable, correct with pressure correction factor (*Cpl*) and meter factor.

— **on-board quantity**

OBQ

The material present in vessel's cargo tanks, void spaces, and pipelines before the vessel is loaded. OBQ may include any combination of water, oil, slops, oil residue, oil/ water emulsions, and sediment.

— **remaining on board**

ROB

The material remaining in a vessel's cargo tanks, void spaces, and pipelines after the cargo is discharged. ROB quantity may include any combination of water, oil, slops, oil residue, oil/ water emulsions, and sediment.

— **total calculated volume**

TCV

The total volume of all petroleum liquids and S&W, corrected by the appropriate volume correction factor (*Ctl*) for the observed temperature and API gravity, relative density, or density to a standard temperature such as 60 °F or 15 °C. If applicable, correct with pressure correction factor (*Cpl*) and meter factor and all FW measured at observed temperature and pressure (GSV plus FW).

— **total observed volume**

TOV

The total measured volume of all petroleum liquids, S&W, and FW at observed temperature and pressure.

NOTE Where the terms 60 °F and 15 °C are used, this does not indicate that the terms are equal.

3.39**wall wash test**

The procedure for washing selected areas such as the interior bulkheads, tank bottoms, and sumps of cargo tanks with an appropriate medium and testing the wash liquid for the presence of material which might contaminate cargo to be loaded (see API *MPMS* Ch. 17.8).

3.40**water cut measurement**

The procedure for locating the oil/water interface for the purpose of determining the volume of FW in a shore tank or vessel compartment. It is also used to refer to the line of demarcation of the oil/water interface.

3.41**wedge formula**

A mathematical means to approximate small quantities of liquid and solid cargo and FW on board prior to loading and after discharge, based on cargo compartment dimensions and vessel trim. The wedge formula is to be used only when the liquid does not touch all the bulkheads of the vessel's tank.

3.42**wedge table**

A pre-calculated vessel table based on the wedge principle and displayed much like the vessel's usual innage/ullage tables. These tables, however, are for small quantities (OBQ, ROB) when the cargo or FW does not touch all the bulkheads of the vessel's tank.

3.43**wipe test**

The procedure of physically wiping random interior areas and steam coils of the vessel's tanks with absorbent white rags. This procedure is used to test the tank's coating for possible color contamination.

4 Recommended Documentation

These guidelines provide for collecting data in a uniform manner. It is required that the data collected be recorded in a permanent record, at the time when the procedures are being performed. The data thus gathered should then be reported in a clear, understandable format, as illustrated in the sample forms presented in Annex A of this chapter.

5 General Information

Gauging may be performed manually or by automatic systems, in accordance with procedures appropriate to the type of vessel, cargo and location (see API *MPMS* Ch. 3 and API *MPMS* Ch. 17.2).

All responsible parties should be informed if any of the gauging equipment or tank or meter facilities have a known bias. Documentation of these deviations should be available for inspection by all responsible parties and must be used in preparing volume reconciliation. Possibilities for known bias error includes but are not limited to water, snow, ice, or debris on floating-roof tanks.

The procedures described in this publication should be performed by properly trained personnel. If the procedures cannot be performed for any reason (such as safety, environmental, or physical constraints; governmental restrictions; conflicts with contractual agreements; or other problems), the inspection report should include a complete, detailed explanation. Measurement personnel are responsible for ensuring the use of proper safety, measurement, and sampling equipment.

The vessel's master and/or designated representative, the shore supervisory personnel and the measurement personnel conducting the inspection should be familiar with the scope of the cargo inspection procedures and aware of the safety procedures unique to the product being transferred.

If simultaneous ballasting or deballasting must be performed during cargo operations, record this fact and the reasons for it in the inspection report and comment on the degree of segregation that was maintained during the operation.

Petroleum products and chemicals require stringent quality control during loading, transport and discharge operations. Vessels designated to carry these products should meet compatibility criteria. They should also be inspected for cleanliness prior to loading so that the shipment will not be contaminated (see API *MPMS* Ch. 17.8). If

there is any question concerning compatibility or contamination, all interested parties should be notified and the questions resolved prior to commencement of loading.

6 Safety and Health Considerations

6.1 General

Due consideration must always be given to applicable safety and health procedures. Considerations should include, but are not limited to, possible electrostatic hazards (see API 2003) and other fire and explosion hazards, potential dangers to personnel (e.g., exposure limits, hazard communication, training, and various protective clothing and equipment requirements and work practices), and potential explosive and toxic hazards associated with a cargo tank's environment. The physical characteristics of the cargo and existing operational conditions should be evaluated carefully, and applicable international, federal, state, and local regulations should be strictly observed. Safety procedures designated by the employer, the vessel's operator, and other concerned parties also must be observed. *The International Safety Guide for Oil Tankers and Terminals* and appropriate Oil Companies International Marine Forum (OCIMF), International Maritime Organization (IMO) and API publications should be consulted for additional safety information.

It should be noted that while many chemicals have characteristics similar to other petroleum liquid cargoes and thus require no special consideration, many do pose a potential safety threat to personnel, the environment and the vessels carrying them. Accordingly, all special precautions and measurement methods required by the shipper, supplier or any other relevant regulatory authorities should be understood and observed when handling these cargoes.

Petroleum vapors and associated substances—including hydrogen sulfide vapors from “sour” crude—also may involve potential toxicity. Petroleum vapors with high concentrations of hydrogen sulfide may cause unconsciousness or death. During and after the opening of the gauge hatch, all personnel should stand far enough away to minimize the inhalation of vapor.

Since toxic vapors or oxygen deficiency cannot be detected safely by smell, visual inspection, or judgment, appropriate precautions should be taken to ensure protection. Provisions should be made for appropriate exposure monitoring, protective equipment for personnel, and emergency rescue procedures. When it is necessary, personnel should have suitable respiratory protection prior to entering the gauge site and during the gauging procedure.

6.2 Physical Characteristics and Fire Considerations

Personnel who handle petroleum-related substances, as well as other chemical materials, should be familiar with their physical and chemical characteristics—including potential for fire, explosion and reactivity—and with potential toxicity and health hazards and emergency procedures. Personnel should be alert to avoid potential sources of ignition and should keep containers of materials closed when not in use.

API 2217 and API 2026 and any applicable regulations should be consulted when sampling requires entry into confined spaces.

Information regarding particular materials and conditions should be obtained from the employer, the manufacturer, or the supplier of that material or from the material safety data sheet.

7 Before Loading

7.1 Key Meeting

7.1.1 General

Before loading begins, one or more meetings should be held among cargo inspectors, vessel representatives, and shore operational personnel who are involved in the loading operation. At these meetings, key operational people are identified, responsibilities are defined, communication procedures are arranged, and everyone concerned reviews loading procedures and plans to ensure a full understanding of all activities.

- All parties should agree on the cargo's quality specification and quantity (see Cargo Quantity Options Certificate).
- An agreement should be reached on whether shore or ship personnel will terminate the loading.
- Check with the vessel's representative for reports of any unusual events that may have occurred during the sea passage or at the previous port and that may require special vigilance during loading.
- The vessel's representative should confirm the vessel's ability to heat the cargo as instructed.
- Check with shore personnel to agree on procedures for handling any special conditions that exist on shore that may adversely affect the loading activity or measurements.
- A Letter of Protest should be issued to any party failing to comply with recommended procedures.
- Agreement should be reached on the method to be used to determine line fullness (see API *MPMS* Ch. 17.6).
- Determine which vessel tanks will be loaded, the capacity of the tanks, the condition of the lines, the nature of the vessel's last three cargoes, and the method of cleaning the cargo tanks (see API *MPMS* Ch. 17.8).
- If "first-foot" samples are required, a decision on the tanks to be used for such samples and the quantity of cargo to be loaded for the sampling should be made.

On multi-grade vessels, it may be necessary to load the vessel's tanks in a certain order to avoid contamination and to comply with vessel operational requirements. This should be discussed and the order by grade and/or product should be agreed upon before loading operations begin.

NOTE Contamination may result in an unsafe condition for the terminal and/or the vessel.

The suggested inspection checklist (see Annex A) or a similar document should be used.

7.1.2 Blending

If blending aboard the vessel is involved, it is critical that all volumes loaded are consistent with the proportional hand-blend before loading. If the material contained in shorelines is to be loaded as part of the blend, a line sample should be taken and tested.

To aid blending, the heaviest component may be loaded first, followed by the lighter components. The volume should be gauged after each component is loaded. The contents of the shoreline, the vessel's previous cargo and any OBQ should be taken into consideration for their effect on the blending operation. Blends may require adjustment to maintain the mutually agreed upon blend specifications.

NOTE Due to incomplete mixing, sampling limitations and other operational restrictions, vessel tank samples often will not be representative of proportional hand-blends tested at the port of loading.

7.2 Shore Inspection

7.2.1 Shore Lines and Tanks

Determine the nature and quantities of material in the shorelines up to the vessel's flange. When line contents are questionable or when the possibility of cargo contamination exists, line samples should be tested to verify compatibility with the cargo that will be loaded. Alternatively, shoreline contents may be loaded into one cargo compartment on the vessel, gauged, sampled, and tested.

Note: Line samples may not be representative due to sample location limitations.

Determine the shore line fill condition (see API *MPMS* Ch. 17.6). Report the condition and the method used. Additionally, record and report the total capacity of the shorelines used.

It is the terminal's responsibility to ensure that all lines and valves are set in the correct position for the operation. When practical, these settings should be confirmed by the inspector and valves sealed when appropriate.

When non-dedicated loading lines are used, consider loading sequences of products flowing through the lines in order to minimize the potential for contamination caused by line-contents displacement. This determination should include an agreement on how the lines will be displaced and/or how the different product interfaces will be handled.

Product to be loaded must meet the quality specifications of agreements. Sampling and laboratory analysis shall be used to ensure that quality specifications are met (see 7.2.4, 12.4).

If the cargo to be loaded requires heat, report whether the shore lines are insulated and the line temperature should be obtained whenever possible and recorded.

7.2.2 Shore Tank Gauges

7.2.2.1 Manual Gauges

Record the reference height from the tank capacity tables before gauges and water cuts are taken. Take opening gauges, temperatures, samples, and water measurements of each tank to be used in the loading. Any difference between the observed reference height and the reference height shown on the tank capacity tables should be noted and investigated (see API *MPMS* Ch. 17.2, B.3).

All gauges should be recorded only after securing three consecutive readings to be within a range of 3 mm ($\frac{1}{8}$ in.). If two of the three consecutive readings are identical, this reading shall be reported; to the nearest 1 mm if metric gauge tapes are used or to the nearest $\frac{1}{8}$ in. if customary gauge tapes are used. If all three readings are used, they should be averaged. If the tank contents are determined to be in motion and waiting for equilibrium is not possible, the tank measurements should be recorded and all parties advised. If the situation cannot be resolved, a Letter of Protest should be issued. Record the automatic gauges for purposes of comparison (see API *MPMS* Ch. 3.1A).

In the case of tanks with floating roofs, gauging should be avoided while the roof is in the critical zone. The placement of roof legs in high or low position and the critical zone should be recorded.

The heavy nature of some products may require that an outage measurement be taken. Products with densities heavier than water may need to be water cut on top of the product.

Any incrustation that forms on top of the product may produce inaccuracies in measurement. If this condition exists, all parties should be notified and the condition should be recorded.

7.2.2.2 Automatic Gauges

Automatic gauging systems with accuracy and/or measurement tolerances consistent with API *MPMS* Ch. 3.1B may be used for custody transfer by mutual agreement among the interested parties

If an automatic tank gauging system is used and the readings are not verified by manual measurements, record in the inspection report the last two times that the automatic system and the manual measurements were compared. Record on the inspection report that automatic gauges were used.

7.2.3 Shore Tank Temperatures

Temperature determination of cargoes in a shore tank is critical to the custody transfer process. At the time of gauging, therefore, temperatures should be carefully taken (see API *MPMS* Ch. 7). Heavy cargoes, heated cargoes, blended cargoes, and cargoes in unheated tanks in very cold weather may tend to have temperature stratification within each tank. When this situation is determined, extra temperature measurements should be taken. On high-heat cargoes such as asphalt, it may be impossible to obtain representative temperatures with the use of cupcase or Portable Electronic Thermometers; it may be necessary to use permanently installed temperature measuring devices. The use of a permanently installed measuring device should be noted in the report, along with when and how the device's accuracy was verified.

CAUTION — Temperatures taken at or near heating elements may distort temperature profiles.

7.2.3.1 Portable Electronic Thermometer

The Portable Electronic Thermometer (PET) is the preferred equipment for obtaining temperatures.

The PET should have a calibrated range of accuracy that meets the desired temperature range of the material from which a temperature is to be taken. For example, a PET with a calibrated microchip accurate to 300 °F/149 °C is not acceptable for asphalt products that are stored at 350 °F/177 °C (see API *MPMS* Ch. 7).

7.2.3.2 Mercury-in-Glass Thermometer

Thermometers must remain in the liquid long enough to reach the temperature of the liquid that is being measured (see API *MPMS* Ch. 7). With regard to liquids in which temperature stratification may occur, the time constraints involved in using a mercury-in-glass thermometer to profile a tank may necessitate the use of a PET.

7.2.3.3 Dynamic Temperature Measurement

If a temperature probe in the shore line is used to determine the temperature for the correction of metered quantity loaded, verify and record in the inspection report the last two times that the probe was checked for accuracy (see API *MPMS* Ch. 5 and API *MPMS* Ch. 7).

7.2.3.4 Automatic Temperature System

Automatic temperature systems with accuracy and/or measurement tolerances consistent with API *MPMS* Ch. 7 may be used for custody transfer by mutual agreement among the interested parties.

If an automatic temperature system is used and the readings are not verified by manual measurements, record in the inspection report the last two times that the automatic system and the manual measurements were compared, and if any differences were noted. Record on the inspection report that automatic temperatures were used.

7.2.4 Sampling

Promptly label each sample with the appropriate tank number and other pertinent data. If appropriate, seal the container and record the seal numbers.

7.2.4.1 Manual Tank Sampling

The objective of manual sampling is to obtain a small portion (spot sample) of material from a selected area within a container that is representative of the material in the area, or in the case of running or all-levels samples, a sample whose composition is representative of the total material in the container. A series of spot samples may be combined to create a representative sample.

Each shore tank to be used in the loading should be sampled in sufficient quantity to meet the requirements of interested parties and regulatory agencies. Sample containers must be clean and, in the case of petroleum products, should be flushed with product prior to drawing the sample. Sample containers must meet the requirements of API *MPMS* Ch. 8. Containers that are used for transport and storage of samples must meet appropriate regulatory requirements.

When non-homogeneous products are sampled, upper, middle and lower spot samples are usually obtained. If stratification is suspected, it is strongly recommended that samples at additional levels should be taken. If only part of the product in the tank will be used for the loading, then loading zone samples may be taken from that part of the tank that is involved in the transfer.

All concerned parties should be notified if the material is deemed to be stratified, and each party should agree on further actions before proceeding.

Specify in the inspection report the tank locations and methods used to obtain samples. The inspection report should also state whether the tank was equipped with mixers, a circulating system, or aerators and should note the extent of mixing that was performed on the tank.

7.2.4.2 Automatic Sampling

Automatic sampling is the preferred method of sampling a marine cargo transfer. If an automatic sampling system is installed, it should be proved and operated in conformance with API *MPMS* Ch. 8.2. If an automatic sampler is used, it must be properly set up and clean in preparation for taking a sample, and a visual inspection of the sample container must be made. Ensure that the grab rate is correct to collect a sufficient sample to meet requirements without overfilling the container. On at least three occasions during the transfer, observe by non-intrusive means whether the sampler is operating. Observe and note the starting time for the sampler and the amount of oil in the sample receiver at the halfway point during loading and near the completion of loading. Indicate whether the automatic sampler used was flow-proportional or time proportional. Any deficiencies should be reported.

7.2.5 Meters

Terminal operators are responsible for the operation of their meters and meter provers. They are expected to make available appropriate meter proving data to measurement personnel. Meter measurement tickets should be provided for each custody transfer and should include the information required in API *MPMS* Ch. 12.2. Terminal operators or inspectors who are aware of meter difficulties that could affect accuracy should report the problem immediately to all parties involved in the custody transfer. The incident and the resolution must be recorded in the inspection report.

Prior to loading, record the opening meter readings. It is recommended that meters be proved during loading in accordance with API *MPMS* Ch. 4, API *MPMS* Ch. 5 and API *MPMS* Ch. 12.2; and reported.

If manual and/or automatic shore tank measurements are taken, show a comparison with metered volumes. If volumes cannot be reconciled, recheck meter factors, shore tank measurements, and calculations. Report all results in the inspection report.

7.3 Vessel Inspection

7.3.1 VEF

Data on previous voyages must be obtained for use in calculating the VEF. (See API/EI Procedure for Calculating VEFs in API *MPMS* Ch. 17.9/IP HM 49.) Record any comments about previous vessel/shore comparisons contained in the vessel's records. The VEF may be used for volume reconciliation.

7.3.2 Draft, Trim, and List

Record the draft, trim, and list. When barges have no list or trim correction tables, refer to API *MPMS* Ch. 12.1.1.

7.3.3 Remaining Ballast

For most cargoes, there should be no ballast remaining in the cargo tanks, lines, or pumps. Any ballast on board should be totally segregated. Measure and record the quantity of any ballast left on board prior to loading. Record the presence of and sample any measurable petroleum in ballast tanks. If simultaneous deballasting must be performed during loading operations, determine the reason from the vessel's representative and record it on the inspection report. Indicate single/double valve separations, if any, between clean/dirty ballast and cargo systems.

7.3.4 Vessel Lines and Tanks

All vessel tanks, including cargo, ballast, and cofferdams, should be inspected prior to loading.

Before measuring the vessel, request that the vessel lines be drained. Caution should be exercised on multigrade cargoes in order to avoid commingling the line contents of different products. Measure the amount of cargo or ballast water dropped into the tank and sample it if a sufficient quantity exists. In addition, record the capacity of the lines that were drained. Report the transfer of any engine-room slops or other liquid into the cargo or slop tanks.

If the previous cargo poses a contamination problem, all lines and pumps should be cleaned thoroughly and drained. Note on the inspection report how cleaning and draining was accomplished.

When the vessel is inspected for tank acceptability prior to loading, tank inspection should be performed in accordance with API *MPMS* Ch. 17.8.

7.3.5 OBQ Measurement

Obtain and record reference heights from the calibration tables prior to taking opening gauges and water cuts. Record the observed gauge heights; and, investigate and report any discrepancies. Determine the amount and nature of any material on board (OBQ) prior to loading, including all in-transit cargo and material in non-designated cargo spaces (refer to API *MPMS* Ch. 17.2). Describe and report the OBQ and/or FW (see 7.3.8 for slop tanks).

7.3.6 OBQ Volume Calculation

The OBQ/ROB Report is to be completed prior to loading. Determine the OBQ as specified in API *MPMS* Ch. 17.4.

- a) For liquid material and water, use a wedge formula if the liquid does not touch all the bulkheads of the vessel's compartments. Use trim/list corrections if the liquid is in contact with all bulkheads in the compartment.

- b) For non-liquid material, multipoint gauging is recommended to determine if a wedge condition exists. Since the wedge formula uses a trim factor to determine the quantity, an accurate calculation will not be possible without knowing the trim of the vessel at the time the material solidified. If the material measured is not a wedge, the average of the multiple readings should be used for volume determination. However, if only one gauge point is available, the material shall be assumed to be evenly distributed over the tank bottom.

NOTE For additional information refer to API *MPMS* Ch. 17.4.

7.3.7 OBQ Sampling

When OBQ is accessible, samples shall be obtained from all compartments containing liquid volume. An attempt should also be made to sample non liquid volumes. Samples taken should be in sufficient quantity to permit any required analysis. Samples shall be taken in accordance with API *MPMS* Ch. 8.

7.3.8 Slop Tanks

Measure the contents of slop tanks to determine the interface and the separate quantities of FW and slop oil. Take the temperature of and sample the oily layer. Take a separate sample of the water layer. Determine the API gravity and the S&W content of the oily layer sample and record the results. Compute the quantities; if any slops are to be commingled with the subsequent cargo, they are to be treated as OBQ and recorded appropriately.

7.3.9 OBQ Temperatures

Temperatures shall be obtained, recorded and used for cargo volume correction whenever depth of material is sufficient and the nature of the material permits. If the temperature cannot be measured, the GOV shall be reported as GSV.

Temperature measurements shall be obtained in accordance with API *MPMS* Ch. 7 and API *MPMS* Ch. 17.2.

7.3.10 Sea Valves

Confirm in the presence of the vessel's personnel that sea valves and overboard discharge valves are in the closed position and sealed before loading commences. Seal valves to the extent possible, so as to be able to determine whether they were used during loading. Record the seal numbers.

7.3.11 Load On Top

If a load-on-top procedure is followed, fill out a Load-on-Top Report.

7.3.12 Bunker Inspection

A bunker inspection should be performed before and after loading, as required. If the vessel intends to bunker during loading, GOVs should be compared with bunker receiving documents and with normal consumption rates. Bunker samples should be taken and tested on request. On cargo barges, if requested, inspect and report the quantities in the diesel fuel tanks used to fuel the engine-driven pumps.

8 During Loading

8.1 Communications

A reliable means of communication with the shore and between vessels should be arranged. Vessel, shore, or measurement personnel who notice a problem during any stage of the transfer that could affect subsequent events should promptly notify all key personnel so that timely action can be taken. Record these events in the inspection report.

When more than one product and/or grade of product is to be loaded, close communication must be maintained between personnel on shore and on the vessel in order to avoid contamination and off-specification material. This is of special importance when switching from one product and/or grade to another.

8.2 Line Sample

Line samples are normally taken for quality control purposes. For some products, it is necessary to draw a line sample at the commencement of loading. These samples should be taken at, or as close as possible to, the vessel's manifold. Line samples can be inspected visually, or, in the case of products with no obvious signs to observe, prompt laboratory testing for agreed specifications may be required. In any case, these samples should be taken and retained.

8.2.1 First-foot Sample

If a first-foot sample is required, it should be taken when approximately 1 ft (0.3 m) of cargo has been loaded into the tank. A sample is then drawn from the tank. The sample should be examined or tested to determine conformity with cargo specifications. If the sample indicates potential contamination, no additional cargo shall be loaded into the tank until the problem is resolved (reference ISGOTT 20.5.2 and 20.5.3).

8.2.2 Meter Proving

The meter proving should be monitored, as appropriate, in accordance with API *MPMS* Ch. 4, API *MPMS* Ch. 5, and API *MPMS* Ch. 12.2; and, reported.

9 Vessel Inspection After Loading

9.1 Draft, Trim, and List

Verify the draft, trim, and list, and record.

9.2 Vessel Lines

Prior to measuring the vessel, request that the vessel lines be drained. Caution should be exercised on multigrade cargoes in order to avoid commingling the line contents of different products. All internal transfers of cargo should be completed and all tank valves should be secured prior to gauging. Loading lines should be vented prior to gauging. It is common in the case of multigrade petroleum product loadings also to seal the individual tank suction valves.

9.3 Vessel Gauges

Take gauges, water cuts, and temperatures on all cargo compartments at the reference point indicated on the vessel's capacity tables. The report should indicate whether measurements were manual or automatic and whether tanks on the vessel were inerted during gauging.

Inspect for the presence of cargo in non-designated cargo spaces, ballast tanks, cofferdams, and void spaces. If cargo is found, measure it in the same manner as the petroleum in cargo compartments (refer to API *MPMS* Ch. 17.2) and notify all concerned parties.

Observed gauge heights should be recorded and compared to reference gauge heights. Investigate and report any discrepancies. In some instances, it is impossible to determine the observed gauge height, water cut, and innage gauge. The location of the reference gauge point should be noted in the inspection report.

Vessel measurements taken through non-slotted standpipes may be inaccurate as a result of plugging at the base of the pipe, capillary action, or pressure differentials. Additional measurements may be needed from other locations when this condition exists. Note in the report the existence of this condition.

In the case of heavy viscous materials, air and/or inert gases may be entrained in the product. An appropriate settling time should be allowed if possible. If the vessel is gauged immediately after completion of loading, this fact should be noted on the Time Log and in the Ullage Report.

In operations involving lightering, each receiving vessel as well as the delivering vessel should be gauged prior to and upon completion of lightering.

9.4 Water Cut Measurement

Measure the FW during the course of gauging each compartment. Record the type of water-finding paste or device that is used to determine the oil/water interface. Record the interface and any oil emulsion that is detected. If a sufficient quantity of FW is found, take a sample of the water (see API *MPMS* Ch. 17.3).

Products with densities heavier than water may need to be water cut on top of the product. If it proves impossible to take a water-cut measurement, then alternative sampling measures should be taken.

If an increase in FW is detected, a Letter of Protest should be issued to the vessel's representative and to the loading facility, and all interested parties should be notified immediately.

9.5 Vessel Temperature

Individual compartment temperatures on the vessel should be taken concurrent with ullaging. Single or multilevel temperatures may be required. In the case of heated materials upper, middle and lower temperatures should be taken. Additional temperatures may be required as outlined in API *MPMS* Ch. 17.2. Measurements should be averaged to determine the temperature of each compartment. The PET should have a calibrated range of accuracy that meets the desired temperature range of the material to be checked.

CAUTION — Temperatures that are taken at or near heating elements may distort temperature profiles.

9.6 Ballast Tanks

Inspect ballast tanks and record the quantity of ballast on board. Record the presence of and sample any measurable cargo in any ballast tanks if possible. Notify all interested parties and issue a Letter of Protest, as appropriate. Use the Vessel Ullage/Sounding and Capacity Report to record these measurements.

NOTE If simultaneous deballasting was performed during loading operations, determine the reason from the vessel's representative and record it in the inspection report. Indicate single/double valve separations, if any, between the clean/dirty ballast and the cargo system.

9.7 Vessel Sampling

Take samples from each vessel compartment in such a manner that a composite sample, intended to represent the total of each grade of cargo may be prepared for appropriate testing (see API *MPMS* Ch. 8.1). This sample, usually prepared in a laboratory, will be made by combining the vessel's individual tank samples in a ratio approximating the volume of each tank to the total volume of the grade of cargo loaded.

When the existence of stratified material is known or suspected, individual upper, middle, and lower samples may be drawn and analyzed to determine the degree of stratification. All interested parties should be notified accordingly.

NOTE On blended cargoes, due to incomplete mixing, sampling limitations and other operational restrictions, vessel tank samples often will not be representative of proportional hand-blended samples that were tested at the port of loading.

Take samples of slops. Keep these slops samples separate from cargo samples.

In the case of some cargoes, individual tank samples rather than composite samples are required. In these cases it is important that each container be flushed with the product before the sample is drawn in order to ensure the cleanliness of the sample containers. Care must be taken to assure samples are handled in a manner that prevents loss of the light ends. Commingling of samples of different products and/or grades must be avoided (see API *MPMS* Ch. 8).

NOTE Promptly label each sample with the appropriate tank number and other pertinent data.

If the presence of FW is found or suspected, at least one sample should be taken from the compartment floor via a bottom sampler.

NOTE Tin-plated soldered cans are not appropriate containers for FW as they may contaminate the sample.

9.8 Sample Handling

Sufficient samples should be obtained to meet the requirements of interested parties and regulatory agencies. Interested parties generally specify sampling and testing requirements. Identical samples should be provided for the following:

- a) the shore terminal;
- b) the receiving terminal via the vessel master;
- c) the independent inspector;
- d) all other parties designated to receive the samples.

Samples that are placed on board the vessel for delivery to the representative at the discharge port should be sealed and acknowledged with a receipt signed by the vessel's representative. A copy of the signed receipt should be included in the inspection report.

The length of time that samples must be retained should be established in a manner that is consistent with the circumstances, experience, and the policies of the parties involved in the custody transfer.

9.9 Sea Valves

Confirm in the presence of the vessel's personnel that sea valves and overboard discharge valves are closed and that the seals remain intact. If previously sealed valves are not intact, attempt to ascertain why the seals were broken and, if appropriate, notify all interested parties. Record the findings in the inspection report.

9.10 Bunker Inspection

See 7.3.12.

9.11 Volume Calculations

Report both the actual ullage as measured and the ullage corrected for trim and list, include the measurement and quantity of FW, the GOV, and the temperature for each compartment on the vessel. Calculate the GSV for each tank,

using the average temperature for each tank and the supplied density. Do not use an average temperature for the entire vessel. Determine the TCV and subtract the OBQ for a comparison with the shore TCV delivered.

10 Load Port Inspection After Loading

10.1 Shore Lines

Verify that all valves are in the proper position and that seals installed remain intact. Determine the shore-line condition (see API *MPMS* Ch. 17.6). Report the condition and the method used.

Determine the nature and quantities of material in the shore loading lines prior to obtaining the closing tank gauges or meter readings. A sample may be taken from the lines for this purpose. If the line condition after loading differs from the condition before loading, record, and notify all interested parties.

Adjustments to transferred quantities based upon line fullness discrepancies are determined by agreement of the interested parties.

10.2 Tank Measurement

Take closing gauges, temperatures, and water measurements of each tank that is used in the loading operation and record the results.

10.3 Tank Samples

Take representative tank samples if required after loading (see API *MPMS* Ch. 8.1). Specify the tank locations from which samples were obtained.

10.4 Automatic Sampler

If an automatic sampler was used, ascertain that the correct sample volume was obtained (see API *MPMS* Ch. 8.2). Witness the mixing of the contents of the sample receptacle and the withdrawal and, if required, testing of the sample. Report any difficulties that occur with relation to the in-line sampling procedures.

10.5 Meters

Record the closing meter readings and the meter factor used. Obtain a completed copy of all meter proving forms and meter tickets. If the meter or meters were not proved during loading, indicate the frequency of prior meter proving and obtain a copy of prior relevant meter-proving reports.

If manual and/or automatic shore tank measurements were taken, show a comparison between them and the metered volumes. If volumes cannot be reconciled, recheck meter factors, shore tank measurements, and calculations. Report all results in the inspection report.

11 Load Port Reconciliation

11.1 Shore and Vessel Transferred Volume Calculations

See API *MPMS* Ch. 12.

11.2 Load Port Voyage Analysis

Compare the shore's TCV delivered with the vessel's VEF Corrected TCV received. (TCV received equals GSV plus FW minus OBQ.) If the difference is greater than the difference specified by parties to the contract or by stated

policies of those companies, recheck all measurements and calculations in an attempt to identify the discrepancy. If the differences cannot be reconciled, notify the interested parties and issue a Notice of Apparent Discrepancy to vessel and terminal representatives.

11.3 Bill of Lading

When the Bill of Lading and vessel volumes are compared, any discrepancies among the GSV, NSV, density, temperatures, and/or any other specification should be investigated and brought to the attention of the appropriate interested parties.

11.4 Qualitative Testing

The interested parties should specify testing for quality. Report the types of analytical methods (that is, ASTM, ISO, or other industry approved test methods) that are used for testing. Responsibility for testing rests primarily with the designated party. Interested parties or their representatives should be allowed to conduct the same tests on a duplicate sample or, alternatively, to witness the testing that the designated party performs. Any witnessed deviations from the specified testing procedures should be recorded; and, reported to all interested parties.

11.5 Time Log

Report on a Time Log the time and date of the main loading events. Include the time and description of any unusual occurrences in the appropriate column of the Time Log.

11.6 Letter of Protest

If any problems occur that could affect subsequent procedures at any stage of the transfer, all key persons involved should be notified promptly so that corrective action can be taken. Any action or refusal to act contrary to this procedure or specific prior contract agreements must be reported to the persons concerned and may be documented by the issuance of a Letter of Protest.

11.7 Distribution of Documents

Leave a set of all available inspection documents with the vessel and terminal.

12 Before Discharge

12.1 Key Meeting

Before discharge begins, one or more meetings should be held among cargo inspectors, vessel representatives, and shore operation personnel who will be involved in the discharge operation. At these meetings, key operational people are identified, responsibilities are defined, communication procedures are arranged, and everyone concerned reviews discharge procedures and plans to ensure a full understanding of all activities.

Check with the vessel's representative for reports of any unusual events that might have occurred during the sea passage or at the previous port and that may require special vigilance during discharge. Check with shore personnel to ensure that no special conditions exist on shore that may adversely affect the discharge activity or measurements. A Letter of Protest should be issued to any party failing to comply with recommended procedures.

On multigrade vessels, it may be necessary to discharge the vessel in a certain sequence to avoid contamination and to comply with vessel operational requirements. This should be discussed and the sequence of discharge by grade and/or product should be agreed upon prior to discharge.

If any question arises in relation to compatibility or contamination, all interested parties should be notified and the question should be resolved before discharge begins. Contamination may result in an unsafe condition for the terminal and/or vessel.

The suggested inspection checklist (see Annex A) or a similar document should be used.

12.2 Shore Inspection

12.2.1 Shore Lines and Tanks

Determine the nature and quantities of material in the shorelines up to the vessel's flange. When line contents are questionable or when the possibility of cargo contamination exists, line samples should be tested to verify compatibility with the cargo that will be discharged.

NOTE Line samples may not be representative due to sample location limitations.

Determine the shore line fill condition (see API *MPMS* Ch. 17.6). Report the condition and the method used. Additionally, record and report the total capacity of the shore-lines used.

It is the terminal's responsibility to ensure that all lines and valves are set in the correct position for the operation. When practical, the inspector should confirm these settings and valves are sealed when appropriate.

When non-dedicated shorelines are used, consider discharge sequences of products flowing through the lines in order to minimize the potential for contamination caused by line-contents displacement. This determination should include an agreement on how the lines will be displaced and/or how the different product interfaces will be handled.

If the cargo to be discharged requires heat, report whether the shorelines are insulated and/or heated. The line temperature should be obtained whenever possible and recorded.

If the shoreline contains material that requires heat, then it should be noted in the inspection report whether the shorelines are insulated and if they are steam traced, and the line temperature should be recorded.

12.2.2 Shore Tank Gauges

12.2.2.1 Manual Gauges

Record the reference height from the tank calibration tables before gauges and water cuts are taken. Take opening gauges, temperatures, samples, and water measurements of each tank to be used in the discharge. Any difference between the observed reference height and the reference height shown on the tank calibration tables should be noted and investigated (see API *MPMS* Ch. 17.2).

All gauges should be recorded only after securing three consecutive readings to be within a range of 3 mm ($1/8$ in.). If two of the three consecutive readings are identical, this reading shall be reported; to the nearest 1 mm if metric gauge tapes are used or to the nearest $1/8$ in. if customary gauge tapes are used. If all three readings are used, they should be averaged. If the tank contents are determined to be in motion and waiting for equilibrium is not possible, the tank measurements should be recorded and all parties advised. If the situation cannot be resolved, a Letter of Protest should be issued. Record the automatic gauges for purposes of comparison.

In the case of tanks with floating roofs, gauging should be avoided while the roof is in the critical zone. The placement of roof legs in high or low position and the critical zone should be recorded.

The heavy nature of some products may require that an outage measurement be taken. Products with densities heavier than water may need to be water cut on top of the product.

Any incrustation that forms on top of the product may produce inaccuracies in measurement. If this condition exists, all parties should be notified and the condition should be recorded.

12.2.2.2 Automatic Gauges

Automatic gauging systems with accuracy and/or measurement tolerances consistent with API *MPMS* Ch. 3.1B may be used for custody transfer by mutual agreement among the interested parties.

If an automatic tank gauging system is used and the readings are not verified by manual measurements, record in the inspection report the last two times that the automatic system and the manual measurements were compared, and if any differences were noted. Record on the inspection report that automatic gauges were used.

12.3 Shore Tank Temperatures

Temperature determination of cargoes in a shore tank is critical to the custody transfer process. At the time of gauging, therefore, temperatures should be carefully taken (see API *MPMS* Ch. 7). Heavy cargoes, heated cargoes, blended cargoes, and cargoes in unheated tanks in very cold weather may tend to have temperature stratification within each tank. When this situation is determined, extra temperature measurements should be taken. On high-heat cargoes such as asphalt, it may be impossible to obtain representative temperatures with the use of cupcase or PETs; it may be necessary to use permanently installed temperature measuring devices. The use of a permanently installed measuring device should be noted in the report, along with when and how the device's accuracy was verified.

CAUTION — Temperatures taken at or near heating elements may distort temperature profiles.

12.3.1 Portable Electronic Thermometer

The PET is the preferred equipment for obtaining temperatures.

The PET should have a calibrated range of accuracy that meets the desired temperature range of the material from which a temperature is to be taken. For example, a PET with a calibrated microchip accurate to 300 °F/149 °C is not acceptable for asphalt products that are stored at 350 °F/177 °C (see API *MPMS* Ch. 7).

12.3.2 Mercury-in-Glass Thermometer

Thermometers must remain in the liquid long enough to reach the temperature of the liquid that is being measured (see API *MPMS* Ch. 7). With regard to liquids in which temperature stratification may occur, the time constraints involved in using a mercury-in-glass thermometer to profile a tank may necessitate the use of a PET.

12.3.3 Dynamic Temperature Measurement

If a temperature probe in the shore line is used to determine the temperature for the correction of metered quantity loaded, verify and record in the inspection report the last two times that the probe was checked for accuracy (refer to API *MPMS* Ch. 5 and API *MPMS* Ch. 7).

12.3.4 Automatic Temperature System

Automatic temperature systems with accuracy and/or measurement tolerances consistent with API *MPMS* Ch. 7 may be used for custody transfer by mutual agreement among the interested parties.

If an automatic temperature system is used and the readings are not verified by manual measurements, record in the inspection report the last two times that the automatic system and the manual measurements were compared, and if any differences were noted. Record on the inspection report that automatic temperatures were used.

12.4 Sampling

All samples taken must be properly labeled and, if appropriate, sealed. The seal numbers must be recorded.

12.4.1 Tank Samples

Each shore tank to be used in the discharge should be sampled in sufficient quantity to meet the requirements of interested parties and regulatory agencies. Sample containers must be clean and, in the case of petroleum products, should be flushed with product prior to drawing the sample. Sample containers must meet the requirements of API *MPMS* Ch. 8. Containers that are used for transport and storage of samples must meet appropriate regulatory requirements.

When non-homogeneous products are sampled, upper, middle and lower spot samples are usually obtained. If stratification is suspected, it is strongly recommended that samples at additional levels should be taken.

Specify in the inspection report the tank locations and methods used to obtain samples. The inspection report should also state whether the tank was equipped with mixers, a circulating system, or aerators and should note the extent of mixing that was performed on the tank.

12.4.2 Automatic Sampling

Automatic sampling is the preferred method of sampling a marine cargo transfer. If an automatic sampling system is installed, it should be proved and operated in conformance with API *MPMS* Ch. 8.2. If an automatic sampler is used, it must be properly set up and clean in preparation for taking a sample, and a visual inspection of the sample container must be made. Ensure that the grab rate is correct to collect a sufficient sample to meet requirements without overfilling the container. On at least three occasions during the transfer, observe by non-intrusive means whether the sampler is operating. Observe and note the starting time for the sampler and the amount of oil in the sample receiver at the halfway point during discharge and near the completion of discharge. Indicate whether the automatic sampler used was flow-proportional or time proportional. Any deficiencies should be reported.

12.5 Meters

Terminal operators are responsible for the operation of their meters and meter provers. They are expected to make available appropriate meter proving data to measurement personnel. Meter measurement tickets should be provided for each custody transfer and should include the information required in API *MPMS* Ch. 4, API *MPMS* Ch. 5 and API *MPMS* Ch. 12.2. Terminal operators or inspectors who are aware of meter difficulties that could affect accuracy should report the problem immediately to all parties involved in the custody transfer. The incident and the resolution must be recorded in the inspection report.

Prior to discharge, record the opening meter readings. It is recommended that meters be proved during discharge in accordance with API *MPMS* Ch. 4, API *MPMS* Ch. 5 and API *MPMS* Ch. 12.2; and reported.

If manual and/or automatic shore tank measurements are taken, show a comparison with metered volumes. If volumes cannot be reconciled, recheck meter factors, shore tank measurements, and calculations. Report all results in the inspection report.

12.6 Vessel Inspection

12.6.1 VEF

Data on previous voyages must be obtained for use in calculating the VEF. (See API/EI Procedure for Calculating VEFs in API *MPMS* Ch. 17.9/EI HM 49.) Record any comments about previous vessel/shore comparisons contained in the vessel's records. The VEF may be used for volume reconciliation.

12.6.2 Draft, Trim, and List

Record the draft, trim, and list. When barges have no list or trim correction tables, refer to API *MPMS* Ch. 12.1.1.

12.6.3 Vessel Lines and Tanks

Request that the vessel personnel drain the deck lines into the cargo compartments if possible. Report the transfer of any engine-room slops or other liquids into the cargo or slop tanks.

The vessel's piping system should be inspected prior to discharge to ensure that any seals from the load port are in place.

Product to be discharged must meet contractual quality. Sampling and laboratory analysis shall be used to ensure that quality specifications are met (see 7.2.4 and 12.4).

12.6.4 Arrival Gauges

Take gauges, water cuts, and temperatures on all cargo compartments at the reference point indicated on the vessel's capacity tables. The report should indicate whether measurements were manual or automatic and whether tanks on the vessel were inerted during ullaging. Inspect for the presence of cargo in non-designated cargo spaces, ballast tanks, cofferdams, and void spaces. If cargo is found, measure it in the same manner as the petroleum in cargo compartments (refer to API *MPMS* Ch. 17.2) and notify all concerned parties. This procedure should include compartments not intended to be discharged.

Observed gauge heights should be recorded and compared to reference gauge heights. Investigate and report any discrepancies. In some instances, it is impossible to determine the observed gauge height, water cut, and innage gauge. The location of the reference gauge point should be noted in the inspection report.

Vessel measurements taken through non-slotted standpipes may be inaccurate as a result of plugging at the base of the pipe, capillary action, or pressure differentials. Additional measurements may be needed from other locations when this condition exists. Note in the report the existence of this condition.

In operations involving lightering, each receiving vessel as well as the delivering vessel should be gauged prior to and upon completion of lightering.

12.6.5 Water Cut Measurement

Measure FW in the course of ullaging each compartment. Record the type of water-finding paste or device that was used to determine the oil/water interface. Record the interface and any oil emulsions that are detected. If a sufficient quantity of FW is found, take a sample of the water (see API *MPMS* Ch. 17.3).

Products with densities heavier than water may require a water cut measurement on top of the product. If a water cut measurement proves impossible to make, alternative sampling measures should be taken.

When FW is detected in certain products whose specifications are sensitive to the presence of FW, the vessel should be given a Letter of Protest on that account and all concerned parties should be notified immediately.

12.6.6 Vessel Temperature

Individual compartment temperatures on the vessel should be taken concurrent with ullaging. Single or multilevel temperatures may be required. In the case of heated materials upper, middle and lower temperatures should be taken. Additional temperatures may be required as outlined in API *MPMS* Ch. 17.2. Measurements should be averaged to determine the temperature of each compartment. The PET should have a calibrated range of accuracy that meets the desired temperature range of the material to be checked.

CAUTION — Temperatures that are taken at or near heating elements may distort temperature profiles.

12.6.7 Ballast Tanks

Inspect ballast tanks and record the quantity of ballast aboard. Report the presence of any measurable cargo in any ballast tanks and obtain samples if possible. Notify all interested parties and issue a Letter of Protest, as appropriate. Use the Vessel Ullage/Sounding and Capacity Report to record these measurements.

NOTE If simultaneous ballasting must be performed during discharging operations, determine the reason from the vessel's representative and record it in the inspection report. Indicate single/double valve separations, if any, between the clean/dirty ballast and the cargo system.

12.6.8 Vessel Sampling

Take samples from each vessel compartment in such a manner that a composite sample, intended to represent the total of each grade of cargo may be prepared for appropriate testing (see API *MPMS* Ch. 8.1). This sample, usually prepared in a laboratory, will be made by combining the vessel's individual tank samples in a ratio approximating the volume of each tank to the total volume of the grade of cargo loaded.

When the existence of stratified material is known or suspected, individual upper, middle, and lower samples may be drawn and analyzed to determine the degree of stratification. All interested parties should be notified accordingly.

NOTE On blended cargoes, due to incomplete mixing, sampling limitations and other operational restrictions, vessel tank samples often will not be representative of proportional hand-blended samples that were tested at the port of loading.

Take samples of slops. Keep these slops samples separate from cargo samples.

In the case of some cargoes, individual tank samples rather than composite samples are required. In these cases it is important that each container be flushed with the product before the sample is drawn in order to ensure the cleanliness of the sample containers. Care must be taken to assure samples are handled in a manner that prevents loss of the light ends. Commingling of samples of different products and/or grades must be avoided (see API *MPMS* Ch. 8).

NOTE Promptly label each sample with the appropriate tank number and other pertinent data.

If the presence of FW is found or suspected, at least one sample should be taken from the compartment floor via a bottom sampler.

12.6.9 Sample Handling

Sufficient samples should be obtained to meet the requirements of interested parties and regulatory agencies. Interested parties generally specify sampling and testing requirements. Identical samples should be provided for the following:

- a) the shore terminal;
- b) the independent inspector;
- c) all other parties designated to receive the samples.

Samples placed on board the vessel for delivery to the discharge port representative should be delivered according to the instructions given by interested parties. The samples should be acknowledged by a receipt signed by the party that accepted the loadport samples. The inspection report should contain a copy of the signed receipt.

The length of time during which samples are to be retained should be established in a manner that is consistent with the circumstances, experience, and the policies of the parties involved in the custody transfer.

12.6.10 Sea Valves

Confirm in the presence of the vessel's personnel that sea valves and overboard discharge valves are in the closed position. Ensure that those valves sealed at the loading port remain closed and sealed until the unloading operation is completed. Record and report seal numbers on the Vessel Ullage/Sounding and Capacity Report. If these numbers differ from those recorded at the load port, ascertain the reason for the discrepancy and notify all concerned parties.

12.6.11 Bunker Inspection

See 7.3.12.

12.6.12 Volume Calculations

Report both the actual ullage as measured and the ullage corrected for trim and list, include the measurement and quantity of FW, the GOV, and the temperature for each compartment on the vessel. Calculate the GSV for each tank, using the average temperature for each tank and the supplied density. Do not use an average temperature for the entire vessel. Determine the TCV.

12.6.13 In-transit Difference

Compare the TCV, GSV and FW at the load port prior to sailing with the TCV, GSV and FW prior to discharge. If the total volume of cargo quantity varies more than the amount specified by the interested parties, notify the vessel's representative and recheck the vessel. If the discrepancy remains after the vessel is rechecked, issue a Letter of Protest to the vessel's representative and notify all interested parties.

13 During Discharge

13.1 Communications

A reliable means of communication with the shore and between vessels should be arranged. Vessel, shore, or measurement personnel who notice a problem during any stage of the transfer that could affect subsequent events should promptly notify all key personnel so that timely action can be taken. Record these events in the inspection report.

When more than one product and/or grade of product is to be discharged, close communication must be maintained between personnel on shore and on the vessel in order to avoid contamination and off-specification material. This is of special importance when switching from one product and/or grade to another.

13.2 Line Sample

Line samples are normally taken for quality control purposes. For some products, it is necessary to draw a line sample at the commencement of discharge. These samples should be taken at, or as close as possible to, the vessel's manifold. Line samples can be inspected visually, or, in the case of products with no obvious signs to observe, prompt laboratory testing for agreed specifications may be required. In any case, these samples should be taken and retained.

13.3 Meter Proving

The meter proving should be monitored, as appropriate, in accordance with API *MPMS* Ch. 4, API *MPMS* Ch. 5, and API *MPMS* Ch. 12.2; and, reported.

13.4 Discharge Pressure

Log the discharge pressure and flow rate on the Vessel Discharge Record. Indicate the place where the vessel's line discharge pressure was measured.

13.5 Time Log

Report on a Time Log the time and date of the main discharge events. Include the time and description of any unusual occurrences in the appropriate column of the Time Log.

14 Vessel Inspection After Discharge

14.1 Draft, Trim, and List

Verify the draft, trim and list, and record.

14.2 Vessel Lines

Before measuring the vessel, request that the vessel lines be drained. Caution should be exercised on multigrade cargoes in order to avoid commingling the line contents of different products. All internal transfer of cargo should be completed and all tank valves should be secured prior to gauging. Discharge lines should be vented prior to gauging.

14.3 ROB Measurement

After discharge lines and deck lines have been drained, determine the amount and nature of any material ROB. Include in-transit cargo that was not discharged, non-load-on-top volumes, and material in non-designated cargo spaces (refer to API *MPMS* Ch. 17.2). Describe material found in the bottom of tanks as liquid material, non-liquid material, or FW. If inspection, measurement, and bottom sampling reveals that any cargo remains on board, concerned parties should determine whether further attempts should be made to pump the remaining quantities ashore. If this is not done, report the reasons. A Letter of Protest should be issued if applicable (see also API *MPMS* Ch. 17.4).

14.4 ROB Volume Calculations

The OBQ/ROB Report is to be completed after discharge. Determine the ROB quantity as specified in API *MPMS* Ch. 17.4.

- a) For liquid material and water, use a wedge formula if the liquid does not touch all the bulkheads of the vessel's compartments. Use trim/list corrections if the liquid is in contact with all bulkheads in the compartment.
- b) For non-liquid material, multipoint gauging is recommended to determine if a wedge condition exists. Since the wedge formula uses a trim factor to determine the quantity, an accurate calculation will not be possible without knowing the trim of the vessel at the time the material solidified. If the material measured is not a wedge, the average of the multiple readings should be used for volume determination. However, if only one gauge point is available, the material shall be assumed to be evenly distributed over the tank bottom.

NOTE For additional information refer to API *MPMS* Ch. 17.4.

All non-load-on-top compartments from the load port should be measured to determine whether any volumes have changed. These measurements should be reported and should not be included in the ROB determination. If there is a change in these volumes, ascertain the reason and, if necessary, notify all interested parties immediately.

14.5 ROB Sampling

When ROB is accessible, samples shall be obtained from all compartments containing liquid volume. An attempt should also be made to sample non-liquid volumes. Samples taken should be in sufficient quantity to permit any required analysis. Samples shall be taken in accordance with API *MPMS* Ch. 8.

14.6 ROB Temperatures

Temperatures shall be obtained, recorded and used for cargo volume correction whenever depth of material is sufficient and the nature of the material permits. If the temperature cannot be measured, the GOV shall be reported as GSV.

Temperature measurements shall be obtained in accordance with API *MPMS* Ch. 7 and API *MPMS* Ch. 17.2.

14.7 Sea Valves

Confirm in the presence of vessel personnel that sea valves and overboard discharge valves are closed and that the seals remain intact. If previously installed seals are broken, attempt to ascertain the reason and, if necessary, notify all interested parties. Record the findings in the Inspection Report.

14.8 Bunker Inspection

See 7.3.12.

14.9 Crude Oil Washing

Indicate on a Time Log when the vessel started and stopped the crude oil washing procedure. Indicate in the inspection report which tanks were washed with crude oil and the extent of the washing.

15 Shore Inspection After Discharge

15.1 Shore Lines and Tanks

Determine the shore line fill condition (see API *MPMS* Ch. 17.6) prior to taking closing tank gauges or meter readings.

Determine the nature and quantities of material in the shorelines prior to obtaining the closing tank gauges or meter readings. A sample may be taken from the lines for this purpose. If the line condition after discharge differs from the condition before discharge, record, and notify all interested parties.

Adjustments to transferred quantities based upon line fullness discrepancies are determined by agreement of the interested parties.

15.2 Shore Tank Measurements

15.2.1 Manual Gauges

Record the reference height from the tank calibration tables before gauges and water cuts are taken. Take closing gauges, temperatures, samples, and water measurements of each tank used in the discharge. Any difference between the observed reference height and the reference height shown on the tank calibration tables should be noted and investigated (see API *MPMS* Ch. 3.1A and API *MPMS* Ch. 17.2).

All gauges should be recorded only after securing three consecutive readings to be within a range of 3 mm ($\frac{1}{8}$ in.) If two of the three consecutive readings are identical, this reading shall be reported; to the nearest 1 mm if metric gauge tapes are used or to the nearest $\frac{1}{8}$ in. if customary gauge tapes are used. If all three readings are used, they should

be averaged. If the tank contents are determined to be in motion and waiting for equilibrium is not possible, the tank measurements should be recorded and all parties advised. If the situation cannot be resolved, a Letter of Protest should be issued. Record the automatic gauges for purposes of comparison.

In the case of tanks with floating roofs, gauging should be avoided while the roof is in the critical zone. The placement of roof legs in high or low position and the critical zone should be recorded.

The heavy nature of some products may require that an outage measurement be taken. Products with densities heavier than water may need to be water cut on top of the product.

Any incrustation that forms on top of the product may produce inaccuracies in measurement. If this condition exists, all parties should be notified and the condition should be recorded.

If settling time is required before closing gauges are taken, an insurance or preliminary gauge or gauges should be taken and the inlet and outlet valves on each tank should be sealed in the closed position.

15.2.2 Automatic Gauges

Automatic gauging systems with accuracy and/or measurement tolerances consistent with API *MPMS* Ch. 3.1B may be used for custody transfer by mutual agreement among the interested parties.

If an automatic tank gauging system is used and the readings are not verified by manual measurements, record in the inspection report the last two times that the automatic system and the manual measurements were compared. Record on the inspection report that automatic gauges were used.

15.3 Shore Tank Temperatures

Temperature determination of cargoes in a shore tank is critical to the custody transfer process. At the time of gauging, therefore, temperatures should be carefully taken (see API *MPMS* Ch. 7). Heavy cargoes, heated cargoes, blended cargoes, and cargoes in unheated tanks in very cold weather may tend to have temperature stratification within each tank. When this situation is determined, extra temperature measurements should be taken. On high-heat cargoes such as asphalt, it may be impossible to obtain representative temperatures with the use of mercury-in-glass or PETs; it may be necessary to use permanently installed temperature measuring devices. The use of a permanently installed measuring device should be noted in the report, along with when and how the device's accuracy was verified.

CAUTION — Temperatures taken at or near heating elements may distort temperature profiles.

15.4 Sampling

All samples taken must be properly labeled and, if appropriate, sealed. The seal numbers must be recorded.

15.4.1 Manual Tank Sampling

Each shore tank that has received cargo should be sampled in sufficient quantity to meet the requirements of interested parties and regulatory agencies. Sample containers must be clean and, in the case of petroleum products, should be flushed with product prior to drawing the sample. Sample containers must meet the requirements of API *MPMS* Ch. 8. Containers that are used for transport and storage of samples must meet appropriate regulatory requirements.

When non-homogeneous products are sampled, upper, middle and lower spot samples are usually obtained. If stratification is suspected, it is strongly recommended that samples at additional levels should be taken.

All concerned parties should be notified if the material is deemed to be stratified, and each party should agree on further actions before proceeding.

Specify in the inspection report the tank locations and methods used to obtain samples. The inspection report should also state whether the tank was equipped with mixers, a circulating system, or aerators and should note the extent of mixing that was performed on the tank.

15.4.2 Automatic Sampling

If an automatic sampler is used, make certain that the correct sample volume was obtained (Refer to API *MPMS* Ch. 8.2). Witness the mixing of the contents of the sample receptacle and the withdrawal and testing of the sample. Report any difficulties that occur with in-line sampling procedures.

15.5 Meters

Record the closing meter readings and the meter factor used. Obtain a completed copy of all meter proving forms and meter measurement tickets. If the meter or meters were not proved during discharge, indicate the frequency of meter proving and obtain a copy of prior relevant meter proving reports.

If manual and/or automatic shore tank measurements are taken, show a comparison with metered volumes. If volumes cannot be reconciled, recheck meter factors, shore tank measurements, and calculations. Report all results in the inspection report.

16 Discharge Port Reconciliation

16.1 Shore and Vessel Transferred Volume Calculations

See API *MPMS* Ch. 12.

16.2 Discharge Port Voyage Analysis and Cargo Reconciliation

Complete the Voyage Analysis and Reconciliation Report. All relevant data from loadport through discharge port should be assembled, and an analysis should be made to provide an overall view of the voyage performance. Include on the Voyage Analysis Report any relevant comments that may help to explain any significant discrepancies. Compare the shore TCV received (by shore tank or meter) with the vessel's TCV delivered. (Note that the vessel's TCV delivered equals the vessel's TCV on arrival minus the quantity ROB.) If the difference on the same comparison basis is greater than the difference specified by parties to the contract or by stated policies of those companies after application of the VEF, recheck all measurements and calculations in an attempt to identify the discrepancy. If the differences cannot be reconciled, notify the interested parties and issue a notice of apparent discrepancy to vessel and terminal representatives (see API *MPMS* Ch. 17.5).

16.3 Qualitative Testing

The interested parties should specify testing for quality. Report the types of analytical methods (that is, ASTM, ISO, or other industry approved test methods) that are used for testing. Responsibility for testing rests primarily with the designated party. Interested parties or their representatives should be allowed to conduct the same tests on a duplicate sample or, alternatively, to witness the testing that the designated party performs. Any witnessed deviations from the specified testing procedures should be recorded; and, reported to all interested parties.

16.4 Letter of Protest

If any problems occur that could affect subsequent procedures at any stage of the transfer, all key persons involved should be notified promptly so that necessary, timely action can be taken. Any action or refusal to act that is not in accordance with this procedure or specific prior contract agreements will be reported to the persons concerned and may be documented by the issuance of a Letter of Protest.

Annex A—Sample Forms

The following sample forms are designed to provide a standard comprehensive format to record and report essential data obtained during the marine cargo inspection procedure.

The forms are designed to facilitate computation and thereby reduce computational errors and assist in checking for errors. The training of new measurement personnel is also facilitated through the use of standard forms.

These forms are designed for simple voyage and as such may not be suitable for all contingencies. Measurement personnel may use other forms and explanations where required to fully document the transfer operation.

Cross-cuts are provided on all suggested forms to accommodate the various systems of measurement.

The following forms are freely offered to all companies to use, with or without company identification logos:

Forms:

Vessel Ullage/Sounding and Capacity Report

Report of Shore Quantity

Metered Quantity Report

Meter Prover Record

Slops Record

OBQ/ROB Report

Load-on-Top Monitoring Record

Time Log

Vessel Discharge Record

Bunker Inspection Record

Load Port Inspection Checklist

Discharge Port Inspection Checklist

Laboratory Report of Quality

Cargo Quantity Options Certificate

Sample Receipt

Basic Marine Movement Data Sheet

Letters:

Letter of Protest (Shore Facility)

Letter of Protest (Marine Vessel)

Notice of Apparent Discrepancy

Vessel Ullage / Sounding and Capacity Report		Before	After
Load	<input type="checkbox"/>	<input type="checkbox"/>	
Discharge	<input type="checkbox"/>	<input type="checkbox"/>	
Lighter	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> To <input type="checkbox"/> Vessel: <u>FO</u>

[illegible]

Capacity of vessel lines (_____)	When this form is used for on-board quantity/remaining on board, transfer this number to the OBQ/ROB report.
------------------------------------	--

(____) Indicates unit of volume and/or measurement is to be entered.

Report of Shore Quantity

Indicate: \longrightarrow ☐ Load port \longrightarrow ☐ Discharge port

Vessel:			Port/Terminal:			Cargo:	Voyage No:				Date/Time Prepared:				
Tank Number	At load port tank opening data entered in first row.		Reference Height	Observed Height	Ullage (ft/m)	Total Observed Volume (____)	Free water		Gross Observed Volume (____)	CTSH Correction	Floating Roof Adjustment	Temp. (°F/°C)	°API @ 60 °F or Density @ 15 °C	VCF Table (____)	Gross Standard Volume (____)
	At disc port tank						Innage Ullage (ft/m)	Volume (____)							
	Date	Time													
Totals this tank															
Totals this tank															
Totals this tank															
Totals this tank															
Totals this tank															
Totals this tank															
Totals this tank															
Gross standard volume (____)						Net standard volume (m³/l)				<div>Signatures</div> <div>_____</div> <div>Terminal representative</div> <div>_____</div> <div>Measurement representative</div>					
Free water (____)						Net standard volume (____)									
Total calculated volume (____)						Composite (shore/vessel) (API gravity 60 °F / density 15 °C)									
Percent sediment and water						Weight conversion factor (Table ____)									
Sediment and water (____) vessel/shore						Weight (____)									
(____) Indicates unit of volume and/or measurement is to be entered.															

METERED QUANTITY REPORT

☐ Load port ☐ Discharge port

Date	Time
------	------

Port/Terminal	Operator	Vessel	Cargo	Voyage No.
1	Meter number			
2	Closing meter reading (____)			
3	Opening meter reading (____)			
4	Indicated volume (line 2 – line 3) (____)			
5	Meter factor (Note 1)			
6	Average stream temperature, (____) if non-temperature compensated (Note 2)			
7	API gravity 60 °F/density 15 °C (____)			
8	Volume correction factor (C _{ti}) (see Note 2) Table ____			
9	Average meter pressure, (____) (volumetric weighted average)			
10	Pressure correction factor (C _{pi})			
11	Composite correction factor	For non-temperature compensated meters only (line 5x8x10)		
		For temperature compensated meters only (line 5x10)		
12	Total calculated volume (line 4x11)			
13	Free water (see Note 3)			
14	Gross standard volume (____)			
15	Sediment and water, percent			
16	Sediment and water, volume (____)			
17	Net standard volume (bbl/gal)			
18	Net standard volume (m/l)			

Summary (as determined by meter facility sampling)		Signatures _____ Terminal representative _____ Measurement representative Notes: 1. Attach to this form copies of meter proving reports showing determination. Reference API MPMS Chapter 12.2. 2. Non-temperature compensated meters only. 3. Only to be used with non-inline sampler movement. (____) Units of measurement
Total calculated volume (____)		
Free water volume (____)		
Gross standard volume (____)		
Sediment and water, volume percent		
Composite gravity 60°F (Table ____)		
Weight conversion factor		
Total calculated weight (____)		
Net standard volume (bbl/gal) Total		
Net standard volume (m/l) Total		

METER PROVER REPORT

LOCATION				DATE		AMBIENT TEMP.		REPORT NO.	

PROVER DATA				PREVIOUS REPORT								
BASE VOLUME AT 60 °F/15 °C AND "0" psi			SIZE		WALL		FLOW RATE		FACTOR		DATE	
bbl.							bbl/hr.					

METER DATA							
SERIAL NO.	METER NO.	PULSES/bbl.	TEMP. COMP.	MANUF.	SIZE	MODEL	

FLOW RATE		NON-RESET TOTALIZER	
bbl/hr.			

RUN DATA						C_{ts} = CORRECTION FOR TEMPERATURE ON STEEL	
TEMPERATURE		PRESSURE		TOTAL PULSES	RUN NO.		
PROVER AVG.	METER	PROVER	METER				
					1	C_{ps} = CORRECTION FOR PRESSURE ON STEEL	
					2		
					3	C_{tl} = CORRECTION FOR TEMPERATURE ON LIQUID TABLE 6 OR TABLE 24 FOR LPGs	
					4		
					5	C_{pl} = CORRECTION FOR PRESSURE ON LIQUID	
					6		
					7		
					8		
					9		
					10		
AVG		AVG		AVG			

LIQUID DATA					
TYPE	API GRAVITY @60°F OR DENSITY @ 15 °C	SPECIFIC GRAVITY @ 60 °F	R. V. PRESS	BATCH/TENDER NO.	

FIELD CALCULATIONS										
PROVER VOLUME	\times	C_{ts}	\times	C_{ps}	\times	C_{tl}	\times	C_{pl}	$=$	CORRECTED PROVER VOLUME

AVERAGE PULSES	PULSES/bbl.	$=$	GROSS METER VOL.	\times	C_{ts} USE ONLY FOR NONTEMP. COMP. METER	\times	C_{pl}	$=$	CORRECTED METER VOLUME

CORRECTED PROVER VOLUME	$=$	CORRECTED METER VOLUME	$=$	METER FACTOR	\times	C_{pl} LIQUID CORR. FOR PRESS. AT METERING COND.	$=$	COMPOSITE FACTOR USE FOR CONSTANT PRESSURE APPLICATIONS

REMARKS, REPAIRS, ADJUSTMENTS, ETC.

SIGNATURE	DATE	COMPANY REPRESENTED

SLOPS RECORD

☐ LOADING☐ DISCHARGE

INSTRUCTIONS: This record is for tanks used in the recovery of oily residues from load-on-top operations (prior to loading) and for tanks used in retaining liquid slops to be pumped ashore at the discharge port. The Slops Record is not used for recording on-board quantities.

VOYAGE NO.

VESSEL		PORT/TERMINAL		DATE/TIME	
		TANK NO. _____	TANK NO. _____	TANK NO. _____	
ULLAGE/INNAGE (ft/m)					
TRIM (ft/m)					
CORRECTED ULLAGE/INNAGE (ft/m)					
TOTAL OBSERVED VOLUME (_____)					
WATER GAUGE (ft/m)					
CORRECTED WATER GAUGE (ft/m)					
FREE WATER VOLUME (_____)					
GROSS OBSERVED VOLUME (_____)					
API GRAVITY/DENSITY OBSERVED					
TEMPERATURE (°F/°C)					
API GRAVITY 60°F/DENSITY 15°C					
VOLUME CORRECTION FACTOR TABLE (_____)					
GROSS STANDARD VOLUME (_____)					
WEIGHT CONVERSION FACTOR (_____)					
GROSS WEIGHT (_____) TONS					
PREVIOUS CARGO					
PORT LOADED					
API GRAVITY 60 °F/DENSITY 15°C					
? SIGNATURES					
VESSEL REPRESENTATIVE		TERMINAL REPRESENTATIVE		MEASUREMENT REPRESENTATIVE	

(_____) UNITS

LOAD-ON-TOP MONITORING RECORD

DATE COMPLETED	TIME COMPLETED
----------------	----------------

NOTES:

1. Volume Formulas:

a. For ships of 150,000 deadweight tons or more, minimum recovered oil is to be expected as:

$$\frac{\text{cubic capacity of the ship} + (3 \times \text{cubic capacity of tanks washed})}{1000}$$
- b. For ships of less than 150,000 deadweight tons, minimum recovered oil is to be expected as:

$$\frac{\text{cubic capacity of the ship} + (2 \times \text{cubic capacity of tanks washed})}{1000}$$

2. Master's comments are to include his/her reasons for low oil recovery on this voyage.

PORT			LOADING TERMINAL			
VESSEL NAME			FLAG			
SUMMER DEADWEIGHT TONS →			TOTAL CAPACITY OF CARGO TANKS () →			
1. LOAD-ON-TOP						
WAS A LOAD-ON-TOP PROCEDURE FOLLOWED ON THIS VOYAGE?			<input type="checkbox"/> YES <input type="checkbox"/> NO			
IF NO, STATE REASON						
TANKS WASHED THIS VOYAGE →		NUMBERS		TOTAL CAPACITY OF TANKS WASHED () →		
2. SLOP TANK MEASUREMENTS						
		SLOP TANKS				TOTAL OBSERVED VOLUME ()
		ULLAGE(S)		VOLUME		
		TANK A	TANK B	TANK A	TANK B	
						A + B
1	TOTAL CONTENTS					
2	FREE WATER CONTENT					
OIL (LINE 1 — LINE 2)						
3. VOLUMES						
WILL EITHER SLOPS TANK BE LOADED WITH CARGO?			TANK A	<input type="checkbox"/> YES <input type="checkbox"/> NO	TANK B <input type="checkbox"/> YES <input type="checkbox"/> NO	
MINIMUM VOLUME OF OIL THAT SHOULD HAVE BEEN RECOVERED UNDER FORMULA → ()						
SIGNATURE →		MEASUREMENT REPRESENTATIVE				
MASTER'S EVALUATION AND COMMENTS (SEE NOTE 2)						
SIGNATURE →				MASTER		

() UNITS

TIME LOG☐

DISCHARGE

☐

LOADING

DATE

REFERENCE NO.

VESSEL		PORT/TERMINAL		PRODUCT/CARGO	
		MONTH	DAY	HOUR	
1. VESSEL ARRIVED – _____					
2.					
3.					
4. DOCKED (GANGWAY IN PLACE)					
5. NOTICE OF READINESS TENDERED					
6. NOTICE OF READINESS ACCEPTED					
7. VESSEL CLEARED BY GOVERNMENTAL OFFICIAL					
8. SURVEYOR ON BOARD					
9. KEY MEETING HELD					
10. VESSEL SURVEY COMPLETED/BEGINNING OF TRANSFER					
11. HOSES CONNECTED (X)					
12. COMMENCED DISCHARGE/TAKING BALLAST					
13. FINISHED DISCHARGE/TAKING BALLAST					
14. STARTED LOADING/UNLOADING					
15. COMPLETED LOADING/UNLOADING					
16. HOSES DISCONNECTED					
17. ESTIMATED SAILING TIME					
18. SURVEY COMPLETED/END OF TRANSFER					
19.					
20.					
21.					
22.					
AMBIENT TEMPERATURE	SEA WATER TEMPERATURE	GENERAL WEATHER CONDITIONS			
REMARKS:					

MEASUREMENT REPRESENTATIVE

VESSEL REPRESENTATIVE

**VESSEL DISCHARGE RECORD
(FROM VESSEL/FROM SHORE)**

REFERENCE NO.

VESSEL	PORT	BERTH	DATE

[illegible]

LOCATION OF GAUGE → SHORE:	VESSEL:
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NOTE: Pressures are expressed as pounds per square inch gauge unless otherwise stated

[illegible]

BUNKER INSPECTION REPORT

NOTE: ONE FORM PER GRADE OF BUNKERS

VESSEL		PORT/TERMINAL		DATE PREPARED		GRADE		
■ 1. VESSEL HISTORY FROM CHIEF ENGINEER								
AVERAGE BUNKER CONSUMPTION/DAY (TONS) () AT SEA				IN PORT		AT ANCHOR		
■ 2. BUNKERS LAST PORT OF CALL								
SAILING DATE		SAILING TIME		BUNKERS ON SAILING → () TONS		API GRAVITY 60°F/DENSITY 15°C →		
■ 3. INSPECTION UPON ARRIVAL DATE: TIME:								
BUNKER TANKS	ULLAGES ()	GROSS OBSERVED VOLUME ()	API/ DENSITY	FLASH POINT	LOWER EXPLOSIVE LIMIT LEL %	TEMP ()	VCF TABLE ()	GROSS STANDARD VOLUME ()
				TOTAL GROSS STANDARD VOLUME ()				
				WEIGHT CONVERSION FACTOR ()				
				GROSS STANDARD WEIGHT ()				
■ 4. INSPECTION PRIOR TO SAILING DATE: TIME:								
BUNKER TANKS	ULLAGES ()	GROSS OBSERVED VOLUME ()	API/ DENSITY	FLASH POINT	LOWER EXPLOSIVE LIMIT LEL %	TEMP ()	VCF TABLE ()	GROSS STANDARD VOLUME ()
DID VESSEL BUNKER AT THIS PORT? <input type="checkbox"/> YES <input type="checkbox"/> NO				TOTAL GROSS STANDARD VOLUME ()				
DID VESSEL BUNKER IN TRANSPORT? <input type="checkbox"/> YES <input type="checkbox"/> NO				WEIGHT CONVERSION FACTOR ()				
QUANTITY LOADED () TONS				GROSS STANDARD WEIGHT: <input style="width: 100px;" type="text"/>				
				GROSS STANDARD WEIGHT ()				
■ 5. BUNKER CONSUMPTION								
	IN PORT				TIME PERIOD			
OPENING +			DATE/TIME					
CLOSING –			DATE/TIME					
BUNKERING +			ELAPSED DAYS/HOURS					
CONSUMPTION +			CONSUMPTION PER 24 HOURS					

INSPECTION CHECKLIST LOAD PORT

VESSEL NAME _____
 PORT NAME _____
 CARGO(ES) _____
 DATE _____

If an item listed below was completed in accordance with the procedures, check “yes”; if not, check “no” and explain under the comment section. If an item is not applicable, write “NA” (not applicable) next to it.

NOTE A completed copy of this checklist should be included with the measurement report.

Item Number	Action	Section	Yes	No
Before Loading				
1.	Was a key meeting held with vessel representative and shore representative?	7.1	_____	_____
2.	Were all shorelines checked and shore tanks gauged?	7.2.1	_____	_____
		7.2.2	_____	_____
3.	Were temperatures taken from all shore tanks?	7.2.3	_____	_____
4.	Was the temperature device checked prior to use?	7.2.3.1	_____	_____
		7.2.3.2	_____	_____
		7.2.3.3	_____	_____
5.	Were all automatic tank gauging and temperature devices checked?	7.2.2.2	_____	_____
		7.2.3.4	_____	_____
6.	Were all shore tanks sampled?	7.2.4.1	_____	_____
7.	Was an automatic sampler used?	7.2.4.2	_____	_____
8.	Were meters used in loading the vessel?	7.2.5	_____	_____
9.	Were vessel experience factors available on board?	7.3.1	_____	_____
10.	Were draft, trim, and list recorded?	7.3.2	_____	_____
11.	Was vessel completely deballasted?	7.3.3	_____	_____
12.	Were vessel deck lines drained?	7.3.4	_____	_____
13.	Were on-board quantity gauges taken?	7.3.5	_____	_____
14.	Were wedge, trim, or list corrections made?	7.3.6	_____	_____
15.	Were on-board quantity samples taken?	7.3.7	_____	_____
16.	Were slops tanks measured?	7.3.8	_____	_____
17.	Were on-board quantity temperatures taken?	7.3.9	_____	_____
18.	Were sea valves sealed in the closed position?	7.3.10	_____	_____
19.	Was load-on-top procedure followed?	7.3.11	_____	_____
20.	Were bunker quantities verified?	7.3.12	_____	_____
During Loading				
21.	Were any difficulties encountered?	8.1	_____	_____
22.	Were line samples drawn?	8.2	_____	_____
23.	Were meters proved?	8.4	_____	_____

Item Number	Action	Section	Yes	No
After Loading				
24.	Were draft, trim, and list recorded?	9.1	_____	_____
25.	Were vessel lines drained to compartments prior to ullaging?	9.2	_____	_____
26.	Were all vessel ullages, temperatures, and water measurements recorded?	9.3	_____	_____
		9.4	_____	_____
27.	Were temperatures taken in all vessel compartments?	9.5	_____	_____
28.	Were ballast tanks inspected?	9.6	_____	_____
29.	Were samples taken from each vessel compartment?	9.7	_____	_____
		9.8	_____	_____
30.	Were vessel sea valves inspected and confirmed closed?	9.9	_____	_____
31.	Were bunker quantities verified?	9.10	_____	_____
32.	Were vessel volumes recorded and calculated?	9.11	_____	_____
33.	Were all shorelines surveyed and quantities determined?	10.1	_____	_____
34.	Were all closing tank gauges taken?	10.2	_____	_____
35.	Were tank samples taken?	10.3	_____	_____
36.	Were proper automatic sampling and sample mixing performed?	10.4	_____	_____
37.	Were copies of meter tickets and proving reports obtained?	10.5	_____	_____
38.	Was a load port reconciliation made between vessel and shore?	11.1	_____	_____
39.	Was a load port voyage analysis prepared?	11.2	_____	_____
40.	Does the Bill of Lading agree with the vessel measurements?	11.3	_____	_____
41.	Was qualitative testing performed according to directions furnished by interested parties?	11.4	_____	_____
42.	Was a Time Log maintained?	11.5	_____	_____
43.	Were any Letters of Protest or Notices of Apparent Discrepancy issued during loading?	11.6	_____	_____

INSPECTION CHECK- LIST DISCHARGE PORT

VESSEL NAME _____
 PORT NAME _____
 CARGO(ES) _____
 DATE _____

If an item listed below was completed in accordance with the procedures, check "yes"; if not, check "no" and explain under the comment section. If an item is not applicable, write "NA" (not applicable) next to it.

NOTE A completed copy of this checklist should be included with the measurement report.

Item Number	Action	Section	Yes	No
Before Discharge				
1.	Was a key meeting held with vessel representative and shore representative?	12.1	_____	_____
2.	Were all shorelines checked and shore tanks gauged?	12.2.1	_____	_____
		12.2.2	_____	_____
3.	Were temperatures taken in all shore receipt tanks?	12.3	_____	_____
4.	Was the temperature device checked prior to use?	12.3.1	_____	_____
		12.3.2	_____	_____
		12.3.3	_____	_____
5.	Were all automatic tank gauging and temperature devices checked?	12.2.2	_____	_____
		12.3.4	_____	_____
6.	Were all shore tanks sampled?	12.4.1	_____	_____
7.	Was an automatic sampler used?	12.4.2	_____	_____
8.	Were meters used in discharging the vessel?	12.5	_____	_____
9.	Was vessel experience factor data available from the vessel representative?	12.6.1	_____	_____
10.	Were draft, trim, and list recorded?	12.6.2	_____	_____
11.	Were vessel lines drained into the cargo compartments?	12.6.3	_____	_____
12.	Were all arrival ullages, temperatures, and water measurements taken on the vessel?	12.6.4	_____	_____
		12.6.5	_____	_____
		12.6.6	_____	_____
13.	Were all ballast tanks checked?	12.6.7	_____	_____
14.	Were vessel samples taken from each compartment?	12.6.8	_____	_____
15.	Were load port samples collected from the vessel and a receipt issued?	12.6.9	_____	_____
16.	Were sea valves found to be intact and seal numbers recorded?	12.6.10	_____	_____
17.	Were bunker quantities verified?	12.6.11	_____	_____
18.	Were volume calculations completed before discharge began?	12.6.12	_____	_____
19.	Was an in-transit difference determined?	12.6.13	_____	_____
During Discharge				
20.	Were any unusual problems encountered?	13.1	_____	_____
21.	Was a line sample taken?	13.2	_____	_____
22.	Were meters proved?	13.3	_____	_____
23.	Was a Vessel Discharge Record prepared?	13.4	_____	_____
24.	Was a Time Log prepared?	13.5	_____	_____

Item Number	Action	Section	Yes	No
After Discharge				
25.	Were draft, trim, and list recorded?	14.1	_____	_____
26.	Were all vessel deck lines checked for remaining cargo?	14.2	_____	_____
27.	Were remaining on board gauges taken?	14.3	_____	_____
28.	Was quantity remaining on board measured at a different point than the ullage?	14.4	_____	_____
29.	Were wedge, trim, or list corrections used?	14.4	_____	_____
30.	Was an On-Board Quantity/Remaining On Board Report completed?	14.4	_____	_____
31.	Was a sample taken of the material remaining on board?	14.5	_____	_____
32.	Were temperatures available for quantities remaining on board?	14.6	_____	_____
33.	Were sea valves intact from load port?	14.7	_____	_____
34.	Were bunker quantities verified?	14.8	_____	_____
35.	Was crude oil washing carried out?	14.9	_____	_____
36.	Were shore lines inspected to determine quantity?	15.1	_____	_____
37.	Were all shore tank gauges taken?	15.2	_____	_____
38.	Were tank samples taken from shore tanks?	15.4	_____	_____
39.	Were proper automatic sampling and sample mixing performed?	15.4.2	_____	_____
40.	Were copies of meter tickets and proving reports obtained?	15.5	_____	_____
41.	Was a discharge port voyage analysis made?	16.2	_____	_____
42.	Was a vessel experience factor used for volume reconciliation?	16.2	_____	_____
43.	Were all laboratory tests performed and witnessed by qualified personnel?	16.3	_____	_____
44.	Were any Letters of Protest or Notices of Apparent Discrepancy issued?	16.4	_____	_____

LABORATORY REPORT OF QUALITY

DATE: _____
OUR LAB NO. _____
OUR JOB NO. _____
CLIENT REF. NO. _____

GRADE	
VESSEL	
TERMINAL	
SAMPLE FROM:	
SAMPLE SUBMITTED BY:	
ANALYSIS PERFORMED BY:	

The above laboratory sample was examined and the following results obtained in our laboratory:

TEST	METHOD	RESULTS

AUTHORIZED SIGNATURE

CARGO QUANTITY OPTIONS CERTIFICATE

VESSEL: _____ PORT: _____ DATE: _____
 TERMINAL: _____

CARGO QUANTITY

	<u>PRODUCT</u>	<u>SHORE ORDER</u>	<u>VESSEL REQUIRED</u>
1.	_____	_____	_____
2.	_____	_____	_____
3.	_____	_____	_____
4.	_____	_____	_____
5.	_____	_____	_____

VESSEL REQUIREMENT ESTABLISHED BY VESSEL'S OFFICER.

INSPECTOR: _____

VESSEL'S OFFICER: _____

SAMPLE RECEIPT

VESSEL	PRODUCT/CARGO	PORT/TERMINAL	DATE
--------	---------------	---------------	------

SIZE OF SAMPLE	SEAL NUMBER	DESCRIPTION
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
11.		
12.		
13.		
14.		
15.		
16.		
17.		
18.		
COMMENTS:		

RECEIVED BY:
Signature: _____
Print Name: _____
Company/Vessel: _____
Date: _____

RECEIVED FROM:
Signature: _____
Print Name: _____
Company/Vessel: _____
Date: _____

BASIC MARINE MOVEMENT DATA SHEET

TELEX ADDRESS: _____

Telex _____

Answer _____

Attention _____

Line	Line Description	Line Data
A	Vessel identification	_____
B	Cargo identification (prepare a separate sheet for each cargo)	_____
C	Origin: Port identification	_____
D	Origin: Month, day, year, hour, minute of last hose disconnect	_____
E	Destination: Port identification	_____
F	Destination: Month, day, year, hour, minute of last hose disconnect	_____
G	Origin: Bill of Lading, gross standard volume (GSV), 60 °F, in whole barrels (see Note 1)	_____
H	Origin: Bill of Lading, net standard volume (NSV), 60 °F, in whole barrels (see Note 2)	_____
I	Origin: Bill of Lading, Certificate of Quality, API Gravity at 60 °F	_____
J	Origin: Bill of Lading, Certificate of Quality, suspended sediment and water (S&W), volume percent	_____
K	Origin: Marine vessel, before loading, on-board quantity (OBQ) in all compartments, in whole barrels (see Note 3)	_____ (L) _____ (S)
L	Origin: Marine vessel, before loading, free water volume in compartments to be loaded, in whole barrels (see Note 4)	_____
M	Origin: Marine vessel, after loading, gross standard volume (GSV), 60 °F, of compartments loaded, in whole barrels (see Note 5)	_____
N	Origin: Marine vessel, after loading, free water volume in compartments loaded, in whole barrels (see Note 4)	_____
O	Origin: Was automatic line sampler used?	_____
P	Destination: Marine vessel, before discharge, gross standard volume (GSV), 60 °F, of compartments to be discharged, in whole barrels (see Note 5)	_____
Q	Destination: Marine vessel, before discharge, free water volume in compartments to be discharged, in whole barrels (see Note 4)	_____
R	Destination: Marine vessel, after discharge, cargo quantity remaining on board (ROB) in compartments discharged, in whole barrels (see Note 3)	_____ (L) _____ (S)
S	Destination: Marine vessel, after discharge, free water volume remaining in compartments discharged, in whole barrels (see Note 4)	_____
T	Destination: Shore receipt, total calculated volume (TCV), 60 °F, in whole barrels (see Note 6)	_____
U	Destination: Shore receipt, gross standard volume (GSV), 60 °F, in whole barrels	_____
V	Destination: Shore receipt, net standard volume (NSV), 60 °F, in whole barrels	_____
W	Destination: Was automatic line sampler used?	_____
X	Destination: Inspector's report, suspended sediment and water (S&W), volume percent	_____

NOTES

1. GSV, 60 °F, is defined as that volume at 60°F noted on the Bill of Lading that does not contain FW but does contain suspended S&W.
2. Net Standard Volume (NSV), 60 °F, is defined as the GSV, 60 °F, (see Note 1), corrected for the percentage of suspended S&W that was reported in the laboratory report.
3. Nonliquid retains reported as solid retains shall have their measured volumes reported as volumes at 60 °F. If there is liquid cargo, but of insufficient quantity for API gravity or temperature determinations, then this liquid volume shall also be assumed to be volume at 60 °F. If there is sufficient liquid cargo for both API gravity and temperature data, then the 60 °F volumes will be based on that data. If OBQ or material ROB is liquid or solid (Lines K and R), indicate by including the word "liquid" or "solid" after the quantity listed.
4. Measured FW shall be recorded as volume uncorrected for temperature.
5. GSV, 60 °F, in the cargo compartments of a marine vessel shall be obtained by subtracting any measured FW from the total observed volume in the compartment, then correcting that compartment volume to 60 °F volume using the average temperature of the liquid within that compartment and the API gravity, 60 °F, found on the original Certificate of Quality associated with the Bill of Lading. The summation of all compartments involving the specific cargo will be reported.
6. TCV, 60 °F, is defined as the GOV corrected by the appropriate volume correction factor for the observed temperature and API gravity to the standard temperature (60 °F) plus FW (GSV + FW).

LETTER OF PROTEST
(Duplicate to be signed and returned)
Shore Facility

Date _____

Address

To the Port Representative of _____

In the Port of _____

Dear Sir or Madam:

On behalf of _____, we hereby notify you that on _____ day of _____, at _____ (a.m. or p.m.), the above named port caused (describe nature of the occurrence)

_____ at _____

in the city (or town) of _____

Accordingly, we are holding your port, the owners, operators, and other interested parties responsible for the loss and damage thereby sustained, as well as any consequential loss and damage arising therefrom.

Will you kindly acknowledge receipt on the copy thereof and return it to us. The signatures thus obtained are for receipt only and in no way acknowledge responsibility for the incident.

Please direct any written correspondence on this matter to:

Very truly yours,

By _____

Title _____

Receipt acknowledged:

(owner, agent, other)

cc: Port agent, owner, representative, or
operator (if different from owner)

LETTER OF PROTEST
(Duplicate to be signed and returned)
Marine Vessel

Date _____

Address

To the Master of SS _____

In the Port of _____
(or designate the agents, owner's representative, owner, or operator)

Dear Sir or Madam:

On behalf of _____, we hereby notify you that on _____ day of _____,
at _____ (a.m. or p.m.), the above named port caused (describe nature of the occurrence)

_____ at _____

in the city (or town) of _____

Accordingly, we are holding your vessel, her owners, charterers, operators, and other interested parties responsible for the loss and damage thereby sustained, as well as any consequential loss and damage arising therefrom.

Will you kindly acknowledge receipt on the copy thereof and return it to us. *The signatures thus obtained are for receipt only and in no way acknowledge responsibility for the incident.*

Very truly yours,

By _____

Title _____

Receipt acknowledged:

(master, agent, or other)

cc: Vessel agent, owner, representative,
operator (if different from owner)

NOTICE OF APPARENT DISCREPANCY

(Duplicate to be signed and returned)

Date _____

Address

To _____

In the Port of _____

Dear Sir or Madam:

On behalf of _____, we hereby notify you that on _____ day of _____,
at _____ (a.m. or p.m.), the above named terminal caused (describe nature of the occurrence)

_____ at _____

in the city (or town) of _____

Accordingly, you are hereby notified that further investigation is intended to resolve this discrepancy.

Will you kindly acknowledge receipt on the copy thereof and return it to us. *The signatures thus obtained are for receipt only and in no way acknowledge responsibility for the incident.*

Very truly yours,

By _____

Title _____

Receipt acknowledged:

(shore representative)



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