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Bunker Surveys on the East African Coast

Field observations, quantity assurance and vessel-performance insights across Djibouti, Kenya, Tanzania and Mozambique

MULTI-YEAR SERVICE EXPERIENCE | 510+ VESSELS | 9 COASTAL PORT LOCATIONS

Djibouti Port and Doraleh | Mombasa | Tanga | Dar es Salaam | Mtwara | Nacala | Beira | Pemba | Maputo

Prepared by Observater Surveys and Services Group

Independent bunker surveyors, marine surveyors and claims specialists

CONFIDENTIALITY-PROTECTED OPERATIONAL EVIDENCE - Aggregated port and vessel experience translated into practical survey, maintenance and claims guidance.

Abstract

Independent bunker surveying sits at the intersection of quantity assurance, charter-party accounting, marine engineering, fuel-quality control, environmental compliance and vessel-performance management. Along the East African coast, the value of that independence is amplified by the diversity of ports, transfer arrangements, vessel types, trading patterns and operational time windows. A bunker figure may be used to settle an on-hire or off-hire account, close a voyage, assess a delivery, investigate abnormal consumption or support a wider claim. If the measurement basis is weak, every downstream calculation is exposed.

This paper presents the multi-year experience of Observater Surveys and Services Group in bunker quantity surveys, on-hire and off-hire bunker surveys, remaining-on-board (ROB) surveys, delivery supervision, sampling, discrepancy investigation and related vessel-performance review across Djibouti, Kenya, Tanzania and Mozambique. It covers Djibouti Port and Doraleh; Mombasa; Tanga, Dar es Salaam and Mtwara; and Nacala, Beira, Pemba and Maputo. Anonymized and aggregated attendance experience is translated into practical planning guidance for each location.

The paper also summarizes an Observater operational review involving more than 510 vessels attended over several years. Repeated feeder-vessel attendances offered a useful opportunity to compare the same vessel with itself at different points in its maintenance cycle. Where suitable records were available, survey observations were considered alongside fuel-consumption trends, speed, draft, trim, operating pattern, hull-cleaning timing, maintenance records and the general orderliness of machinery spaces and bunker documentation. The resulting vessel-specific patterns show how bunker data can support maintenance timing, performance review and earlier technical intervention.

The central conclusion is straightforward: bunker assurance is strongest when quantity measurement, documentary discipline, maintenance information and vessel-performance data are treated as one evidence system. Clean underwater surfaces, current maintenance, reliable tank tables, controlled transfers, representative sampling and orderly records reinforce each other. Observater's role is to establish the facts, identify uncertainty, preserve evidence and help the parties reach defensible commercial and technical decisions.

> **KEY MESSAGE - A bunker survey is not merely a set of soundings. It is an independent reconciliation of physical quantity, documentary evidence, timing, vessel condition and calculation assumptions at a commercially defined moment.**

Executive Summary

What years of bunker-survey attendance have shown

Across the East African coast, the largest avoidable bunker disputes rarely begin with a single dramatic event. More often, they develop from several small weaknesses occurring together: measurements taken at different times, a trim correction not applied, an unsuitable density used, a transfer between tanks not recorded, a service tank omitted, a sampling process poorly documented or a delivery note signed before the figures are fully reconciled.

Observater's multi-year attendances have shown that a technically correct sounding can still produce a weak commercial result if the contractual time is unclear. Conversely, a carefully defined on-hire or off-hire time can still produce dispute if tanks are inaccessible, calibration tables are uncertain or consumption between the contractual time and physical attendance is not recorded. The surveyor must connect measurement, time, documentation and operations.

The practical controls that consistently strengthen a bunker case are:

1. early nomination and confirmed access;
2. a written scope identifying the contractual or operational cut-off time;
3. a complete tank list, including storage, settling, service, overflow, drain and relevant sludge tanks;
4. joint measurement wherever practicable;
5. correct tank identification and calibration tables;
6. recorded trim, list, temperature and density inputs;
7. a transfer and consumption log covering the survey window;
8. representative sampling and sealed sample custody where delivery quality is relevant;
9. immediate reconciliation before documents are finalized; and
10. prompt reservation of rights when a material difference remains unresolved.

What the 510+ vessel observational review added

Observater's multi-year operational review reinforced the technical connection between bunker control and vessel performance. On repeated feeder-vessel routes, the same vessel could sometimes be observed before hull cleaning, soon after cleaning and later in the fouling cycle. Where operating conditions were sufficiently comparable, a clean hull generally corresponded with a more favourable relationship between speed, engine demand and fuel consumed. A fouled or rough underwater surface generally corresponded with either more power and fuel required to maintain speed, or reduced speed at a similar power setting.

The most useful result was not a single fleet-wide savings percentage, but a vessel-specific performance direction. The effect varied with vessel design, fouling severity, coating condition, propeller condition, sea state, current, draft, trim and operating speed. When those factors were normalized and interpreted alongside other evidence, consumption trends often provided an early maintenance signal.

The review also found a recurring association between current planned-maintenance routines and more reliable bunker records. Vessels with orderly sounding stations, legible tank identification, available calibration tables, current logs and clean machinery spaces usually allowed faster, more repeatable surveys. Where documentation or housekeeping was disordered, the survey often required more reconciliation and the uncertainty band was harder to narrow. The operational value is clear: physical order and record discipline commonly reinforce the reliability and auditability of bunker evidence.

What this means for clients

For owners and managers, an independent survey protects the fuel asset, tests the integrity of internal controls and creates evidence for performance management. For charterers, it protects delivery and redelivery settlements and helps distinguish consumption from measurement error. For bunker buyers, it provides delivery oversight and sample custody. For suppliers, it can independently document transfer conditions and defend a properly executed delivery. For insurers and P&I interests, it preserves evidence before positions harden.

Observater can deploy a consistent survey methodology across the East African coast while adapting logistics and attendance planning to each port. The result is one regional evidence standard across Djibouti, Kenya, Tanzania and Mozambique.

Evidence Base and Appropriate Use

This paper gives shipowners, charterers, vessel managers, bunker buyers and suppliers, P&I Clubs, insurers, brokers, maritime lawyers, claims handlers, financiers, traders, technical managers and port agents an operational benchmark for bunker-survey planning and review. Legal, class, flag-State and contractual decisions remain vessel- and appointment-specific.

The port profiles draw on anonymized, aggregated attendance experience. They are planning profiles rather than ratings of any port, authority, supplier, vessel or crew. Because access procedures, transfer modes, environmental controls, supplier availability and launch arrangements can change, each nomination begins with confirmation through the vessel's agent and the relevant local parties.

The 510+ vessel review is a retrospective operational dataset in which record availability varied by vessel. Weather, current, loading condition, trim, speed, machinery condition, auxiliary demand, fuel properties and operating instructions were considered when the evidence allowed. Its strongest use is to identify

vessel-specific trends, prioritize investigation and establish better measurement baselines. A physical variance establishes a difference for reconciliation; attribution of cause requires the evidence appropriate to the quantity, quality, compliance or claims question involved.

Contents

Part I - Regional Context and Service Foundation

1. Bunker Assurance on the East African Coast

The coastline covered by this paper stretches from Djibouti at the entrance to the Red Sea, through Kenya and Tanzania, to Mozambique and the southern approaches of the Mozambique Channel. It includes high-frequency liner and feeder calls, bulk and breakbulk trades, project and offshore-support activity, tankers, general cargo ships and vessels calling primarily for cargo operations while receiving bunkers within the same port stay.

That diversity matters. The measurement principles are stable, but the attendance plan may differ significantly between a sheltered berth, an exposed anchorage, a barge delivery, a truck-to-ship transfer, a shore connection or an on-hire survey conducted between cargo operations. Access permissions, transport to the vessel, launch readiness, terminal safety rules, local weather, daylight restrictions and the sequence of other port services can influence the time at which the surveyor can physically measure the tanks.

Commercially, East African bunker surveys frequently support more than a bunker invoice. They may determine fuel settlement under a time charter, establish ROB at a change of employment, verify a bunker stem received during a short port call, investigate a voyage-consumption concern, support a performance claim or form part of a combined on-hire, off-hire or vessel-condition survey.

The strongest approach is therefore regional but not generic. Observater applies one calculation and evidence discipline while preparing a port-specific attendance plan for each nomination.

1.1 Why independence matters

The vessel, supplier, barge, owner and charterer may all generate figures for legitimate operational purposes. Those figures are not automatically wrong, but they are created from different positions and may use different time stamps, instruments, assumptions or contractual interests. An independent surveyor does not replace those records. The surveyor tests and reconciles them.

Independence is particularly valuable when:

28. delivery quantities will be paid immediately;
29. the vessel is entering or leaving a charter;
30. more than one fuel grade is carried;
31. internal transfers are taking place;
32. the vessel has substantial trim or list;

33. small tanks create high percentage sensitivity;
34. a prior discrepancy remains unresolved;
35. remote tank gauges conflict with manual measurements;
36. consumption between survey time and contractual time is material; or
37. a claim may later require contemporaneous evidence.

1.2 Quantity is not quality

A bunker quantity survey establishes how much fuel was measured within the agreed scope and time. It does not, without representative sampling and laboratory analysis, establish that the fuel meets a contractual specification. ISO 8217:2024 sets general requirements and specifications for marine fuels prior to onboard handling. MARPOL Annex VI and related IMO guidance address, among other matters, sulphur controls, bunker delivery documentation and representative samples.

A well-designed appointment may combine quantity verification, sampling supervision, seal control, document review and later laboratory testing. The resulting evidence should still distinguish clearly between:

38. quantity delivered or remaining on board;
39. grade declared;
40. sample identity and custody;
41. laboratory test results;
42. contractual specification; and
43. regulatory compliance.

2. What an Independent Bunker Survey Proves

A bunker survey produces a reasoned quantity determination based on observed measurements, vessel data and stated assumptions. It should allow a technically competent reviewer to understand how the final metric-tonne figure was reached and where uncertainty remains.

The core evidence normally includes:

44. the date, location and survey time;
45. vessel identity and attendance purpose;
46. declared fuel grades and quantities;
47. the list of tanks within scope;
48. sounding or ullage measurements;

49. tank temperatures;
50. vessel trim and list;
51. tank-table volumes and corrections;
52. densities and their documentary source;
53. calculations to standard reference volume where applicable;
54. transfers, consumption or deliveries during the survey window;
55. comparison figures and identified variances;
56. persons present;
57. qualifications or access limitations; and
58. signed measurement records, photographs and supporting documents where permitted.

2.1 The importance of the defined moment

On-hire and off-hire bunker surveys are time-sensitive. The charter-party may define delivery or redelivery by a particular event rather than by the time the surveyor boards. If the physical measurement is made before or after that event, consumption and transfers must be bridged by a clear reconciliation.

The report should distinguish:

59. the contractual time;
60. the physical measurement time;
61. any bunker delivery or internal transfer time;
62. consumption between those times; and
63. the basis on which the final contractual ROB was derived.

An unexplained time gap can create more disagreement than the soundings themselves.

2.2 Independent conclusions and decision boundaries

The independent surveyor establishes observed facts, calculations, inconsistencies and technical reservations. When a variance is identified, the first decision point is technical verification: confirm the inputs, repeat measurements where justified, review records and preserve the parties' positions. Questions of theft, fraud, deliberate manipulation or legal liability require a separate evidential basis and the appropriate investigative mandate.

This division of responsibility protects all parties and gives commercial, insurance and legal teams a technically credible foundation on which to make the next decision.

3. Observater's Multi-Year Regional Service Record

Observater has provided bunker and related marine surveys along the East African coast for multiple years. Assignments have included bunker quantity surveys during delivery, on-hire and off-hire ROB surveys, bunker detective work, fuel sampling, document review, vessel-condition surveys, consumption review, discrepancy investigation and coordinated attendance alongside cargo operations.

The service network addressed in this paper covers:

Country / region	Principal locations covered in this paper	Typical appointment categories
Djibouti	Djibouti Port, Doraleh and approved anchorage locations	BQS, on/off-hire ROB, delivery verification, sampling, discrepancy investigation
Kenya	Mombasa and other locations by arrangement	BQS, on/off-hire ROB, barge/truck/shore delivery oversight, condition surveys
Tanzania	Tanga, Dar es Salaam and Mtwara	BQS, ROB, charter surveys, sampling, consumption and document review
Mozambique	Nacala, Beira, Pemba and Maputo	BQS, ROB, charter surveys, sampling, offshore/project-vessel support

Transfer mode and supplier availability are reconfirmed for every call. The table describes Observater's survey capacity, not a guarantee that a specific product, supplier or transfer arrangement will be available at a particular time.

3.1 One regional method, adapted locally

Regional consistency is valuable because owners and charterers can receive comparable calculations and reporting even when a vessel trades through several countries. Local adaptation is equally important because attendance logistics determine whether the surveyor is present at the decisive moment.

Observater's operating model therefore separates:

64. the technical survey standard, which remains consistent;
65. the appointment scope, which follows the contract and client instructions;
66. the port attendance plan, which is locally coordinated;
67. the safety plan, which follows the vessel, terminal and authority requirements; and
68. the reporting format, which can be tailored to owner, charterer, insurer or claims needs.

3.2 Integrated technical capacity

Bunker quantity disputes can involve more than tank arithmetic. Observater's broader marine and cargo capability allows an appointment to be expanded, where instructed, to include vessel condition, machinery observations, fuel-transfer systems, underwater inspection coordination, hull-cleaning attendance, cargo-operation interfaces, document review, claims support and post-survey technical analysis.

This integrated capacity is particularly useful when abnormal consumption may involve a combination of hull condition, propeller condition, machinery performance, operational profile and bunker-record reliability.

Part II - The 510+ Vessel Observational Study

4. Study Purpose, Dataset and Method

Observater reviewed an anonymized operational dataset covering more than 510 vessels attended over multiple years. The study was designed to answer a practical question: what recurring relationships can be observed when bunker-survey evidence is considered together with vessel consumption, maintenance timing, hull-cleaning status and the general reliability of shipboard records?

The dataset included different vessel types, but feeder and regularly trading vessels were especially informative because repeated calls created more opportunities to compare the same ship with itself. This is methodologically preferable to comparing unrelated vessels. ISO 19030-2 similarly frames hull and propeller performance measurement around comparison of the same ship over time.

4.1 Data categories considered

Where available and relevant, the review considered:

69. bunker soundings or ullages and calculated ROB;
70. bunker delivery quantities and BDN information;
71. fuel grade and density records;
72. engine-room consumption records;
73. daily or voyage fuel consumption;
74. speed and distance;
75. vessel draft and trim;
76. main-engine operating demand;
77. auxiliary-engine and boiler load;
78. weather, sea-state and current information;
79. hull-cleaning and propeller-polishing dates;
80. dry-docking and coating information;
81. planned-maintenance status;
82. tank-gauge and sounding-equipment condition;
83. internal fuel-transfer records;
84. machinery-space housekeeping;
85. legibility and availability of tank identification; and
86. quality and consistency of logbooks, noon reports and calculation records.

Not every category was available for every vessel. The study did not fill missing data by assumption. Findings were weighted toward recurring patterns visible in repeated or sufficiently documented attendances.

4.2 Analytical approach

The review used four practical lenses.

Same-vessel comparison

Where possible, the vessel's own performance before and after a documented hull-cleaning or maintenance event was compared. This reduces, but does not eliminate, design and machinery differences.

Normalization

Raw daily fuel consumption was not treated as a complete performance measure. Speed, distance, draft, trim, weather, current and auxiliary demand were considered where records allowed. Consumption per nautical mile, power demand at a given speed and speed achieved at a similar power setting were more informative than a single daily total.

Evidence confidence

Each observation was considered in light of the underlying record quality. A trend supported by consistent soundings, stable tank tables and complete logs carried more weight than a trend dependent on uncertain or contradictory records.

Applying the findings across different vessels

The study sought repeated directions of change and then tested how strongly they applied to the vessel concerned. This approach reflects the real differences between vessel types, coatings, trading patterns and fouling severity and produces a more useful basis for maintenance and commercial decisions than a single fleet-wide percentage.

4.3 Variables used in vessel-level interpretation

The review was retrospective and operational, reflecting the evidence available during real vessel attendances. To make each fuel-and-speed comparison commercially useful, the following variables were considered wherever the records allowed:

87. wind, waves and current;
88. water depth and water density;
89. displacement, draft and trim;
90. speed instructions and schedule pressure;

91. engine and propeller condition;
92. hull coating type, age and damage;
93. biofouling severity and distribution;
94. fuel calorific value and physical properties;
95. auxiliary and reefer load;
96. boiler use;
97. maneuvering and port time;
98. route changes;
99. measurement timing and human entry errors; and
100. cleaning method and the condition of the coating after cleaning.

These variables determine how much weight can be placed on a particular trend. The review therefore supports targeted investigation, maintenance prioritization and stronger measurement baselines, while formal seaworthiness, compliance and efficiency determinations remain within their applicable technical and regulatory processes.

5. Principal Findings from the 510+ Vessel Review

5.1 Hull cleanliness and the fuel-speed relationship

The clearest recurring observation was that underwater condition matters. On feeder vessels with repeat routes, performance after an effective hull cleaning was generally more favourable than during periods when fouling was reported or suspected. Depending on the operating strategy, this appeared as:

101. lower fuel required to maintain a comparable service speed;
102. lower main-engine demand at a comparable speed;
103. improved speed at a similar engine setting; or
104. reduced schedule pressure for the same voyage.

The signal was not identical on every vessel. Light slime, heavier macrofouling, propeller roughness and coating condition affect resistance differently. A cleaning that removes fouling but damages the coating may not produce the same durable outcome as a properly selected cleaning method.

IMO's 2023 Biofouling Guidelines recognize performance monitoring, including fuel-consumption monitoring, as a possible indicator of biofouling accumulation. IMO's 2025 guidance on in-water cleaning also emphasizes local authorization, environmental controls, coating protection and appropriate capture practices. Observater therefore treats performance gain and environmental compliance as linked, not competing, objectives.

5.2 Dirty-hull signals were often visible before a critical loss of schedule

On vessels with reasonably consistent operations, the earliest signal was not always a dramatic rise in daily fuel use. It could be a gradual increase in engine demand to hold speed, a small but persistent speed loss at the usual setting, or a widening difference between planned and actual voyage consumption.

This matters because waiting for a major performance failure can be more expensive than investigating a sustained trend. A normalized trend can justify:

105. record validation;
106. underwater inspection;
107. propeller and niche-area review;
108. machinery-performance checks; and
109. a maintenance decision based on evidence.

5.3 Cleaning benefit was easiest to see on regular feeder services

Feeder vessels often repeat routes, speeds and port patterns. That repetition creates a useful performance baseline. When a vessel returned to a similar service after cleaning, the before-and-after relationship could be assessed with fewer route differences than would be possible for a tramp vessel changing trades.

Even then, the comparison required caution. Cargo load, draft, waiting time, current, weather and schedule instructions could change between voyages. The value of repeated attendance was not that all conditions were identical, but that the surveyor and technical manager had more reference points from the same vessel.

5.4 Hull and propeller effects could not always be separated

Hull cleaning and propeller polishing are sometimes carried out together. An improvement observed afterward may be a combined effect. The study did not assign a precise proportion of performance change to the hull or propeller unless separate evidence supported that conclusion.

For stakeholders, separating the hull and propeller contributions prevents unsupported allocation of fuel savings and keeps maintenance decisions tied to the evidence available.

5.5 Maintenance discipline and record reliability moved together

Vessels with current maintenance routines tended to present:

110. accessible and clearly identified sounding points;
111. functioning self-closing devices and caps;

112. cleaner tapes, thermometers and sampling arrangements;
113. more consistent remote and manual readings;
114. available calibration tables;
115. traceable internal-transfer records; and
116. faster reconciliation of survey figures.

Where maintenance was deferred, the problem was not necessarily excessive consumption. Sometimes the immediate effect was data uncertainty: a gauge drifted, a sounding pipe was difficult to access, a tank label was unclear or a log did not explain a transfer. These weaknesses increase the time and cost of determining the truth.

5.6 Tidiness as an operational control indicator

Observater surveyors noted a recurring association between orderly machinery spaces and orderly bunker records. Clean, clearly marked and unobstructed sounding stations reduced measurement friction. Well-filed tank tables and transfer records reduced reconciliation time.

Orderly physical and documentary systems made bunker measurements more repeatable and auditable. Tidiness is therefore valuable as a control indicator: it improves access, reduces identification error and supports faster reconciliation, while the accuracy of ROB remains established by physical measurement and calculation.

5.7 Bunker surveys can strengthen performance management

A one-time survey settles a defined quantity question. A series of surveys can do more. When ROB, deliveries, consumption, distance and maintenance events are consistently recorded, the data can reveal:

117. unexplained inventory drift;
118. recurring differences between remote and manual gauges;
119. abnormal consumption after a maintenance event;
120. apparent performance degradation between cleanings;
121. discrepancies between noon reports and tank movement;
122. boiler or auxiliary demand that is masking main-engine trends; and
123. weaknesses in the fuel-data chain used for internal reporting.

The bunker survey therefore becomes a verified checkpoint within the vessel's broader energy and maintenance record.

5.8 Consolidated finding matrix

Recurring signal	Direction observed in suitable cases	Operational significance	Recommended control
Effective hull cleaning	More favourable speed / power / consumption relationship	Supports a maintenance-effect conclusion when normalized against weather, loading and machinery factors	Compare the same vessel over repeated voyages and preserve the cleaning record
Progressive fouling or roughness	Rising demand to maintain speed, or speed loss at similar demand	Provides a reason to test for increased underwater resistance through validated data and inspection	Validate data, then consider underwater inspection
Current planned maintenance	More stable instruments, records and access	Maintenance discipline supports data reliability	Include bunker-measurement equipment in PMS
Orderly machinery spaces and files	Faster reconciliation and fewer unexplained inputs	Orderliness strengthens access, traceability and evidence quality	Standardize tank labels, tables and transfer logs
Repeated independent ROB checkpoints	Reduced inventory uncertainty over time	Trend value increases when timing and method are consistent	Use the same measurement protocol at agreed milestones
Incomplete time bridge	Larger contractual disagreement despite acceptable soundings	Survey time and charter time are not aligned	Record consumption and transfers between the two times

Part III - Bunker Survey Types and Technical Methodology

6. Bunker Survey Types and Commercial Use Cases

6.1 Bunker Quantity Survey during delivery

A Bunker Quantity Survey (BQS) independently determines the quantity transferred during a bunker delivery. The scope may include pre-delivery measurements, monitoring of transfer, representative sampling, post-delivery measurements, quantity reconciliation and document review.

A BQS should identify the receiving vessel, supplying unit or shore source, fuel grade, nominated quantity, start and completion times, tanks involved, measurements, temperatures, density basis, calculations, samples and any material event during the transfer.

6.2 On-hire and off-hire ROB surveys

An on-hire or off-hire survey establishes the bunker and, where instructed, lubricating-oil quantities at a charter transition. The result can directly affect the hire account and final financial settlement.

The survey may be combined with a vessel-condition survey. Combining the appointments can be efficient, but the bunker scope must remain technically complete. The defined charter time, physical measurement time and consumption bridge should be stated unambiguously.

6.3 Delivery and redelivery surveys

Delivery and redelivery can occur at a berth, anchorage, pilot station or another contractually defined place. The survey plan must reflect the agreed event and the practical point at which safe measurement is possible. If the times differ, the report should show how the figure was adjusted.

6.4 ROB verification and inventory audit

An ROB survey may be commissioned outside a charter transition to test inventory, investigate a book-versus-physical difference or establish a baseline before a voyage, repair period or management change.

Repeated inventory audits are especially useful where:

124. manual and remote gauges disagree;
125. numerous small tanks are used;
126. frequent internal transfers occur;
127. sludge treatment affects recorded quantities;
128. fuel is consumed by several engines and boilers; or
129. management requires an independent control checkpoint.

6.5 Bunker detective and consumption analysis

A bunker detective survey extends beyond a single measurement. It may reconstruct deliveries, transfers and consumption over a period; compare tank movements with logbooks and voyage activity; review machinery loads; and identify where the evidence stops reconciling.

The result should distinguish confirmed facts, calculated values, documentary statements and technical hypotheses. It should not label a difference as deliberate without adequate evidence.

6.6 Fuel sampling and quality support

Sampling can support contractual testing, MARPOL-related requirements and incident investigation. The surveyor may witness continuous-drip sampling at the receiving ship's manifold, divide the composite sample, record seal numbers, secure signatures and establish custody for laboratory dispatch.

The IMO's 2024 sampling guidance describes continuous-drip, time-proportional and flow-proportional methods and emphasizes a representative sample drawn throughout the bunkering period at the receiving ship's manifold.

7. Technical Methodology: From Nomination to Final Report

7.1 Stage 1 - Nomination and scope control

The appointment should identify:

130. vessel name and IMO number;
131. port, berth or anchorage;
132. ETA and expected attendance window;
133. survey type;
134. contractual time or delivery basis;
135. fuel grades;
136. nominated or declared quantities;
137. parties to be represented;
138. agent and supplier contacts;
139. sampling and laboratory instructions;
140. reporting urgency; and
141. any known discrepancy, protest or access limitation.

Early nomination is especially important for anchorage attendance, short port stays, multi-port feeder schedules and surveys tied to delivery or redelivery.

7.2 Stage 2 - Pre-survey briefing

On board, the surveyor confirms the scope with the Master, Chief Engineer or responsible officer. A tank list is established and the measurement sequence is agreed. Any ongoing consumption, transfer, purification, heating or delivery must be identified.

The surveyor requests relevant documents, which may include:

142. tank-capacity tables;
143. trim/list correction tables;
144. bunker delivery notes;
145. engine logbooks;
146. oil record book entries where relevant;
147. internal-transfer records;
148. fuel analysis reports;
149. declared ROB statement;
150. charter-party extracts or written cut-off instructions;
151. meter records; and
152. previous survey or calibration information.

7.3 Stage 3 - Vessel condition inputs

Before tank calculations, the surveyor records the vessel's drafts, trim and list or obtains a reliable basis for them. The measurement method, equipment identity and condition should be noted. Tanks that cannot be safely accessed should be reported as limitations rather than estimated without a stated basis.

7.4 Stage 4 - Tank measurement

The method may be sounding, ullage or an agreed alternative. Manual measurement is normally compared with remote indication where available, but a remote display should not be treated as automatically superior or inferior. The key question is whether the instrument is calibrated, stable and suitable for the tank and conditions.

Good practice includes:

153. confirming the exact tank and fuel grade;
154. checking that the sounding tape or ullage equipment is clean and suitable;
155. obtaining repeat readings where the surface is unstable;
156. recording temperature at a representative level or using an agreed method;

157. noting foam, agitation or access limitations;
158. identifying free water where the scope and safe method allow; and
159. obtaining joint acknowledgement of the observed reading.

7.5 Stage 5 - Volume and mass calculation

The observed measurement is converted to tank volume using the correct calibration table. Trim or list correction is applied where required. The observed volume is then converted using the relevant density and temperature basis.

The calculation record should show:

160. tank identity;
161. observed sounding or ullage;
162. correction applied;
163. resulting volume;
164. temperature;
165. density and its source;
166. conversion basis; and
167. final metric tonnes.

Hidden spreadsheet formulas or unexplained software output weaken the audit trail. The report need not reproduce every internal formula, but the calculation basis must be reviewable.

7.6 Stage 6 - Transfer monitoring

During delivery, the surveyor monitors the sequence of events and records:

168. connection and disconnection times;
169. start, stop and completion times;
170. line displacement arrangements;
171. tank changes;
172. unusual stoppages;
173. pressure or rate concerns reported by the parties;
174. sampling operation;
175. spills, leaks or safety events within the surveyor's observed scope;
176. protest communications; and
177. the point at which final measurements are stable.

The surveyor does not control the vessel or supplier's operation. The surveyor observes, records and raises relevant concerns through the responsible officers.

7.7 Stage 7 - Reconciliation

The final comparison may include:

178. supplier or barge figure;
179. receiving-vessel figure;
180. BDN quantity;
181. mass-flow-meter figure, where used;
182. nominated quantity;
183. book ROB;
184. physical ROB; and
185. contractual ROB after time adjustment.

A difference should be tested systematically before positions are fixed. Tank omissions, unit conversion, temperature, density, trim, list, line content, measurement timing and internal transfers should be checked.

7.8 Stage 8 - Reporting

The report should separate:

186. observed facts;
187. information provided by others;
188. calculated results;
189. unresolved differences;
190. limitations;
191. samples and seals;
192. documents reviewed; and
193. recommendations or reservations.

For urgent commercial decisions, Observater can issue a preliminary statement or attendance update followed by the full report and supporting calculations.

8. Measurement Uncertainty and Common Sources of Difference

No physical measurement is perfectly exact. The professional objective is to reduce uncertainty, make it visible and prevent avoidable error.

8.1 Tank calibration

Tank tables may contain historical assumptions and can be sensitive to structural changes, scale, deformation or repair. A surveyor should use the vessel's approved or accepted tables but may note concerns if identification is unclear or readings produce improbable results.

8.2 Small tanks and percentage sensitivity

A small absolute measurement error can become a large percentage difference in a small service or settling tank. These tanks should not be ignored, but their sensitivity should be understood when interpreting the final variance.

8.3 Trim and list

Long or irregular tanks can show a material volume change for a relatively small change in trim. Using an uncorrected reading when a correction table is required may create a systematic error across several tanks.

8.4 Temperature

Fuel volume changes with temperature. A temperature that is copied from a document rather than measured or reasonably established may distort the mass calculation. Stratification can also make one reading unrepresentative.

8.5 Density

The density source should be identified. A nominal density, BDN density, laboratory density and observed or corrected density are not interchangeable without explanation.

8.6 Free water, sludge and unpumpable quantities

Parties may treat water, sludge or unpumpable fuel differently under contracts and internal records. The survey should record the physical observation and contractual treatment separately. A surveyor should not make a legal interpretation unless specifically retained and competent to do so.

8.7 Line content and line displacement

Fuel remaining in or displaced from hoses and pipelines may affect the comparison between supplying and receiving figures. The agreed line-clearing method and the point at which delivery is considered complete should be recorded.

8.8 Measurement timing

Tank surfaces may remain unstable immediately after transfer. Final soundings taken too early can be unreliable. At the same time, operational schedules may limit waiting. The surveyor should document the condition and any qualification.

8.9 Human and transcription error

A technically sound operation can still be weakened by a transposed tank number, incorrect unit, copied density, arithmetic mistake or premature signature. Joint review of the measurement sheet before finalization remains one of the simplest controls.

9. Sampling, Fuel Quality and Documentary Integrity

9.1 Representative sampling

A bottle filled at one moment may not represent a delivery that occurred over several hours. A representative primary sample should be collected across the delivery using a suitable method and at the appropriate location. For MARPOL delivered-sample purposes, current IMO guidance identifies the receiving ship's bunker manifold and describes continuous-drip or proportional methods.

The sampling record should identify:

194. vessel and supplier;
195. fuel grade;
196. delivery date and location;
197. sample point;
198. sampling method;
199. start and completion times;
200. container preparation;
201. seal numbers;
202. distribution of samples;
203. persons witnessing; and
204. subsequent custody or laboratory destination.

9.2 Sample custody

An excellent sample can lose evidential value if seals, labels or custody are uncertain. Each retained bottle should be uniquely identified, sealed and recorded. The report should state who retained each sample and whether any party declined to sign or accept a bottle.

9.3 Bunker Delivery Note review

The BDN is an important delivery document, but a quantity survey should not simply reproduce it. Review may include:

205. vessel and supplier identity;
206. date and location;
207. grade and quantity;
208. density;
209. sulphur declaration;
210. signatures;
211. sample references; and
212. consistency with the survey measurements.

The BDN, survey calculation and laboratory report serve different functions. They should be linked without being confused.

9.4 Fuel-quality warning signs

Surveyors do not diagnose fuel quality by sight alone. They may, however, record observable conditions such as unusual odour, visible separation, excessive sediment, water indications, inconsistent documentation or abnormal handling. Laboratory testing is required for specification conclusions.

Where compatibility between fuels is a concern, segregation and controlled testing may be more important than a quantity calculation. The scope should be agreed before commingling removes the opportunity for clear attribution.

10. Responding to a Bunker Difference

10.1 A disciplined escalation sequence

When a material difference appears, the following sequence helps preserve both accuracy and working relationships:

213. stop and verify that the same time basis and units are being compared;
214. confirm every tank and fuel grade;
215. repeat disputed measurements jointly where safe and practicable;
216. verify temperature, density, trim, list and tank tables;
217. review internal transfers and consumption;
218. review line displacement and completion status;

219. compare vessel, supplier, meter and documentary figures;
220. preserve sample and measurement evidence;
221. record unresolved positions without inflammatory language; and
222. issue a protest or reservation of rights through the appropriate party where instructed.

10.2 Anonymized Djibouti case example

During a recent Observater bunker survey at Djibouti Port, the independent reconciliation identified positive variances of:

Fuel grade	Positive variance
VLSFO	+35.729 MT
LSMGO	+10.872 MT
Combined	+46.601 MT

The vessel and appointing party remain confidential. The commercially relevant finding was that the physically determined quantities differed materially from the figures submitted for comparison. The survey converted that difference into documented evidence for reconciliation; any further conclusion on cause would depend on a separate review of the relevant records and circumstances.

The case illustrates why declared ROB should not substitute for independent measurement when a charter settlement or operating account depends on the result.

10.3 Evidence-based reporting for claims and settlement

When a difference remains unresolved, precise factual wording allows owners, charterers, suppliers, insurers and counsel to act without losing the value of the original evidence. Useful report formulations include:

223. "a variance was identified";
224. "the figures did not reconcile on the information available";
225. "the following input could not be independently verified";
226. "a repeat measurement produced…";
227. "the parties were advised to reserve their respective positions"; and
228. "no conclusion on cause is offered without further investigation."

This wording identifies what is known, what remains unresolved and what requires further investigation. It strengthens later commercial negotiation or claims analysis because the report remains anchored to verifiable facts.

Part IV - Port-by-Port Operational Observations

11. Scope of the Regional Operational Observations

The following sections combine Observater's multi-year field experience with practical appointment planning. Each section functions as a planning profile for survey access, timing, transfer arrangements and measurement control. The same measurement risks can arise at many ports, so the profiles support preparation rather than comparative ranking.

For every nomination, Observater reconfirms transfer mode, local permissions, supplier availability, launch requirements, terminal access and safety procedures with the relevant local parties. This appointment-specific check converts regional experience into a workable plan for the actual call.

12. Djibouti: Djibouti Port, Doraleh and Anchorage Attendances

Djibouti is positioned on a major international shipping route and also serves the Horn of Africa's inland trade corridors. Observater's bunker work in Djibouti has included delivery surveys, on-hire and off-hire ROB surveys, sampling, quantity reconciliation and discrepancy investigation.

12.1 Recurring planning lessons

The main operational lesson has been the importance of precise timing. A vessel may combine bunkering with cargo, stores, crew or other port services. The surveyor should therefore receive the expected bunker window, transfer location, agent contact and boarding arrangement early enough to be present for opening measurements.

Anchorage or offshore attendance requires particular attention to safe transfer, launch coordination and weather. Berth attendance still requires access and terminal coordination. A nomination that states only the vessel's ETA is not enough; the relevant time is the expected survey or bunker start.

12.2 Measurement observations

On-hire and off-hire assignments in Djibouti frequently demonstrate the importance of:

229. separating contractual time from boarding time;
230. accounting for consumption during port stay;
231. identifying all VLSFO and LSMGO tanks;
232. reviewing internal transfers before final ROB;
233. confirming the density source for each grade; and
234. reconciling declared ROB before the vessel sails.

The anonymized +46.601 MT case in this paper is an example of why independent verification can materially alter the commercial evidence.

12.3 Observater capacity in Djibouti

Services include BQS, on/off-hire ROB, bunker sampling, condition surveys, cargo surveys, claims support and coordinated evidence continuity where cargo or vessel issues extend into the Ethiopia-Djibouti corridor.

13. Kenya: Bunker Surveys at the Port of Mombasa

Mombasa is a major regional gateway with a broad mix of vessel types and cargo operations. Official Kenya Ports Authority information lists bunkering among port services, while detailed port requirements govern oil transfer within the harbour. For survey planning, the transfer mode and permissions should be confirmed for the specific operation.

13.1 Recurring planning lessons

Survey attendance often has to fit around pilotage, cargo work, terminal activity, stores and sailing schedules. Clients gain the strongest protection when the surveyor is nominated before the supplier arrives and receives the vessel agent's boarding plan.

Where fuel is delivered by barge, truck or shore arrangement, the scope should identify which side or sides will be measured. If the supplying unit is outside the surveyor's access, the report should state that limitation and avoid implying a joint barge-and-vessel calculation.

13.2 Measurement observations

Observater surveyors in Mombasa have repeatedly found value in:

235. verifying the full tank list before measurement;
236. recording port consumption and auxiliary demand;
237. checking line clearing and completion;
238. keeping cargo and bunker event times separate;
239. preserving sample labels and seal records; and
240. issuing prompt preliminary figures where sailing time is tight.

These controls reflect the same good practices required at busy ports worldwide and allow clients to apply one evidence standard in Mombasa and across a wider regional survey programme.

13.3 Performance and maintenance opportunities

Mombasa calls can also provide a useful checkpoint for feeder and regional vessels. When bunker measurement is combined with underwater inspection, cleaning records or a condition survey, technical managers can connect physical inventory with performance and maintenance evidence.

14. Tanzania: Dar es Salaam

Dar es Salaam handles diverse liner, bulk, tanker, project and coastal activity. The combination of port services and vessel schedules makes appointment sequencing important.

14.1 Recurring planning lessons

The survey scope should distinguish whether the appointment concerns a delivery, ROB, charter transition or broader investigation. A request for "bunker survey" without a defined purpose can lead the parties to expect different outputs.

Where bunkering overlaps with cargo operations, the surveyor should confirm safe access to all relevant measurement points. Any tank that cannot be measured should be documented as a limitation. The report should also record machinery consumption during extended port stays, particularly where reefer, cargo-gear, boiler or auxiliary loads are material.

14.2 Measurement observations

Recurring controls that have proved useful include:

241. confirming tank identity before and after internal transfers;
242. separating fuel grades and density sources;
243. comparing remote gauges with manual measurements;
244. recording transfer interruptions;
245. reconciling the BDN only after final readings stabilize; and
246. keeping a clear timeline where charter and bunker events are close together.

14.3 Regional service connection

Dar es Salaam can be treated as part of a wider Tanzania survey program. A vessel calling Dar es Salaam, Tanga and Mtwara can be followed using a consistent ROB and reporting method, reducing discontinuity between appointments.

15. Tanzania: Tanga

Tanga's operating scale and call patterns differ from Dar es Salaam, but the technical bunker-survey requirements remain the same. Early coordination is particularly valuable when attendance depends on local transport, launch or a narrow vessel window.

15.1 Recurring planning lessons

The agent should confirm the vessel's exact location, access arrangement and expected transfer time. Short-notice changes can be managed more effectively when the surveyor already has the vessel particulars, tank plan and written scope.

15.2 Measurement observations

Smaller ports do not mean smaller commercial exposure. A vessel may carry multiple grades, have a significant charter ROB or receive a delivery affecting the next voyage. The survey should therefore retain the full discipline of:

247. joint opening measurements;
248. temperature and density control;
249. representative sampling where instructed;
250. transfer timeline;
251. final reconciliation; and
252. immediate reporting of unresolved differences.

15.3 Protecting the opening measurement baseline

Appointment before transfer begins preserves the initial tank condition, sample continuity and joint-measurement opportunity. Once that baseline is lost, the surveyor can document the remaining evidence but cannot recreate the original condition with the same evidential strength.

16. Tanzania: Mtwara

Mtwara supports bulk, project, energy-related and regional trades. The range of vessel types can include ships with specialized operational profiles and significant auxiliary demand.

16.1 Recurring planning lessons

The surveyor should understand whether the vessel is alongside, at anchorage or engaged in offshore or project support. Boarding, safety and timing must be arranged accordingly. Supplier and transfer arrangements should be confirmed per call.

16.2 Measurement observations

For vessels with high auxiliary or operational load, a simple daily-consumption assumption may be inappropriate. The report should identify, where relevant:

253. main-engine status;
254. number of auxiliaries online;
255. cargo or deck machinery in use;
256. boiler demand;
257. dynamic-positioning or specialized operating demand; and
258. consumption during the interval between contractual and survey time.

This context helps distinguish a quantity difference from a consumption-accounting difference.

16.3 Maintenance integration

Mtwara attendances can be expanded to machinery-condition review, project-vessel inspection, underwater inspection coordination or consumption analysis. This is valuable where the bunker question is part of a larger asset-performance concern.

17. Mozambique: Nacala

Nacala is a northern Mozambique port with deep-water characteristics and liquid-bulk infrastructure described by the national ports and railways authority. Observater's appointment planning treats the port as part of the wider northern corridor that also includes Pemba.

17.1 Recurring planning lessons

Clients should provide adequate notice for local deployment, access and any launch requirement. Written instructions should identify whether the survey includes only the receiving vessel or also the supplying side.

17.2 Measurement observations

The most useful controls are familiar:

259. verify tank tables before boarding where possible;
260. confirm whether the vessel has significant trim;
261. separate VLSFO, MGO and other grades;
262. record port and auxiliary consumption;
263. monitor tank changes during delivery; and

264. reconcile before documentation is closed.

17.3 Corridor value

Where the same owner or charterer has vessels calling several Mozambique ports, one survey protocol and one reporting structure improve comparability. This is more useful than forcing unlike ports into a ranking.

18. Mozambique: Beira

Beira is an estuarine port serving important regional cargo corridors. Navigation, tide, weather and port schedules can influence attendance timing, so the vessel's agent remains central to operational coordination.

18.1 Recurring planning lessons

A surveyor nominated for anchorage or berth attendance needs the most current boarding information, not only the original ETA. If a vessel's schedule changes, the contractual survey time and actual boarding time should be reconfirmed.

18.2 Measurement observations

Observater's approach at Beira emphasizes:

265. stable final measurements after transfer;
266. clear documentation of line clearing;
267. correct temperature and density inputs;
268. separate treatment of port consumption;
269. sample custody; and
270. prompt notification if figures do not reconcile.

18.3 Claims readiness

Where a bunker difference becomes a claim, contemporaneous measurement sheets, photographs, logs and signed reservations are more valuable than a narrative written weeks later. Observater's cargo and claims presence in Beira allows related evidence to be coordinated under one file when instructed.

19. Mozambique: Pemba

Pemba serves general, project and offshore-related activity in northern Mozambique. Vessel operating profiles can vary widely, making scope definition especially important.

19.1 Recurring planning lessons

The appointment should identify the vessel's operational mode and whether propulsion, auxiliaries, boilers or specialized equipment will consume fuel during the survey window. The surveyor should not apply a generic hourly consumption assumption when vessel-specific records are available.

19.2 Measurement observations

For offshore-support and project vessels, tank geometry, frequent internal transfers and variable load can complicate reconciliation. A clear transfer log and agreed measurement freeze provide stronger evidence than retrospective reconstruction.

19.3 Integrated survey capacity

Observater can combine bunker attendance with condition, project-cargo, lifting, machinery or underwater-survey support where the client requires a broader technical picture.

20. Mozambique: Maputo

Official Port of Maputo information confirms bunker services and identifies several fuel and lubricant categories. Port information has also described barge availability, including VLSFO service. The exact product, supplier, transfer location and current arrangement should nevertheless be reconfirmed for each call.

20.1 Recurring planning lessons

Maputo appointments benefit from early confirmation of whether delivery will occur alongside or at anchorage and whether the supplying unit can be jointly measured. The surveyor should know the nominated grade, density basis and anticipated delivery quantity before opening measurements.

20.2 Measurement observations

Where several grades are carried, tank allocation and segregation deserve particular attention. A quantity survey should record any tank change and avoid using a single density across unlike products.

Useful controls include:

271. pre-delivery tank plan;
272. joint opening and closing readings;
273. manifold sampling;
274. line displacement record;
275. BDN reconciliation;

276. prompt protest if a material difference remains; and
277. retention of the complete calculation trail.

20.3 Southern corridor connection

Maputo can serve as the southern end of a consistent East African bunker-survey network. For fleets trading between Mombasa, Tanzania and Mozambique, Observater can apply a common reporting structure across the route.

21. Regional Port Planning Matrix

Location	Operational planning priority	Measurement focus	Wider Observater capability
Djibouti / Doraleh	Berth or anchorage access; precise bunker and charter timing	Multi-grade ROB, time bridge, density and transfer history	Cargo, claims and Ethiopia-corridor continuity
Mombasa	Coordinate with cargo work, transfer mode and port access	Full tank list, line clearing, samples and port consumption	Condition, underwater and claims support
Dar es Salaam	Define purpose and manage simultaneous operations	Tank identity, remote/manual comparison and stable finals	Tanzania multi-port reporting
Tanga	Early local and launch coordination	Preserve opening baseline and full survey discipline	Regional deployment and charter surveys
Mtwara	Confirm vessel operating mode and specialized loads	Consumption bridge and auxiliary demand	Project, machinery and underwater support
Nacala	Early deployment and clear supplying-side scope	Trim, grade segregation and tank changes	Northern Mozambique continuity
Beira	Keep boarding plan current with vessel schedule	Stable finals, line clearing and evidence preservation	Cargo and claims coordination
Pemba	Define offshore/project operating profile	Transfers, variable load and measurement freeze	Project, condition and underwater support
Maputo	Confirm berth/anchorage and supplying-unit access	Multi-grade segregation, samples and BDN reconciliation	Southern corridor fleet coverage

Part V - Hull Performance, Maintenance and Emissions

22. Why a Dirty Hull Changes the Bunker Conversation

A ship's underwater hull and propeller must overcome hydrodynamic resistance. Biofouling and surface roughness increase resistance and can change the power required to achieve a given speed. IMO guidance recognizes that performance monitoring, including fuel-consumption monitoring, may indicate biofouling accumulation. ISO 19030-2 provides a default method for measuring changes in hull and propeller performance by comparing the same ship with itself over time.

This connection matters to bunker surveyors because abnormal consumption can be misclassified. A charterer may suspect an ROB error when the vessel is consuming more fuel to maintain schedule. An owner may attribute the entire difference to weather when a normalized trend also suggests underwater degradation. Integrating quantity, voyage and condition evidence helps separate the most plausible explanations and direct the next technical action.

22.1 The performance triangle

Three questions should be considered together:

278. What physical bunker quantity was present or delivered?
279. What fuel was consumed over the relevant distance and operating period?
280. What vessel, machinery and environmental conditions explain the required power?

If only the first question is answered, the account may settle but the performance problem remains. If only the second is answered, the consumption data may rest on an unreliable inventory baseline. If only the third is answered, the economic effect may not be quantified.

22.2 Before-and-after cleaning review

A useful review compares the same vessel across:

281. a pre-cleaning baseline;
282. the first suitable voyages after cleaning;
283. later voyages as the fouling cycle develops; and
284. the next maintenance event.

Data should be normalized as far as possible for speed, draft, trim, weather, current and auxiliary demand. The purpose is not to produce a perfect laboratory result but to decide whether the observed change is strong enough to justify action.

22.3 Building a vessel-specific performance baseline

Published research shows that biofouling can materially affect resistance, fuel use and emissions, while the scale of the effect depends on vessel design, coating condition, fouling severity and operating profile. Observater therefore builds the performance baseline from the vessel's own repeated data rather than applying a generic fleet percentage.

The resulting output is a vessel-specific range or direction supported by the quality of the underlying evidence. This gives technical managers a more dependable basis for evaluating cleaning results, scheduling the next intervention and estimating the commercial effect.

23. Maintenance Schedules and Bunker Reliability

23.1 Planned maintenance as a data-control system

The planned maintenance system is usually discussed in relation to machinery reliability and safety. It also affects bunker data. Sounding equipment, remote gauges, temperature sensors, tank alarms, valves, transfer pumps and record systems all depend on maintenance.

When these components are current, the vessel is more likely to produce consistent evidence. When they are overdue or unreliable, the survey may still be completed, but with more manual verification and wider uncertainty.

23.2 Maintenance events to correlate with consumption

Technical managers should consider recording:

285. hull cleaning;
286. propeller polishing;
287. dry-docking;
288. coating application or repair;
289. main-engine overhaul;
290. turbocharger cleaning;
291. fuel-injector work;
292. economizer and boiler maintenance;
293. flow-meter calibration;
294. tank-gauge calibration;
295. speed-log or weather-sensor work; and
296. changes in fuel treatment or operational practice.

Without event dates, a consumption chart can show that performance changed but not why.

23.3 Operational indicators for targeted follow-up

Within the permitted scope, a surveyor may note:

297. repeated disagreement between manual and remote readings;
298. inaccessible or unclear sounding points;
299. damaged or difficult caps;
300. inconsistent tank identification;
301. missing correction tables;
302. unexplained transfers;
303. persistent sludge growth;
304. abnormal purifier losses reported by the vessel;
305. unusual auxiliary demand; or
306. a consumption trend that changed after a maintenance event.

Individually, these indicators may have routine explanations. When they recur or align with a bunker variance or consumption change, they help the technical manager focus investigation on the systems most likely to affect measurement or performance.

24. Tidiness, Housekeeping and Evidence Quality

24.1 Why physical order matters

The surveyor's ability to obtain reliable measurements depends partly on safe, clean and identifiable access. A clear sounding station reduces the chance of measuring the wrong tank or contaminating equipment. Clean tools and labelled sample bottles strengthen sample integrity.

24.2 Why documentary order matters

A complete bunker file allows rapid reconciliation. It should bring together tank tables, correction data, BDNs, sample seals, laboratory reports, transfer logs, ROB declarations, previous survey reports and relevant charter instructions.

When documents are scattered or inconsistent, the surveyor may spend more time determining which record is authoritative. That delay can matter during a short port call.

24.3 Interpreting housekeeping observations in context

Vessels operate under time pressure, and temporary disorder can arise during maintenance, transfer or an intensive port call. The stakeholder value lies in the observable operational effect: whether access was obstructed, identification was unclear, equipment cleanliness affected sampling or record organization delayed reconciliation. Recording that connection gives technical managers an actionable control finding while keeping the report focused on the evidence.

25. Bunker Data, SEEMP, IMO DCS and CII

MARPOL Annex VI establishes fuel-consumption data requirements for relevant ships, and IMO guidance identifies several collection methods, including BDNs, flow meters and onboard tank monitoring. The Carbon Intensity Indicator uses operational fuel-consumption data within a broader efficiency framework, and the Ship Energy Efficiency Management Plan provides a management mechanism for improving performance.

An independent bunker survey does not replace the vessel's statutory DCS process or verifier. It can, however, strengthen the underlying data chain by providing:

307. independent ROB checkpoints;
308. verified delivery figures;
309. traceable density and temperature inputs;
310. reconciliation of inventory and consumption;
311. identification of unexplained tank movements; and
312. evidence around maintenance or operational events.

25.1 Why accurate inventory matters to emissions data

Fuel-consumption reporting may use delivery records, meters, tank monitoring or other accepted methods. Every method has controls and limitations. If opening and closing inventory is uncertain, a calculated consumption figure may drift even when voyage records appear complete.

Independent ROB surveys at selected milestones can test whether cumulative book consumption remains consistent with physical inventory.

25.2 CII and hull condition

CII is not a hull-cleanliness score. It is affected by transport work, fuel consumed and other regulatory parameters. Hull condition can still influence CII indirectly because increased resistance may increase fuel required for a given operation.

For vessel managers, hull performance is therefore one manageable input within a broader efficiency system.

25.3 Role of independent data assurance

Observater reviews the technical consistency of bunker and consumption data and provides independent checkpoints that strengthen the vessel's wider data chain. Statutory verification, class functions and flag-State decisions remain with the competent entities; the survey evidence supports those processes by making quantities, inputs, timing and unresolved differences traceable.

Part VI - Client Value and Observater's Integrated Capacity

26. Value for Shipowners and Vessel Managers

Owners and managers use bunker surveys to protect a high-value consumable, confirm delivery, establish charter ROB and test shipboard controls. A regional survey program can also identify recurring gauge differences, tank-table concerns and consumption drift.

Key benefits include:

313. independent quantity evidence;
314. protection at delivery and redelivery;
315. stronger supplier and charter reconciliation;
316. verified checkpoints for performance review;
317. early warning of data or maintenance weaknesses;
318. better claim documentation; and
319. one reporting standard across multiple countries.

27. Value for Charterers

Charterers need a reliable quantity at the contractual transition and a clear bridge between physical survey and charter time. They also need to distinguish excessive consumption from measurement error, route conditions and maintenance effects.

Observater can support:

320. on-hire and off-hire ROB;
321. delivery and redelivery calculation;
322. bunker-price settlement inputs;
323. voyage-consumption review;
324. performance-claim evidence;
325. repeated feeder-vessel checkpoints; and
326. independent investigation of an unresolved difference.

28. Value for Bunker Buyers, Traders and Suppliers

For buyers and traders, delivery oversight protects quantity and sample evidence. For suppliers, an independent survey can document that the transfer was measured and sampled using an agreed process.

The survey should remain impartial. Its value comes from creating evidence that can support whichever position the facts justify.

29. Value for P&I Clubs, Insurers, Lawyers and Claims Teams

Bunker disputes may involve charter-party interpretation, alleged short delivery, off-specification fuel, machinery damage, contamination, performance or fraud allegations. Early independent attendance preserves the physical evidence before tanks are used, mixed or transferred.

Observater can provide:

327. urgent attendance;
328. measurement and sample evidence;
329. preliminary factual updates;
330. chronology;
331. document collection;
332. technical discrepancy analysis;
333. cause-focused follow-up within an agreed mandate;
334. loss-mitigation recommendations; and
335. coordinated regional investigation.

30. Observater's Full Bunker and Vessel-Performance Service Matrix

Service	Core output	Typical appointing interests
Bunker Quantity Survey	Opening/closing measurement, transfer record and quantity reconciliation	Buyer, owner, charterer, supplier
On-Hire / Off-Hire ROB	Contract-time ROB and time bridge	Owner, charterer, broker
Bunker Delivery Survey	Delivery oversight, documents and samples	Buyer, manager, operator
ROB Inventory Audit	Independent physical inventory and book comparison	Owner, manager, financier
Sampling and Seal Control	Representative sampling record and custody	Buyer, supplier, insurer
Bunker Detective Survey	Reconstructed transfers, consumption and variance analysis	Owner, charterer, P&I, lawyer
Consumption Review	Normalized trend and evidence-confidence assessment	Technical manager, charterer

Service	Core output	Typical appointing interests
Hull / Propeller Performance Review	Same-vessel pre/post maintenance comparison	Owner, manager, efficiency team
Underwater Inspection Coordination	Visual evidence of hull, propeller and niche condition	Owner, manager, insurer
Hull-Cleaning Attendance	Method, condition and completion documentation	Owner, manager
Combined Condition Survey	Bunkers plus vessel condition at charter transition	Owner, charterer
Claims and Expert Support	Factual chronology, technical analysis and evidence package	P&I, insurer, counsel

31. Regional Delivery Model

31.1 Central instructions, local attendance

Clients may send one nomination to Observater's operations desk. The regional team coordinates the local surveyor, agent, access plan and reporting requirements. This reduces the need for a fleet manager or claims handler to establish a new reporting method at each port.

31.2 Preliminary reporting

Where commercial decisions are time-sensitive, the appointed surveyor can provide an agreed preliminary update, which may include:

336. attendance completed;
337. quantities established;
338. variance identified;
339. samples and seals;
340. material limitation;
341. protest status; and
342. expected full-report timeline.

Preliminary figures should be clearly marked and followed by the verified final report.

31.3 Technical review

Complex calculations or discrepancy cases can be reviewed by Observater's wider marine-engineering and claims team. Regional knowledge is combined with central quality control.

31.4 Integrity and anti-corruption

Independent survey value depends on impartiality. Observater's surveyors are expected to record facts accurately, reject improper influence, disclose conflicts, preserve client confidentiality and escalate any attempt to alter observations or calculations.

Part VII - Appointment Guide, Deliverables and SEO FAQs

32. How to Appoint a Bunker Surveyor

Send the following information as early as possible:

343. vessel name and IMO number;
344. flag and vessel type;
345. port, berth or anchorage;
346. ETA and expected bunker or survey time;
347. agent's full contact details;
348. survey type;
349. contractual delivery or redelivery time;
350. fuel grades and nominated quantities;
351. expected transfer method;
352. supplier or barge details, if available;
353. sampling and laboratory requirements;
354. parties to be copied;
355. required preliminary-report deadline; and
356. known dispute, protest or access concern.

For repeated feeder calls, also provide previous survey reports and relevant maintenance or cleaning dates where performance review is required.

33. Recommended Client Instructions

A clear instruction may state:

"Attend on behalf of [party] to conduct an independent bunker quantity and remaining-on-board survey. Measure all relevant tanks, record trim, list, temperatures and density sources, review tank tables and transfer records, reconcile physical figures against declared quantities, witness representative sampling where applicable, immediately advise any material variance and issue a preliminary statement followed by a full report. Do not characterize cause or liability without further instruction."

This wording can be adapted to the charter party, port and purpose.

34. Standard Deliverables

Depending on scope, Observater's deliverables may include:

357. attendance chronology;
358. signed or witnessed measurement sheet;
359. tank-by-tank calculation schedule;
360. bunker quantity statement;
361. ROB statement;
362. delivery comparison;
363. sample and seal record;
364. photographic record where permitted;
365. documents-reviewed list;
366. limitation and reservation statement;
367. preliminary operational update;
368. full survey report; and
369. technical discrepancy memorandum.

35. Survey Readiness Checklist

Before attendance

370. scope and contractual time confirmed;
371. agent and supplier contacts available;
372. boarding and launch arrangements confirmed;
373. tank tables requested;
374. fuel grades and nominated quantities known;
375. sample equipment and bottles ready;
376. PPE and access requirements confirmed; and
377. reporting chain agreed.

On board

378. responsible officer identified;
379. all tanks listed;
380. transfers and consumption stopped or recorded as agreed;

381. trim and list established;
382. measurement equipment checked;
383. temperatures and densities documented;
384. sample point agreed;
385. opening and closing readings witnessed; and
386. unresolved differences raised before signature.

After attendance

387. calculations independently checked;
388. times and units verified;
389. sample seals reconciled;
390. preliminary result issued if required;
391. supporting documents secured;
392. limitations stated;
393. report reviewed; and
394. follow-up investigation proposed only where justified.

36. Frequently Asked Questions

What is a bunker survey in Djibouti, Kenya, Tanzania or Mozambique?

It is an independent measurement and reconciliation of marine fuel delivered to or remaining on a vessel. The survey can support a bunker delivery, on-hire or off-hire settlement, ROB audit, consumption investigation or claim.

What does a bunker quantity surveyor measure?

The surveyor measures or verifies the relevant bunker tanks, tank temperatures, vessel trim and list, calibration-table volumes and density inputs. During delivery, the surveyor also records transfer events, samples and final reconciliation.

When should a bunker surveyor be appointed?

Before the bunker transfer begins or before the contractual delivery or redelivery event. Late appointment may prevent verification of the opening condition.

Can Observater conduct bunker surveys at Djibouti Port and Doraleh?

Yes. Observater provides BQS, on/off-hire ROB, sampling, discrepancy investigation and related marine surveys in Djibouti, subject to the specific access and attendance arrangements for the call.

Does Observater provide bunker surveys at Mombasa?

Yes. Services include bunker delivery surveys, ROB, on-hire and off-hire surveys, sampling, discrepancy work and combined vessel-condition attendance at Mombasa and other Kenyan locations by arrangement.

Are bunker surveys available at Dar es Salaam, Tanga and Mtwara?

Yes. Observater coordinates bunker and charter survey attendance across Tanzania, with port-specific planning for access, timing and transfer arrangements.

Does Observater cover Nacala, Beira, Pemba and Maputo?

Yes. Observater provides regional bunker-survey coverage across Mozambique. Supplier availability, transfer mode and local requirements are reconfirmed for each nomination.

What is the difference between a BQS and an ROB survey?

A BQS typically determines the quantity delivered during a bunker transfer. An ROB survey determines the quantity physically remaining on board at a defined time. A delivery survey may include both opening and closing ROB.

What is the difference between bunker quantity and bunker quality?

Quantity concerns how much fuel was delivered or remains on board. Quality concerns whether the fuel meets contractual and regulatory requirements. Quality conclusions require representative sampling and appropriate laboratory testing.

Why can ship and supplier figures differ?

Possible causes include tank measurement, temperature, density, trim, list, calibration tables, timing, line content, internal transfers, meter basis, unit conversion or transcription. A variance should be verified before cause is assigned.

Can hull fouling increase fuel consumption?

Yes. IMO guidance recognizes that hull fouling increases resistance and that fuel-consumption monitoring may indicate biofouling accumulation. The effect must be assessed vessel by vessel and normalized for operating conditions.

How soon after hull cleaning should performance be reviewed?

The first suitable voyages after cleaning can establish a new reference, but the comparison should consider weather, current, draft, trim, speed and machinery condition. Repeated data is stronger than one voyage.

Does a tidy engine room prove accurate bunker figures?

No. Tidiness is not proof. Observater's 510+ vessel review found a recurring association between orderly machinery spaces, accessible sounding points and more reliable records. Physical measurements and calculations remain necessary.

Can a bunker survey support CII or SEEMP data?

It can strengthen the underlying fuel-data chain through independent delivery and ROB checkpoints. It does not replace statutory reporting, verification or the vessel's approved SEEMP.

Can Observater investigate a historical bunker discrepancy?

Yes, subject to available evidence. A retrospective review may examine BDNs, soundings, tank tables, transfer records, consumption, logs, voyage data and previous surveys. The achievable conclusion depends on record quality.

What happens if the figures do not reconcile?

The measurements and inputs should be checked, repeated where appropriate and documented. If the difference remains, the parties can reserve their positions, issue protest and commission further investigation.

37. Conclusions

Bunker surveying on the East African coast requires consistent technical discipline and flexible local coordination. The same principles apply from Djibouti to Maputo, but each attendance must account for vessel schedule, access, transfer mode, port operations and the commercial event being measured.

Observater's multi-year experience shows that the strongest bunker evidence combines:

395. independent physical measurement;
396. a clearly defined time;
397. complete tank and transfer records;
398. correct temperature, density, trim and list treatment;
399. representative sampling where quality matters;

400. proportionate discrepancy language;
401. maintenance and instrument context; and
402. a report that can be independently reviewed.

The 510+ vessel observational review adds an important performance dimension. Hull cleanliness, propeller condition, planned maintenance, instrument reliability, physical order and documentary discipline interact with fuel consumption and bunker-account confidence. A clean hull cannot correct a poor inventory baseline. A perfect sounding cannot explain abnormal performance. The best results come from joining the evidence.

For owners, charterers, managers, suppliers, insurers and claims teams, the question is not simply "How much fuel is there?" The better question is:

> **What quantity can be independently supported, at what time, on what assumptions, and how does it fit the vessel's operational and maintenance record?**

That is the question Observater is equipped to answer across the East African coast.

Contact Observater

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Coverage in this paper: Djibouti Port and Doraleh; Mombasa; Tanga, Dar es Salaam and Mtwara; Nacala, Beira, Pemba and Maputo.

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