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AECOM

MOTEMS Inspections
Subsequent Audit Process

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What is MOTEMS?

The Marine Oil Terminal Engineering and Maintenance Standards (MOTEMS)

"establish minimum engineering, inspection and maintenance criteria for MOTs in order to prevent oil spills and to protect public health, safety and the environment"

CHAPTER 31F [SLC]

MARINE OIL TERMINALS

Division I

SECTION 3101F [SLC] INTRODUCTION

3101F.1 Authority. The Lempert-Keene-Seastrand oil spill prevention and response act of 1990 (act), as amended, authorizes the California State Lands Commission (SLC) to regulate marine terminals, herein referred to as marine oil terminals (MOTs), in order to protect public health, safety and the environment. The authority for this regulation is contained in Sections 8750 through 8760 of the California Public Resources Code. This act defines "oil" as any kind of petroleum, liquid hydrocarbons, or petroleum products or any fraction or residues thereof, including but not limited to, crude oil, bunker fuel, gasoline, diesel fuel, aviation fuel, oil sludge, oil refuse, oil mixed with waste, and liquid distillates from unprocessed natural gas. The provisions of this chapter regulate onshore and offshore MOTs as defined under this act, including marine terminals that transfer liquefied natural gas (LNG).

The Marine Environmental Protection Division (Division) administers this code on behalf of the SLC.

3101F.2 Purpose. The purpose of this code is to establish minimum engineering, inspection and maintenance criteria for MOTs in order to prevent oil spills and to protect public health, safety and the environment. This code does not specifically address terminal siting or operational requirements. Relevant provisions from existing codes, industry standards, recommended practices, regulations and guidelines have been incorporated directly or through reference, as part of this code.

Where there are differing requirements between this code and/or references cited herein, the choice of application shall be subject to approval of the Division.

In circumstances where new technologies are proposed, equivalent prevention of oil spills and protection to the public health, safety and the environment must be demonstrated, subject to Division approval.

3101F.3 Applicability. The provisions of this chapter are applicable to the evaluation of existing MOTs and design of new MOTs in California. Each provision is classified as New (N), Existing (E), or Both (N/E) and shall be applied accordingly. If no classification is indicated, the classification shall be considered to be (N/E).

Existing (E) requirements apply to MOTs that are in operation on the date this code is adopted. For these MOTs, equivalent or in-kind replacement of existing equipment, short pipeline sections, or minor modification of existing components shall also be subject to the existing (E) requirements.

New (N) requirements apply to:

1. *A MOT or berthing system (Subsection 3102F.1.3) that commences or recommences operation with a new or modified operations manual after adoption of this code.*
2. *Addition of new structural components or systems at an existing MOT that are structurally independent of existing components or systems.*
3. *Addition of new (nonreplacement) equipment, piping, pipelines, components or systems to an existing MOT.*
4. *Major repairs or substantially modified in-place systems.*
5. *Any associated major installations or modifications.*

What are Audits?

- Initial Audit

- Subsequent Audits

Also Included in MOTEMS, but not detailed in this presentation are:

- *Post Event Inspections*
- *Baseline Inspections*

3102F.3 Audits.

3102F.3.1 Objective. *The objective of the audit is to review structural, mechanical and electrical systems on a prescribed periodic basis to verify that each berthing system is fit for its specific defined purpose. The audit includes above water and underwater inspections, engineering evaluation, documentation and recommended follow-up actions.*

What is a Subsequent Audit?

- Relies on previously performed initial audit, and comprises a compendium of sequential MOTEMS compliance records
- Performed on a Prescribed Periodic Basis
- Included the review of all structural, electrical and mechanical systems
- Structured template for methodically documenting characteristics and assessing compliance of MOTs

TABLE 31F-2-1
MAXIMUM INTERVAL BETWEEN UNDERWATER INSPECTIONS (YEARS)[1]

INSPECTION CONDITION ASSESSMENT RATING (ICAR)[6]	CONSTRUCTION MATERIAL				CHANNEL BOTTOM OR MUDLINE—SCOUR[4]	
	Unwrapped Timber or Unprotected Steel (no coating or cathodic protection)[4]		Concrete, Wrapped Timber, Protected Steel or Composite Materials (FRP, plastic, etc.)[4]			
	Benign[2] Environment	Aggressive[3] Environment	Benign[2] Environment	Aggressive[3] Environment	Benign[2] Environment	Aggressive[3] Environment
6 (Good)	6	4	6	5	6	5
5 (Satisfactory)	6	4	6	5	6	5
4 (Fair)	5	3	5	4	6	5
3 (Poor)	4	3	5	4	6	5
2 (Serious)	2	1	2	2	2	2
1 (Critical)	N/A[5]	N/A[5]	N/A[5]	N/A[5]	N/A[5]	N/A[5]

3102F.3.3.2 Subsequent audits. *A subsequent audit of each terminal shall be completed concurrently with the inspections (see Section 3102F.3.5). The audit team leader shall recommend either: (1) a default subsequent audit interval of 4 years, or (2) an alternate interval, based on assessments of the structural, mechanical and electrical systems, and consideration of:*

1. *The extent of the latest deterioration and/or disrepair,*
2. *The rate of future anticipated deterioration and/or disrepair,*
3. *The underwater inspection guidance provided in Table 31F-2-1, and*
4. *Other specified factors.*

Based on independent assessment of these factors, the Division may accept the audit team leader's recommendation or require a different subsequent audit interval.

If there are no changes in the defined purpose (see Section 3102F.3.6.1) of the berthing system(s), relevant prior analyses may be referenced. However, if there is a significant change in the operations or condition of berthing system(s), a new analysis may be required.

The Division may require an audit, inspection or supplemental evaluations to justify changes in the use of the berthing system(s).

What is the Subsequent Audit Process?

- PRE-INSPECTION ACTIVITIES
- INSPECTION ACTIVITIES
  - Above Water Inspection
  - Below Water Inspection
- SUBSEQUENT AUDIT REPORT
  - Executive Summary Tables

Pre-Inspection Activities

Define and/or obtain:

- Physical Boundaries of the MOT
- Facility Description
- Facility and Berth Layout Drawings
- Previous Audit & Inspection Reports
- Executive Summary Tables
- Systems & Equipment Capacities and Specifications
- Terminal Operating Limits (TOLs), Vessel - Sizes and Environmental Limits
- Mooring and Berthing Analyses
- Operating and Emergency Procedures
- Mooring Hardware and Fender Capacities
- **As-Built MOT Drawings**

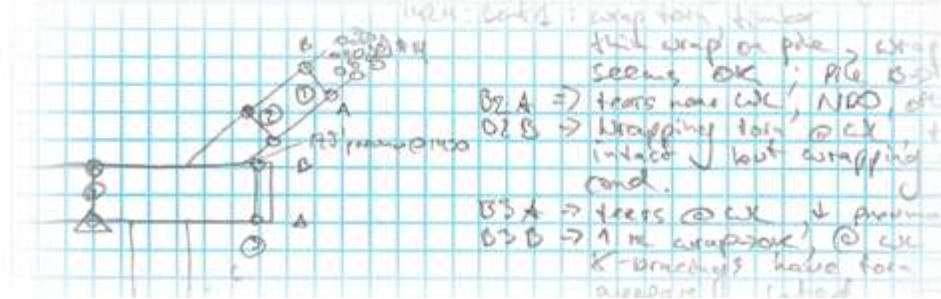
Prior to starting field inspections, “as-built” documentation shall be reviewed. Review shall include all changes since the previous audit. For example, modification and/or replacement of structural components, electrical/mechanical equipment and operations, new construction, and maintenance manuals.

Inspection Activities

Inspection Activities

During field inspections, discrepancies between documentation and actual installations shall be noted and marked. If “as-built” documentation is not available, incomplete or inaccurate, baseline inspection may be required to gather data in sufficient detail for adequate evaluation.

Conduct comprehensive structural (above and below water), mechanical, electrical and corrosion inspections. Findings shall be reported, including supporting data, photographs and sketches.



Above Water Inspection

3102F.3.5.1.1 Above water structural inspection. *The above water inspection shall include all accessible components above and below deck that are reachable without the need for excavation or extensive removal of materials that may impair visual inspection. The above water inspection shall include, but not be limited to, the following:*

1. *Piles*
2. *Pile caps*
3. *Beams*
4. *Deck soffit*
5. *Bracing*
6. *Retaining walls and bulkheads*
7. *Connections*
8. *Seawalls*
9. *Slope protection*
10. *Deck topsides and curbing*
11. *Expansion joints*
12. *Fender system components*
13. *Dolphins and deadmen*
14. *Mooring points and hardware*
15. *Navigation aids*
16. *Platforms, ladders, stairs, handrails and gangways*
17. *Backfill (sinkholes/differential settlement)*

Below Water Inspection

Why Registered Professional Engineer-Divers?

- Because professional judgement is required throughout the inspection process
- Accurately Quantifying Damage for Structural Analysis
- First-hand knowledge of the deterioration required
- Engineering Judgement for what data to collect required

TABLE 31F-2-2
UNDERWATER INSPECTION LEVELS OF EFFORT [2.2]

LEVEL	PURPOSE	DETECTABLE DEFECTS			
		Steel	Concrete	Timber	Composite
I	General visual/tactile inspection to confirm as-built condition and detect severe damage	Extensive corrosion, holes Severe mechanical damage	Major spalling and cracking Severe reinforcement corrosion Broken piles	Major loss of section Broken piles and bracings Severe abrasion or marine borer attack	Permanent deformation Broken piles Major cracking or mechanical damage
II	To detect surface defects normally obscured by marine growth	Moderate mechanical damage Corrosion pitting and loss of section	Surface cracking and spalling Rust staining Exposed reinforcing steel and/or prestressing strands	External pile damage due to marine borers Splintered piles Loss of bolts and fasteners Rot or insect infestation	Cracking Delamination Material degradation
III	To detect hidden or interior damage, evaluate loss of cross-sectional area, or evaluate material homogeneity	Thickness of material Electrical potentials for cathodic protection	Location of reinforcing steel Beginning of corrosion of reinforcing steel Internal voids Change in material strength	Internal damage due to marine borers (internal voids) Decrease in material strength	N/A

Executive Summary Tables

Prepare the relevant Executive Summary (ES) Tables. Compare findings to previous audits and identify progression and patterns of deterioration.

A summary of structural, mooring and berthing, mechanical and electrical deficiencies found during the inspection shall be recorded. In preparation for populating Tables ES-1A and ES-1B, necessity for additional structural, geotechnical, mooring/berthing and pipeline analyses shall be identified.


EXECUTIVE SUMMARY TABLE (ES-2)

COMPONENT DEFICIENCY REMEDIAL ACTION PRIORITIES (RAP)

REV. 3

09/2017


Tabstructure	Type of Inspection	MOTEMS ICAR Rating	Date of This Inspection	Inspection Interval (Yrs.)	Date of Next Inspection
Barge Wharf	AW	Satisfactory 5	05/2017	4	05/20
Barge Wharf	BW	Satisfactory 5	05/2017	1	05/20
Tanker Wharf	AW	Satisfactory 5	05/2017	4	05/20
Tanker Wharf	BW	Satisfactory 5	05/2017	1	05/20
Catwalk Trestle	AW	Satisfactory 5	05/2017	4	05/20
Catwalk Trestle	BW	Satisfactory 5	05/2017	1	05/20

Subsequent Audit Report

Compiled per MOTEMS Section 3102F.3.8.

The MOTEMS Initial Audit shall include “as-built” documentation for installations, attached within the audit report’s applicable sections.

Audit team shall prescribe follow-up actions as required.

MOTEMS Audits shall be referenced by the month and year of its completion and not as Revision 1, Revision 2, etc. This is important to eliminate confusion with the ES Tables Revision #s.

The Initial and Subsequent Audits comprise a compendium of sequential MOTEMS compliance records that shall be maintained and readily accessible at the MOT.

Subsequent Audit Challenges

Incomplete or out of date facility records or Undocumented facility changes since previous audit and/or inspection

Often, this information is not available before the commencement of the inspection

Contracts have already been issued, and due to inconsistencies in the information, and baseline inspection may be required.

Shut the barn door . . . . . .

3102F.1.4 RECORDS	
2.1.2	Does MOT have records reflecting current, "as-built" conditions for all berthing systems?
2.1.3	Verify that all as-build records since the previous audit are included. Records include, modifications and/or replacement of structural components, electrical or mechanical equipment or relevant operational changes, new construction including design drawings, calculations, engineering analyses, soil borings, equipment manuals, specifications, shop drawings, technical and maintenance manuals and documents.
2.1.4	Are records indexed and be readily accessible?

Subsequent Audit Challenges

Incorrect, or inaccurate nomenclature carried through from previous reports, often not compatible with recent facility modifications

5. New inspection findings shall be compared to previous MOTEMS Audit results to identify and report progression and patterns of damage/deterioration.

Marine Environmental Protection Division
California State Lands Commission

DRAFT – MOTEMS Audit Manual (05/05/2017)
Section 3102F – Audit and Inspection

should use good judgment to come up with a simple labeling system and legend. Once nomenclature is established, it shall be consistent for all subsequent inspections.

Subsequent Audit Challenges

Level III inspection Monitoring Locations

Locations will vary from inspection to inspection, but are areas which may be representative of the underwater structure.

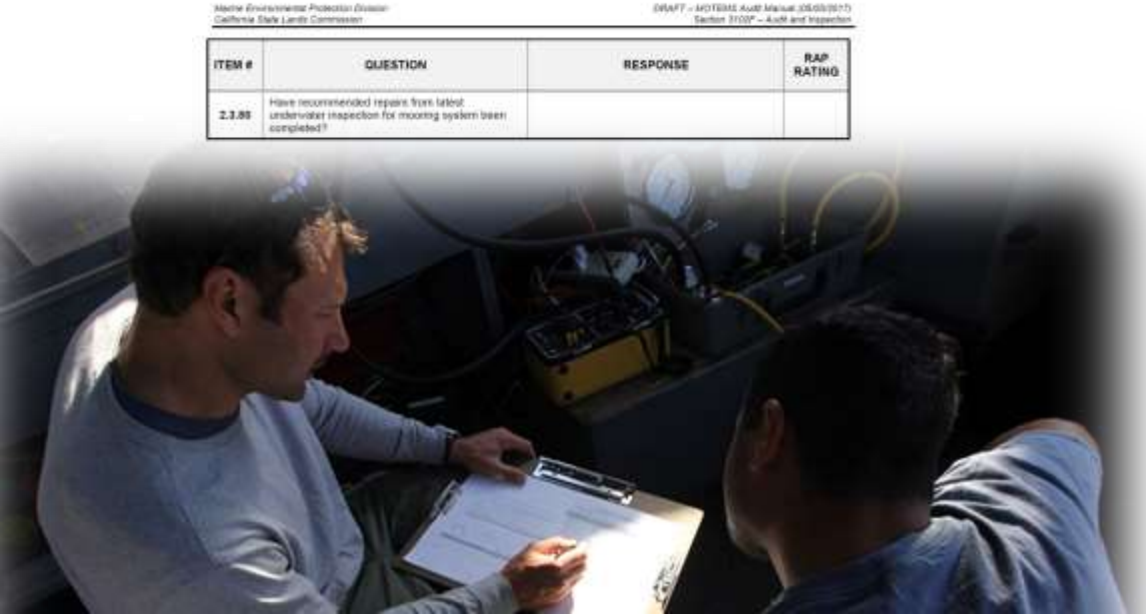
A 1:1 comparison of previous inspections is not always possible

TABLE 31F-2-3
UNDERWATER INSPECTION LEVELS OF EFFORT [2.2]

LEVEL		SAMPLE SIZE AND METHODOLOGY[1]							
		Steel		Concrete		Timber		Composite	Slope Protection, Channel Bottom or Mudline-Scou
		Piles	Bulkheads/ Retaining Walls	Piles	Bulkheads/ Retaining Walls	Piles	Bulkheads/ Retaining Walls	Piles	
1	Sample Size:	100%	100%	100%	100%	100%	100%	100%	100%
	Method:	Visual/Tactile	Visual/Tactile	Visual/Tactile	Visual/Tactile	Visual/Tactile	Visual/Tactile	Visual/Tactile	Visual/Tactile
	Sample Size:	10%	Every 100 LF	10%	Every 100 LF	10%	Every 50 LF	10%	As necessary

Subsequent Audit Challenges

Implementation or non-implementation affect the subsequent audits and evaluate the assumption of responsibility for “trickle-down” defects and audit data carried through several subsequent audits and collected by different auditors/consultants.



ITEM #	QUESTION	RESPONSE	RAP RATING
2.3.88	Have recommended repairs from latest underwater inspection for mooring system been completed?		

3102F.3.8 Documentation and reporting. The audit reports shall be signed and stamped by the audit team leader. The inspection and other reports and drawings shall be signed and stamped by the engineers in responsible charge.

Each audit and inspection, whether partial or complete, shall be adequately documented. Partial inspections cover only specific systems or equipment examined. The resulting reports shall summarize and reference relevant previous ratings and deficiencies. Inspection reports shall be included in subsequent audits.

Proposed Code Modifications

REGARDING PROPOSED CHANGES TO THE 2019 CALIFORNIA BUILDING CODE, CALIFORNIA CODE OF REGULATIONS, TITLE 24, PART 2

2.4. Update footnote for "***TABLE 31F-2-4 ASSESSMENT RATINGS***" as follows:

1. …
2. …
3. *ICAR = Inspection Condition Assessment Ratings [2.2]; Ratings shall be assigned comparing the observed condition to the as-built ~~original~~ condition.*

2.5. Update footnote for "***TABLE 31F-2-7C***" as follows:

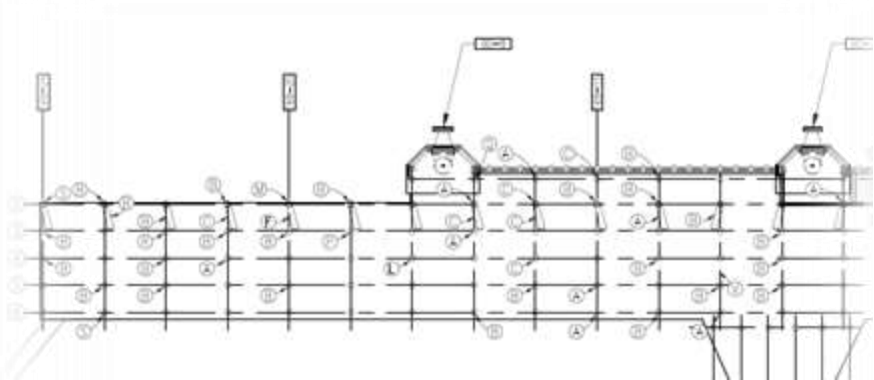
…

9. *Ratings shall be assigned comparing the observed condition to the as-built ~~original~~ condition.*
10. …

STATEMENT OF SPECIFIC PURPOSE, PROBLEM, RATIONALE and BENEFITS:
The terminology *"original"* is updated to *"as-built"* for clarity and consistency with industry and code terminology, such as utilized in the *"Purpose"* defined for Level I inspections in Table 31F-2-2. Therefore, this change is editorial and non-substantive.

2.4 "…Rating shall be assigned comparing the observed condition to the as-built original condition", As-built information is not always available

2.5 "…Rating shall be assigned comparing the observed condition to the as-built original condition", As-built information is not always available



Questions