



MOTEMS

Marine Oil Terminal Engineering and Maintenance Standards Implementation & Updates

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MARINE OIL TERMINAL ENGINEERING AND MAINTENANCE STANDARDS (MOTEMS)

MANDATED:

**LEMPERT-KEENE-SEASTRAND OIL SPILL PREVENTION
AND RESPONSE ACT OF 1990**

CURRENT CONDITIONS OF 40 TERMINALS:

Grandfathering – vessel size

Structural degradation

Inadequate fire detection/suppression

Build dates 1901 to 1984 (Average age is 50)



SCOPE OF THE STANDARDS

- ◆ Audit and Inspection Criteria
- ◆ Structural Loading Criteria
- ◆ Seismic Analysis and Design Criteria
- ◆ Mooring and Berthing Analysis and Design Criteria
- ◆ Geotechnical Hazards Criteria
- ◆ Structural Analysis and Design of Components
- ◆ Piping and Pipeline Criteria
- ◆ Mechanical, Fire and Electrical Criteria



Industry & Peer Review

- ◆ **Two workshops: industry, consulting and port engineers and academia (80 to 100 attendees).**
- ◆ **Technical Advisory Group peer review of all structural portions of MOTEMS.**
- ◆ **Industry (WSPA) working group review of all fire, piping, electrical and mechanical portions.**



REGULATORY PROCESS

- ◆ APPROVED - CALIFORNIA STATE LANDS COMMISSION, AUGUST 17, 2004
- ◆ ADOPTED - CALIFORNIA BUILDING STANDARDS COMMISSION, JANUARY 19, 2005
- ◆ PUBLISHED - CALIFORNIA BUILDING STANDARDS CODE (TITLE 24, PART 2, VOL 1, CHAPTER 31F) AUGUST 6, 2005.
- ◆ EFFECTIVE FEBRUARY 6, 2006



FACILITY CLASSIFICATIONS (E) (INITIAL AUDIT DEADLINES)

HIGH : >1200 Bbls at risk
(30 Months)

MEDIUM: <1200 Bbls at risk or
> 90 transfers/year
(48 Months)

LOW: < 1200 Bbls at risk,
< 90 transfers/year
< 30,000 DWT
(60 Months)



TO DETERMINE AMOUNT OF OIL “AT RISK”

Table 31F-8-2 of the MOTEMS:

**TOTAL VOLUME OF OIL AT RISK = STORED +
FLOWING**

$$V_F = Q_c \times (\Delta t) \times (1/3600)$$

**Where Δt = ESD valve closure in 30 or 60 seconds
(post November 1, 1980 uses 30 seconds)**



MOTs in California (Estimated Ratings)

- Number of MOTs Considered “HIGH” = 14 (Audit within 30 months)
- Number of MOTs Considered “MEDIUM” = 12 (Audit within 48 months)
- Number of MOTs Considered “LOW” = 15 (Audit within 60 months)
- After the Audit, rehabilitation is scheduled and agreed upon by operator and MFD.



Mooring/Berthing Risk Classification

HIGH RISK: Wind > 50 knots
Current > 1.5 knots
Passing Vessel Effects: YES
Change in Draft > 8 ft.

MEDIUM RISK: Wind 30 – 50 knots
Current 1.0 to 1.5 knots
Change in Draft 6 to 8 ft.

LOW RISK: Wind < 30 knots
Current < 1.0 knot
Change in Draft < 6 ft.



AUDIT MANUAL & PROCESS

- ◆ **BASELINE INSPECTION – MAY BE REQUIRED**
- ◆ **UNDERWATER INSPECTION – CONFORM TO ASCE STANDARDS**
- ◆ **SIMILAR TO A CAL ARP, USED FOR REFINERIES**
- ◆ **CARS – CONDITION ASSESSMENT RATINGS (1-6)**
- ◆ **RAPS - Remedial Action Priorities (P1 – P4, R)**
- ◆ **ANALYSES MAY BE REQUIRED**



AUDIT RATINGS

Inspection & Analyses

CONDITION ASSESSMENT RATINGS (CAR)

6 = GOOD - fit-for-purpose

5 = SATISFACTORY - fit-for-purpose

4 = FAIR - Marginal, capacity less than 15% degraded

3 = POOR – Not fit-for-purpose

2 = SERIOUS – Not fit-for-purpose

1 = CRITICAL – Cease operations



COMPONENT REMEDIAL ACTION PRIORITIES (RAP)

- **P1 – Condition poses an immediate threat to public health, safety or the environment. Emergency action required**
- **P2 – Condition pose a potential threat to public health, safety and the environment**
- **P3 – Upgrading required, no emergency or urgent action required**
- **P4 – Fit-for-purpose, do the repairs during normal maintenance intervals**
- **R - Recommended action for good engineering or maintenance practice, but not required by these standards**



PIPING AND PIPELINES

STRESS ANALYSIS MAY BE REQUIRED IF:

NEW PIPING

SIGNIFICANT RE-ROUTING

REPLACEMENT OF NOT "IN KIND"

**SIGNIFICANT REARRANGEMENT OF
ANCHORS/SUPPORTS**

SIGNIFICANT SEISMIC DISPLACEMENTS



MECHANICAL AND ELECTRICAL EQUIPMENT

MARINE LOADING ARMS

ELECTRICAL AND HYDRAULIC POWER SYSTEMS

WINCHES AND CRANES

SHORE-TO-VESSEL ACCESS FOR PERSONNEL

**SUMPS, DISCHARGE CONTAINMENT AND ANCILLARY
EQUIPMENT**

VCS



MOTEMS UPDATES

San Francisco Bay Tsunami Study (Borrero, Dengler, Uslu and Synolakis)

Passing Vessel Forces on Moored Vessels (Kriebel)

Multiple Mooring Hooks – Tie-down capacity



MOTEMS IMPLEMENTATION (OUTSIDE CALIFORNIA)

“SEISMIC DESIGN GUIDELINES FOR PORT STRUCTURES”, WORKING GROUP 34 OF PIANC, 2001.

“NEHRP RECOMMENDED PROVISIONS FOR SEISMIC REGULATIONS FOR NEW BUILDINGS AND OTHER STRUCTURES”, FEMA 450/1, 2, 2003 EDITION

UNIFIED FACILITIES CRITERIA (UFC) – “DESIGN: PIERS AND WHARVES”, UFC 4-152-01, 28 JULY 2005



MOTEMS – CONCLUSIONS

- 1. INITIAL AUDITS FOR HIGH RISK FACILITIES ARE DUE IN AUGUST 2008**
- 2. A MOTEMS UPDATE WILL BE PUBLISHED SHORTLY.**
- 3. RECENT STUDIES (SF BAY TSUNAMI & PASSING VESSEL LOADS) ARE AVAILABLE ON THE CSLC WEBSITE.**
- 4. MOTEMS IS NOW AN ENFORCEABLE PART OF THE CALIFORNIA BUILDING CODE.**