The purpose of this code is to establish minimum engineering, inspection and maintenance criteria for marine oil terminals in order to prevent oil spills and to protect public health, safety and the environment.

WELCOME

Hugo A. Cisneros, P.E.
Long D. Nguyen

MOTEMS COMPLIANCE
AT THE PORT OF LOS ANGELES

California State Lands Commission – Prevention First 2012
Part I: Existing Marine Oil Terminals

Part II: MOTEMS Compliance
Part I: Existing Marine Oil Terminals
MOTEMS COMPLIANCE AT THE PORT OF LOS ANGELES

1. Berths 70-71, Moderate Risk
2. Berths 118-120, Moderate Risk
3. Berths 148-151, High Risk
4. Berth 163, Moderate Risk
5. Berth 164, Moderate Risk
6. Berths 167-169, Moderate Risk
7. Berths 187-191, Moderate Risk
8. Berths 238-240C, High Risk
MOTEMS COMPLIANCE AT THE PORT OF LOS ANGELES

BERTHS 70-71 (DEMOLISHED)

- Built 1923
- 800 ft Berth
- Concrete Deck
- 18” Conc. Piles
- 14.8 ft Deck Elev.
- 35.0 ft Water Depth

Moderate Risk

Initial Audit Submitted
07/2009
MOTEMS COMPLIANCE AT THE PORT OF LOS ANGELES
BERTHS 70-71 (DEMOLISHED)

- 136 Storage Tanks
- 593,000 Barrel Cap.
- 12.11 Acres
MOTEMS COMPLIANCE AT THE PORT OF LOS ANGELES

BERTHS 118-120

• Built 1959
• 825 ft 2 Berths
• Timber Deck
• Timber Piles
• 13.0 ft Deck Elev.
• 35.0 ft Water Depth

Moderate Risk
Initial Audit
Submitted 01/2011
MOTEMS COMPLIANCE AT THE PORT OF LOS ANGELES

BERTHS 118-120

- 11 Storage Tanks
- 498,000 Barrel Cap.
- 12.4 Acres
MOTEMS COMPLIANCE AT THE PORT OF LOS ANGELES

BERTHS 148-151

- Built 1955
- 1328 ft Total Length
- Concrete Deck
- 18” Concrete Piles
- 15.2 ft Deck Elev.
- 35.0 ft Water Depth

High Risk

Initial Audit Submitted 04/2009
MOTEMS COMPLIANCE AT THE PORT OF LOS ANGELES

BERTHS 148-151

- 26 Storage Tanks
- 825,000 Barrel Cap.
- 13.5 Acres
Berth 163
- Built 1959
- 888 ft Berth
- Timber Deck
- Timber Piles
- 13.0 ft Deck Elev.
- 40.0 ft Water Depth

Moderate Risk

Initial Audit Submitted 01/2010

Berth 164
- Built 1923
- 888 ft Berth
- Timber Deck
- Timber Piles
- 13.0 ft Deck Elev.
- 35.0 ft Water Depth

Moderate Risk

Initial Audit Submitted 01/2010
MOTEMS COMPLIANCE AT THE PORT OF LOS ANGELES
BERTHS 163-164

Berth 163
- 19 Storage Tanks
- 599,000 Barrel Cap.
- 5.8 Acres

Berth 164
- 17 Storage Tanks
- 947,000 Barrel Cap.
- 10.5 Acres
MOTEMS COMPLIANCE AT THE PORT OF LOS ANGELES

BERTHS 167-169

- Built 1947
- 1238 ft Total Length
- Timber Deck
- Timber Piles
- 13.0 ft Deck Elev.
- 40.0 ft Water Depth

Moderate Risk
Initial Audit Submitted
01/2010
MOTEMS COMPLIANCE AT THE PORT OF LOS ANGELES
BERTHS 167-169

• 10 Storage Tanks
• 580,000 Barrel Cap.
• 9.1 Acres
BERTHS 187-191

Berths 187-191
• 2,336 ft Total Length
• 15.0 ft Deck Elev.
• 38.0 ft Water Depth

• B187 Built 1920
  • Concrete Deck & Piles

• B188 Built 1921
  • Concrete Deck & Piles

• B189-191 Built 1922
  • Timber Deck & Piles

Moderate Risk
Initial Audit Submitted 02/2010
MOTEMS COMPLIANCE AT THE PORT OF LOS ANGELES
BERTHS 187-191

- 60 Storage Tanks at 700,000 Barrels Cap.
- 22 Storage Tanks 1,700,000 Barrels Cap. (inland)
MOTEMS COMPLIANCE AT THE PORT OF LOS ANGELES

BERTHS 238-240C

Berths 238-240C

- 903 ft Total Length
- 14.0 ft Deck Elev.
- 37.0 ft Water Depth

- B238-239 Built 1925
- Concrete Decks & Piles

- B240 Built 1926
- Timber Deck & Piles

High Risk

Initial Audit Submitted
08/2008
MOTEMS COMPLIANCE AT THE PORT OF LOS ANGELES

BERTHS 238-240C

- 26 Storage Tanks
- 2,313,000 Barrel Cap.
- 31.4 Acres
Part II: MOTEEMS Compliance
# MOTEMS COMPLIANCE AT THE PORT OF LOS ANGELES

<table>
<thead>
<tr>
<th>MOT</th>
<th>Risk Classification</th>
<th>Initial Audit Submitted</th>
<th>1&lt;sup&gt;st&lt;/sup&gt; Subsequent Audit Schedule</th>
<th>2&lt;sup&gt;nd&lt;/sup&gt; Subsequent Audit Schedule</th>
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</thead>
<tbody>
<tr>
<td>Berths 70-71</td>
<td>Moderate</td>
<td>07/2009</td>
<td>N/A (Demolished)</td>
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<tr>
<td>Berths 118-120</td>
<td>Moderate</td>
<td>01/2011</td>
<td>N/A</td>
<td>N/A</td>
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<tr>
<td>Berths 148-151</td>
<td>High</td>
<td>04/2009</td>
<td>(B148-149) 04/2012 (B150-151) N/A</td>
<td>(B148-149) 04/2015 (B150-151) N/A</td>
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<tr>
<td>Berth 163</td>
<td>Moderate</td>
<td>01/2010</td>
<td>02/2013</td>
<td>02/2016</td>
</tr>
<tr>
<td>Berth 164</td>
<td>Moderate</td>
<td>01/2010</td>
<td>02/2013</td>
<td>02/2016</td>
</tr>
<tr>
<td>Berths 167-169</td>
<td>Moderate</td>
<td>01/2010</td>
<td>01/2013</td>
<td>01/2016</td>
</tr>
<tr>
<td>Berths 187-191</td>
<td>Moderate</td>
<td>02/2010</td>
<td>02/2013</td>
<td>02/2016</td>
</tr>
<tr>
<td>Berths 238-240C</td>
<td>High</td>
<td>08/2008</td>
<td>08/2011</td>
<td>08/2014</td>
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</tbody>
</table>
MOTEMS COMPLIANCE AT THE PORT OF LOS ANGELES

The Port’s focus, with respects to Plans, Specifications, and Estimates (PS&E), for MOTEMS compliance for existing Marine Oil Terminals (MOTs) is as follows:

- Division 2 – Audit and Inspection (Structural Only)
- Division 3 – Structural Loading Criteria (Structures Only)
- Division 4 – Seismic Analysis and Structural Performance
- Division 5 – Mooring and Berthing Analysis and Design
- Division 6 – Geotechnical Hazards and Foundations
- Division 7 – Structural Analysis and Design of Components
MOTEMS COMPLIANCE AT THE PORT OF LOS ANGELES

PS&E Goals:

• Comply with MOTEMS
• Prepare PS&E:
  – New Mooring and Berthing Structures
  – Independent Structural Systems
  – Slope Stability
  – MEP components compatible with Structural System Displacements
MOTEMS compliance options for:

- Loading Platform Structures
- Seismic
- Slope Stability (Geotechnical)
- Berthing
- Mooring
MOTEMS compliance options for:

- Loading Platform Structure
  - Seismic
  - Slope Stability (Geotechnical)
- Berthing
- Mooring
Loading Platform

Steel Piles, Concrete Deck and Pile Caps
Loading Platform

Cross Section of Steel Piles, Concrete Pile Caps and Concrete Deck with Matching Trestle
Loading Platform

Concrete Deck with Concrete Piles
Loading Platform

Concrete Deck with Concrete Piles Integrated into the Existing Timber Wharf
MOTEMS compliance options for:

- Loading Platform Structure
- Seismic
- Slope Stability (Geotechnical)
- Berthing
- Mooring
Seismic

- Design consistency at POLA
- Palos Verdes fault
- Site-specific design spectra and seven sets of orthogonal time history records
- POLA Port-wide Ground Motion Study produced site-specific OLE and CLE spectra
Seismic

TABLE 31F-4-1

<table>
<thead>
<tr>
<th>MOT RISK CLASSIFICATION</th>
<th>Exposed Oil (bbls)</th>
<th>Transfers per Year per Berthing System</th>
<th>Maximum Vessel Size (DWTx1000)</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>≥1200</td>
<td>N.A.</td>
<td>N.A.</td>
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<tr>
<td>Moderate</td>
<td>&lt;1200</td>
<td>≥90</td>
<td>≥30</td>
</tr>
<tr>
<td>Low</td>
<td>&lt;1200</td>
<td>&lt;90</td>
<td>&lt;30</td>
</tr>
</tbody>
</table>

Purpose is to establish minimum seismic analysis and structural performance. Performance is evaluated at a two level criteria: Level 1 and Level 2 MOTEMS risk classification (Table 31-F-4-1)
All new MOTS are classified as high risk.
1. Exposed oil ≥ 1200 bbls
Design Earthquake Motions:
Level 1
- Minor or no structural damage
- Temporary or no interruption in operations
Level 2
- Controlled inelastic structural behavior with repairable damage
- Prevention of structural collapse
- Temporary loss of operations, restorable within months
- Prevention of major spill (≥ 1200 bbls)
Seismic

Steel Piles with Seismic Connection into Concrete Caps

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Seismic

Concrete Piles with Seismic Connection into a Concrete Deck
Seismic

Bracing of Existing Timber Wharf with Ground Improvements
Seismic

Bracing of Existing Concrete Piles with Ground Improvements
MOTEMS compliance options for:

- Loading Platform Structure
- Seismic
- Slope Stability (Geotechnical)
- Berthing
- Mooring
Slope Stability (Geotechnical)

New Dike (New Wharf)
Slope Stability (Geotechnical)

Dike Improvements with Ground Improvements (New Wharf)
Slope Stability (Geotechnical)

Integrated Piles with Ground Improvements and Underwater Bulkhead (New Wharf)
Slope Stability (Geotechnical)

Integrated Piles with Ground Improvements at Existing Wharf
Slope Stability (Geotechnical)

Ground Improvements at Existing Wharf
MOTEMS compliance options for:

• Loading Platform Structure
• Seismic
• Slope Stability (Geotechnical)
• Berthing
• Mooring
Berthing

Steel Mono-Pile Berthing System
Berthing

Integrated Steel Pipe Pile Berthing System
Berthing

Integrated Concrete Berthing System
Berthing

Foam Filled Fender with Concrete Fender Piles
Berthing

Foam Filled Fender with Concrete Fender Piles & Battered Concrete Piles
Berthing

Foam Filled Fender with Steel Pile Panel and Cylindrical Fender
MOTEMS compliance options for:

- Loading Platform Structure
- Seismic
- Slope Stability (Geotechnical)
- Berthing
- Mooring
Mooring

Mooring Dolphin with Steel Plumb Piles and Steel Batter Piles
Mooring Dolphin with Steel Mono-Pile
Questions?
Thank You!