MOTEMS

Marine Oil Terminal Engineering and Maintenance Standards

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Background
Statutory Authority

- ***From the Lempert-Keene-Seastrand Oil Spill Prevention and Response Act of 1990:***

  "The commission shall adopt rules, regulations, guidelines and commission leasing policies for reviewing the location, type, character, performance standards, size and operation of all existing and proposed marine terminals within the state, whether or not on lands leased from the commission, and all other marine facilities on land under lease from the commission to minimize the possibilities of a discharge of oil." (Sect. 8755 (a))

  "The commission shall periodically review and accordingly modify its rules, regulations, guidelines and commission leasing policies to ensure that all operators of marine terminals within the state and marine facilities under the commission's jurisdiction always provide the best achievable protection of the public health and safety, and the environment…" (Pub. Res. Code Sect. 8756)

THE "MANDATE" FOR MOTEMS – CHAPTER 31F CALIFORNIA BUILDING CODE

- THE NEED FOR THE MOTEMS
- WHERE ARE WE NOW?
- FUTURE IMPLEMENTATION

The Need for MOTEMS

- The average age of marine oil terminals in California is over 50 years (typical design life of marine structure is 50 years)
- No records of any underwater inspection
- Facilities designed for smaller vessels; larger tank ships have higher wind, current and berthing loads - "Grandfathering"
- Little or no modern seismic criteria at time of construction
- Operators want to remain in service for another 20-40 years, or longer.

CORROSION OF A BATTER PILE (HOLLOW STEEL)

CORROSION OF A FIRE WATER LINE AT A FLANGE CONNECTION

STRUCTURAL CRACKING IN A BATTER PILE ON A DOLPHIN

SPALLING AND POTENTIAL REBAR CORROSION

CORROSION ON A PIPELINE FROM A MARINE OIL TERMINAL, ONTO SHORE

WRAP PEELING OFF A STEEL BATTER PILE

SPALLING AND REBAR DAMAGE OF A DOLPHIN

MARINE OIL TERMINAL ENGINEERING AND MAINTENANCE STANDARDS (MOTEMS)

- 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

CONDITION ASSESSMENT RATINGS (CARs)

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

* May require repair/rehabilitation to remain operational

COMPONENT REMEDIAL ACTION PRIORITIES (RAPs)

- 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 – requires urgent action*
- 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

Marine Oil Terminal Engineering and Maintenance Standards (MOTEMS)

- **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

Marine Oil Terminals in California

- 32 Fixed Wharf/Pier Terminals in California (Eureka to San Diego)
- Various build dates, ranging from the early 1900's to 1982. Average age is over 50 years.
- MOTEMS groups terminals by "oil at risk" based on the sum of flowing and packed pipeline volumes.
- High risk 10 terminals
- Medium risk 17 terminals
- Low risk 5 terminals
- NEW MOT – POLA Pier 400, Berth 408 "High" risk

MOTEMS INCREASES RELIABILITY OF MARINE OIL TERMINALS

- Provides a uniform seismic criteria for the marine oil terminal and the refinery. A “hardened” oil terminal should remain operational after a moderate earthquake.
- Marine terminal operations must continue if a refinery is to remain operational after an earthquake.
- If refinery is “down” MOT can still provide direct delivery of products.
- Provides a more robust oil terminal, likely to survive a mooring, berthing, accidental or severe environmental event.

California's Marine Oil Terminals

ID	THROUGHPUT (Bbls)	DATE BUILT AND RECONSTRUCTION DATE(S)	% OF STATE THROUGHPUT	CUM %	RISK	RATING
)	144,637,940	1934, '62, '70,'92	19.78%	19.8%	n/a	n/a
	142,865,601	1946, ' 70	19.53%	39.3%	H	G
2	114,922,100	1982	15.71%	55.0%	H	G
3	42,433,905	1968	5.80%	60.8%	H	G
7	40,651,155	1929, '54	5.56%	66.4%	H	G
5	34,926,452	1967	4.78%	71.2%	M	G
3	25,676,500	1904	3.51%	74.7%	M	G
2	21,458,722	1920, '22	2.93%	77.6%	H	F
3	20,300,430	1923, '59	2.78%	80.4%	M	P
2	18,807,809	1900, ' 54	2.57%	82.9%	H	G
)	18,667,223	1938, '47	2.55%	85.5%	H	G
5	17,724,115	1917, '50, '66	2.42%	87.9%	H	G
4	16,440,650	1974	2.25%	90.2%	M	G
3	12,471,907	1970, ' 78	1.71%	91.9%	M	G
)	9,672,100	1924, ' 98	1.32%	93.2%	M	F
2	7,100,118	1919, '27, ' 55	0.97%	94.2%	M	F
4	6,505,166	1923	0.89%	95.1%	M	P
.	5,895,479	1954	0.81%	95.9%	L	G
5	5,630,300	1981	0.77%	96.6%	M	G
)	5,095,222	1922	0.70%	97.3%	H	P
)	4,745,091	1923	0.65%	98.0%	H	P
5	3,735,119	1953, '66, '92	0.51%	98.5%	L	G
)	2,640,071	1923, ' 59	0.36%	98.9%	M	P
5	2,550,700	1965, ' 87	0.35%	99.2%	L	G
5	1,957,000	1920	0.27%	99.5%	H	G
3	1,355,000	1962	0.19%	99.7%	M	G
)	535,000	1928	0.07%	99.7%	n/a	F
4	492,491	1923	0.07%	99.8%	L	P
7	445,674	1958, ' 96-97	0.06%	99.9%	L	G
2	408,135	1953	0.06%	99.9%	H	G
7	300,000	1965	0.04%	100.0%	L	F
3	245,743	1973	0.03%	100.0%	H	G
7	71,286	1941, ' 54	0.01%	100.0%	L	P
)	35,817	1937, ' 51	0.00%	100.0%	L	G

THE THREE LARGEST MOTs IN CALIFORNIA

1. Chevron El Segundo (offshore, multi-point mooring) 19.78% of total throughput

2. Chevron, Long Wharf, Richmond, CA
   19.53% of total throughput

3. BP, Berth 121, POLB
   15.71% of total throughput

OTHER MAJOR TERMINALS IN CALIFORNIA

- **SOUTHERN CALIFORNIA**

  7 terminals out of total 24 provide 90% of throughput. Most of the 7 are rated as good or better.

- **NORTHERN CALIFORNIA**

  6 terminals out of 26 provide 90% of throughput. Most of the 6 have already performed a limited MOTEMS audit. One has upgraded to MOTEMS, a second terminal is currently in the process of upgrading to the MOTEMS.

MOTEMS INITIAL AUDIT DUE DATES

- HIGH RISK TERMINALS: AUGUST 2008 (MFD has received, and review is in progress)
- MEDIUM RISK TERMINALS: FEBRUARY 2010
- LOW RISK TERMINALS: FEBRUARY 2011

AUDIT REVIEW PROCESS

- MFD ENGINEERS REVIEW ALL SUBMITTALS AND PREPARE A LETTER RESPONSE.
- MFD ENGINEERS MEET WITH OPERATORS, CONSULTANTS AND PORT ENGINEERS TO AGREE ON A REHABILITATION SCHEDULE.

MOTEMS IMPLEMENTATION

- FOR NON-SEISMIC DEFICIENCIES, TERMINAL IS REQUIRED TO REDUCE OPERATING LIMITS TO COMPLY WITH MOTEMS RESULTS.
- FOR SEISMIC, GLOBAL DEFICIENCIES (STRUCTURE NOT FIT-FOR-PURPOSE), THE OPERATOR HAS SUFFICIENT TIME TO ANALYZE/DESIGN AND CONSTRUCT REHABILITATION.
- A UNIFORM DESIGN CRITERIA FOR NEW TERMINALS

MOTEMS – CURRENT USAGE/AWARDS

- PIANC (Permanent International Association Navigation Congress) “Seismic Design Guidelines for Port Structures”, 2001.
- NEHRP (National Earthquake Hazard Reduction Program, FEMA 368), 2003 Edition.
- Unified Facilities Criteria (UFC) – “Design: Piers and Wharves”, UFC 4-152-01, 28 July 2005.
- Silver Award 2003, Consulting Engineers Association of New York

MOTEMS AND AUDIT MANUAL AVAILABLE

CSLC Website: www.slc.ca.gov

http://www.slc.ca.gov/Division_Pages/MFD/MOTEMS/MOTEMS_Home_Page.html

Proposed Revision 1 is on our website.

QUESTIONS??

- THANK YOU FOR YOUR TIME AND ATTENTION