Trunkline LNG Lake Charles Terminal
Site Visit
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California State Lands Commission
Marine Facilities Division
Trunkline LNG Lake Charles Terminal

- Completed 1981
- Located Lake Charles, LA, 9 mi. South Downtown
- ~40 mi. from Gulf of Mexico
- Recent Upgrades incl.
  - New Ship Berth
  - New 140K m³ Storage tank
  - Added 7 SCVs
- Storage 4 tanks 425K m³ (2.7 Mbbl)
- Peak Capacity 2.1 Bcf/day
Trunkline LNG Lake Charles Terminal

- 2 Concrete Wharves
- Latest completed 2006
- No Simultaneous Transfer
- Transfer Shutdown During 2nd Vessel Movement
- Vessels 30K – 100K m³
- Typ. Unloading 12 hours
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- Brackish Water
- 40 feet dredge depth
- No Current
- 1-2 ft tidal variation
- 1400’x1600’ Turning Basin
- Earthquake UBC Zone 1
- 150 mph Design Wind Speed (tanks)
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- 2005 Hurricane Rita Hit Lake Charles
- No Major Structural Damage to Facility
- Flooding at Facility
- Much Debris in Channel
- Resumed Terminal Operations within 10 days
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- **Wharf**
  - Concrete Deck Supported by Concrete Piles
  - Four Berthing Dolphins at Each Wharf w/Steel Piles
  - Mooring Line Configuration and Required Strength by Optimoor
Trunkline LNG Lake Charles Terminal

- **Wharf (cont):**
  - Berthing Approach Velocity 0.5 ft/sec, 0° angle
  - Operational Wind Speed - 30 knots sustained for 10 min
  - Survival Wind Speed - 40 knots sustained for 10 min
  - No Tension Monitoring Devices
  - 100 Ton Rated Mooring Hooks
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Berthing and Mooring Dolphins 2006 Berth
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Fender and Berthing Dolphin 2006 Berth
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Main wharf 2006 Berth
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Typical Hooks 2006 Berth
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Berthing Dolphin 1981 Berth
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Mooring Dolphin 1981 Berth
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- Marine Loading Arms
  - 16” Dia Loading Arms
  - Schwelm Verladetechnik (SVT) mfr. MLA’s at New Wharf
  - FMC Technologies mfr. MLA’s at Older Wharf
  - Breakaway Couplings
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Loading Arms w/breakaway couplings
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Marine Loading Arms as seen from shore
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An Active Transfer to LNG Carrier LNG Cross River. Vessel 66.9KDWT, Built 2005, (cylindrical tanks).
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Active Loading Arms Are White w/ Coated Ice. Water Curtain Visible
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- LNG Pipelines
  - 9% Ni-Steel w/Vacuum Jacket Insulation
  - 150 psig MAOP (terminal to tank)
  - 1256 psig MAOP (tank to vaporizers)
  - Containment Provided from Wharf to Tank Storage Area
  - Low Temperature Sensors in Containment Areas Provide Leak Detection
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LNG Pipelines Routed Inside Containment. Notice Steel Supports Do Not Extend Into Containment Area.
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Typical Pipeline Support
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Pipeline Trestle from Wharf to Tank Area.
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Pipeline Expansion Loop
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Cold Sensors to Detect an LNG Release
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- Fire Protection
  - UV/IR Detectors
  - High Expansion Foam
  - Firewater Monitors
  - Design Follows NFPA 59A
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Typical UV/IR Sensor
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Typical Firewater Monitor
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Firewater Connections at Wharf Trestle
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Typical Foam Generator Located Above Containment Area
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- Storage Tanks
  - Three 95K m³, One 140K m³
  - Double walled, double bottomed
  - 9% Ni-Steel lined, CS outer, HE
  - Insulation Between
  - Aluminum Plate Roof, Steel Dome, HE
  - Insulation Between
  - Pipelines Enter/Exit Top
Trunkline LNG Lake Charles Terminal

- Storage Tanks (cont)
  - Auto-refrigerated, BOG Removed
  - Supported by Closely Spaced Pre-stressed Concrete Piles,
  - Air Space under Tank Bottom, No Soil Contact
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Older 95K m³ Storage Tank. Notice Top Loading/Unloading.
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Elevated Tank Foundation
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Tank Foundation Piles, 14”X14” Pre-stressed Concrete, 70’ Depth, 21” thk Pile Cap
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- Existing Vaporizers
  - 14 Submerged Combustion type
  - Natural Gas Fired
  - Uses 1% LNG
  - Gas Send Out 700 – 1200 psig
  - Not Odorized
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Submerged Combustion Vaporizers
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SCV Closer View
Trunkline LNG Lake Charles Terminal

- New Vaporizers
  - Ambient Air type
  - Under Construction, Online 2008
  - Significantly Reduces Operating Costs and Air Emissions
  - SCV Used as Back-up (Low Temp. Winter Cond.)
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New Vaporizer Construction Site. Two Gas Vent Towers Are Visible.
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New Vaporizer Construction Site. Storage Tanks Are Seen in the Background.
Other LNG Terminals

- Other Planned On-shore LNG Receiving Terminals in Louisiana.
  - Sempra Energy Cameron Terminal, Hackberry LA
  - Golden Pass Terminal, Sabine Pass, LA
- Three On-shore Terminals to Be Located Within a 100 mi. Radius
Sempra Cameron LNG Terminal

- Terminal Located on the Shore of Upper Calcasieu Lake in Cameron Parish
Sempra Cameron LNG Terminal
Sempra Cameron LNG Terminal
The End