EQUIPMENT AND PERSONNEL
TX DOT Ports & Waterways Conference
Sept 2009
Topics

3.1 Equipment – Boats

3.2 Equipment – Barges

3.3 Equipment – Tows
3.4 Personnel

3.4.1 Industry Organization
3.4.2 General Crew
3.4.3 Other Crew
3.4.4 Hiring Processes and Requirements
3.4.5 Time and Experience
3.4.6 Transportation Workers Identification Card (TWIC)

3.5 Merchant Marine Licensing and Credentialing
Equipment and Personnel

3.1.1 Types and Sizes of Towboats
Towboats

- Used to describe a towing vessel that normally pushes barges ahead
- Come in different sizes and colors
- All have a bow, stern, port and starboard sides, and some type of propulsion system
Towboats

3.1.1 Types and Sizes of Towboats
Towboats
Towboat Classes

- River Line Haul
- River
- **Canal** (HP 800-1600)
- **Canal/River** (1800-2600)
- Fleet
- Day boats
- Tender boats
Towboat Classes

3.1.1 Types and Sizes of Towboats
Canal and River Towboat

- Normally we state the horsepower, which gives the tow size that can be pushed.
- This vessel:
  - 90 feet long
  - 33 feet wide
  - 2,600 HP
Towboats – Long Life

- **117** feet long
- Built in **1951**
- **2,800** HP
Towboats

- **104** feet long
- Built in **1975**
- **3,000** HP

**Note:** Sometimes length does not mean more horsepower.
Towboats

- 90 feet long
- Built in 1976
- 3,000 HP
Towboats

- **130** feet long
- **Built in 1977**
- **2,800** HP

**Note:** This vessel is 40 feet longer than the previous vessel, but has less horsepower.
River Boats

- Very large towboat
- Built in 1953
- Classified as a River Boat
Towboat Operating Conditions

- Operate in all types of conditions
- Operate 24/7, except in:
  - Fog
  - Traffic
  - Extremely high winds with tow of empty barges
River Line Towboat

- Larger
- Stay in Western rivers
- This vessel
  - 3 engines
  - 10,500 HP
  - One of largest in river system
Special Design Towboat

- **138** feet long
- Built in **1968**
- **3375** HP

**Note:** This vessel has a retractable wheelhouse.
Wheelhouse Mobility

- Wheelhouse must go up and down
- Crew quarters on first deck
Shift or Work Boats

- Small boats designed as work boats only
- Work with:
  - Fleets
  - Locks
  - Docks
- Crew does not sleep on board
Shift or Work Boats

- Variable sizes
- Mainly used as **shift** boats or **work** boats
Colors and Stack Decal Logo

- Colors and stack decal logo like tattoo
- Both somewhat territorial
Towboat Hulls

- Out of water different from underneath
- Somewhat flat-bottomed hull
Towboat Hulls – New Construction

3.1.1 Types and Sizes of Towboats
Towboat Hull Construction

3.1.1 Types and Sizes of Towboats
Towboat Hulls

- Adding the wheels and rudders to place in water
Rudders

Rudders in front (or forward) of the wheel are used for backing.

Rudders behind the wheel (or aft) are main rudders for going ahead.
• Handling ability boils down to size of rudders, wheels, etc., at the stern.
3.1.2 Main Propulsion Equipment
Generators

- Machinery is the driving source of the boat
- Generators provide electricity for the vessel
Engines

- Engines come from different manufactures such as:
  - John Deere
  - Caterpillar
  - Cummings
Generator Location

Depending on the size of the boat, the generators could be at first deck level, or down in the engine room with the main engines.
Even though today we are classed as **uninspected**, Regulatory has a long history of inspecting our vessels.
Main engines vary from different manufacturers, and different sizes, depending on the vessel.
New Style Engines

Most new style engines have enhanced electronics that assist with maintenance issues.
Engine Gauges

Usually there are sets of gauges on the engines, and a specific set of gauges in the wheelhouse, for the pilot to monitor the engines.
Reduction Gear

All main engines have some type of reduction gear, or clutch, that rotates the wheel.
Most engine rooms are equipped with the same tools that are normally used in any other shop. Remember, most towboats are self sustained with personnel living on board. Trained personnel are professional and keep up routine boat and engine maintenance.
Wheelhouse / Pilot House

The wheelhouse, or pilot house, is the nucleus of the entire operation.
Most all vessels carry a minimum of radar, VHF radio, and cell phones for communication.
Living quarters and galleys vary depending on the size of the vessel. Personnel live aboard the boats, cooking and eating all of their meals each day.
The size of the vessel determines the size of the galley, lounge, and other crew quarters.
Galley design is as variable as the design of kitchens in houses.
3.2.1 Barge Sizes, Types, and Usage
# Barge Sizes

<table>
<thead>
<tr>
<th>Type</th>
<th>Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard</td>
<td>180 by 26 feet</td>
</tr>
<tr>
<td>Regulation</td>
<td>195 by 35 feet</td>
</tr>
<tr>
<td>Jumbo hopper</td>
<td>200 by 35 feet</td>
</tr>
<tr>
<td>Oversize / jumbo</td>
<td>50-54 by 150 by 300 feet</td>
</tr>
<tr>
<td>Lash</td>
<td>30 by 60 feet to 35 by 90 feet</td>
</tr>
</tbody>
</table>
Barges are basically built as a big steel box, with walls (called **bulkheads**) and compartments.
Barge Construction

3.2.1 Barge Sizes, Types, and Usage

Voids on the side (wing tanks)

Cargo tank
Hopper barges, or dry cargo barges, can be covered or open. These barges carry a variety of cargo such as grain, coal, rocks, etc.
Rake and Box Tank Barges
3.2.2 Barge Design
Barge – Side View

- Single skin

- Double skin
Add voids on the bow, which can be a sloped (normally called rake), or just a box shape.
Barge Construction

3.2.2 Barge Design
Barge Hull Designs

3.2.2 Barge Design
Equipment on tank barges varies; however, all barges have a piping system which allows the cargo to be transferred in and out of the cargo tanks. The pipes used to connect and disconnect dock hoses or arms are called **headers**.
There is only about 12 inches of freeboard to the first deck on a normal, loaded barge. The wing tanks are closed and dogged tight so water cannot enter. For safety reasons, personnel will not walk down the lower deck while in transit.
Equipment and Personnel

3.2.5 Barge Equipment
Pressure Barges

Specially designed barges called **pressure barges** are used for carrying liquefied gas. Typical outside hull design is the same; however, the tanks are round and long, usually with two separate tanks on each barge.
This slide illustrates a pressure barge side-by-side with a tank barge.
3.3.1 Equipment – Tow Sizes
Unit Tows

- Tows can be 1 barge, or 20 barges
- Example shown:
  - Approximately 900 feet long by 54 feet wide
  - Length equal to about 3 football fields
Equipment and Personnel

3.3.2 Equipment – Tow Routes
Barges in a Tow

3.3.2 Equipment – Tow Routes
3.3.3 Equipment – Terminology
Face Wires

To make up a tow, a boat has to be secured to the barge. This is done by wires, or special ropes that have no stretch, called **face wires**. These wires keep the boat faced up to the barge.
Pushing or Tow Knees

Located on the bow are the **pushing knees** (or **tow knees**) that allow the different heights of barges to rest against the towboat.
3.3.4 Operating Constraints
Skilled Personnel

It takes a great deal of skill to maneuver a barge as long as a football field and wider than a house in all types of conditions, current, and weather.
Skilled Personnel

Skill is also needed in the proper placement of wires for securing the barges.
Wire Placement

It is critical that all wires are placed correctly. The example shown are the forward and aft (fwd & aft) wires that keep 2 barges secured end-to-end.
Barge Safety

Safety is regarded as the highest priority at all times. Whenever possible, develop safety-based behavior and attitudes such as keeping the crew away from the sides of barges.
Barge Safety

The use of heavy wires and winches can pose risk if not handled properly.
Canal (ICWW) Tows

Tow 70’ x 600’

Tow 54’ x 600’

3.3.4 Operating Constraints
Equipment and Personnel

3.3.5 Equipment – Barges
All types of materials are carried on barges.
Barge Cargo

3.3.5 Equipment – Barges
Equipment and Personnel

3.3.6 Equipment – Boats
Sometimes boats have to operate in close range of each other.
Communication and Traffic

Communication, traffic, and controlling a tow take skill; however, it is done correctly every day of the week.
The example shown here is a boat with another boat on top, being pushed by a third boat. This is still called towing.
Tow of 20 Barges
ICWW – Towboats

This is a typical one barge tow in the ICWW.
ICWW boats work every day of the week, continually moving their cargo.
Specialty Tows
Service Tows

Specialized service vessels bring fuel and supplies to tows.
Equipment and Personnel

3.4.1 Personnel – Industry Organization
The watch officer has a huge responsibility that takes skill to execute safely. This vessel is making a lock; there is little room for error.
Crew Teamwork

It all boils down to people working together as a team for this to happen.
Training

Training is a constant, ongoing process.
Training

From the entry-level deckhand placement of wires and rigging...
Training

...to how to throw a line...
Classroom Type Regulatory Training
Simulator Training
Watch System

- 24-hour Watch system (Square Watch)
  - Two shifts
  - Varies on special services
  - **Hours may vary with education on CEMS**
    - Shift One: 0600 – 1200 On Duty
      - 1st Watch or Front Watch
      - Normally the Captain/Master’s Watch
    - Shift Two: 1200 – 1800 On Duty
      - 2nd Watch or Back Watch
    - Shift One: 1800 – 2400 On Duty
    - Shift Two: 0001 – 0600 On Duty
## Crew Variations

<table>
<thead>
<tr>
<th>Role</th>
<th>Vessel Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Captain/Master</td>
<td>All vessels</td>
</tr>
<tr>
<td>Pilot</td>
<td>All 24-hour vessels</td>
</tr>
<tr>
<td>Engineer</td>
<td>Normally larger vessels</td>
</tr>
<tr>
<td>Tankerman/Deckhand</td>
<td>Normally tankbarges</td>
</tr>
<tr>
<td>Deckhands</td>
<td>All vessels</td>
</tr>
</tbody>
</table>
Different Size Vessels/Crew

5-7 Person Crew

Built for 6, but could have 4

5-7 Person Crew

If used as Day boat, 2 Person Crew
Crew Shifts

- **Two to one schedule**
  - 28 days on, 14 days off
  - 20 days on, 10 days off
  - 14 days on, 7 days off

- **240 days per year on, 120 days per year off**
Crew Structure

105

Master/Captain

Pilot

3 - 5 years

1 year

Engineer

Tankerman

6 - 12 months

Deckhand – Mate

3 - 4 years

Steersman

Entry-Level Deckhand Trainee

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Shore-side Structure – Varies with Size of Company

CEO/Owner – could be one and the same. With smaller companies, this person may be the port captain

President, VP’s, Operations Manager, and other management positions (depending on the size of the company)

Port Captain – usually responsible for handling issues of several different vessels regarding crew, accidents, and/or causalities, this person has usually been a Master, knows the crews on a personal basis, and understands the capabilities of the crews and vessels

Master – responsible for crew and vessel
Equipment and Personnel

3.4.4 Hiring Processes and Requirements
- TWIC-Vetting of criminal background
- DOT Drug & Alcohol Testing
- Credential Mariners USCG criminal background checks
- Proper Training
License / Certification

THOMAS
OMEGO
MCWHORTER
40027 CANE AVE
SLIDE, LA 70461
Citizenship: UNITED STATES
Mariner #: 2022743
DOB: 08/09/1964

Issued 01/17/2008
Expires 01/17/2013
132102

USCG
Combined Document we now called a Credential