

Nearly 80 percent of railroad transportation workers are members of unions. Many different railroad unions represent various crafts on the railroads. Most railroad engineers are members of the Brotherhood of Locomotive Engineers, while most other railroad transportation workers are members of the United Transportation Union. Many subway operators are members of the Amalgamated Transit Union, while others belong to the Transport Workers Union of North America.

Related Occupations

Other related transportation workers include aircraft pilots and flight engineers, busdrivers, truckdrivers and driver/sales workers, and water transportation occupations.

Sources of Additional Information

To obtain information on employment opportunities, contact the

employment offices of the various railroads and rail transit systems, or State employment service offices.

For general information about the rail transportation industry, contact:

► Association of American Railroads, 50 F St. NW., Washington, DC 20001. Internet: <http://www.aar.org>.

► Federal Railroad Administration, 400 7th St. SW., Washington, DC 20590. Internet: <http://www.fra.dot.gov>

For general information about career opportunities in passenger transportation, contact:

► American Public Transportation Association, 1666 K St. NW., Suite 1100, Washington, DC 20006. Internet: <http://www.apta.com>

General information on rail transportation occupations and career opportunities as a locomotive engineer is available from:

► Brotherhood of Locomotive Engineers, 1370 Ontario Ave., Cleveland, OH 44113-1702. Internet: <http://www.ble.org>

Water Transportation Occupations

(O*NET 53-5011.01, 53-5011.02, 53-5021.01, 53-5021.02, 53-5021.03, 53-5022.00, 53-5031.00)

Significant Points

- Many jobs in water transportation occupations require a merchant mariner's document or a license from the U.S. Coast Guard.
- Merchant mariners on ocean-going ships are hired for periods ranging from a single voyage to several continuous voyages and may be away from home continuously for months.
- Jobs aboard ocean-going vessels have high pay but competition for them remains keen, and merchant mariners might have to wait months between work opportunities.

Nature of the Work

Movement of huge amounts of cargo, as well as passengers, between nations and within our nation depends on workers in water transportation occupations. They operate and maintain deep-sea merchant ships, tugboats, towboats, ferries, dredges, excursion vessels, and other waterborne craft on the oceans, the Great Lakes, rivers and canals, other waterways, and in harbors. (Workers who operate watercraft used in commercial fishing are described in the section on fishers and fishing vessel operators elsewhere in the *Handbook*.)

Captain, mates, and pilots of water vessels command or supervise the operations of ships and water vessels, both within domestic waterways and on the deep sea. *Captains* or *masters* are in overall command of the operation of a vessel, and they supervise the work of any other officers and crew. They determine the course and speed, maneuver to avoid hazards, and continuously monitor the vessel's position using charts and navigational aides. Captains either direct or oversee crew members who steer the vessel, determine its location, operate engines, communicate to other vessels, perform maintenance, handle lines, or operate vessel equipment. Captains and their department heads ensure that proper procedures and safety practices are followed, check that machinery and equipment are in good working order, and oversee the loading and discharging of

cargo or passengers. They also maintain logs and other records tracking the ships' movements, efforts at controlling pollution, and cargo/passenger carrying records.

Deck officers or *mates* perform the work for captains on vessels when they are on watch. Mates also supervise and coordinate activities of the crew aboard the ship. They inspect the cargo holds during loading to ensure the load is stowed according to specifications and regulations. Mates supervise crew members engaged in maintenance and the primary up-keep of the vessel. All mates stand watch for specified periods, usually 4 hours on and 8 hours off. However, on smaller vessels, there may be only one mate (called a *pilot* on some inland towing vessels) who alternates watches with the captain. The mate would assume command of the ship if the captain became incapacitated. When more than one mate is necessary aboard a ship, they typically are designated Chief Mate or First Mate, Second Mate, and Third Mate.

Pilots guide ships in and out of harbors, through straits, and on rivers and other confined waterways where a familiarity with local water depths, winds, tides, currents, and hazards such as reefs and shoals are of prime importance. Pilots on river and canal vessels are usually regular crew members, like mates. Harbor pilots are generally independent contractors, who accompany vessels while they enter or leave port. They may pilot many ships in a single day. *Motorboat operators* operate small, motor-driven boats to carry passengers and freight. They also take depth soundings in turning basins, and serve as liaisons between ships, between ship and shore, harbor and beach, or area patrol.

Ship engineers operate, maintain, and repair propulsion engines, boilers, generators, pumps, and other machinery. Merchant marine vessels usually have four engineering officers: A chief engineer, and a first, second, and third assistant engineer. Assistant engineers stand periodic watches, overseeing the safe operation of engines and machinery.

Marine oilers and more experienced *qualified members of the engine department*, or QMEDs, maintain the proper running order of their vessels in the engine spaces below decks under the direction of the ship's engineering officers. They lubricate gears, shafts, bearings, and other moving parts of engines and motors; read pressure and temperature gauges and record data; and may assist with repairs and adjust machinery.

Sailors operate the vessel and its deck equipment under the direction of the ship's officers, and keep the nonengineering areas in

good condition. They stand watch, looking out for other vessels and obstructions in the ship's path and navigational aids such as buoys and lighthouses. They also steer the ship, measure water depth in shallow water, and maintain and operate deck equipment such as lifeboats, anchors, and cargo-handling gear. On vessels handling liquid cargo, sailors hook up hoses, operate pumps, and clean tanks, while on tugboats or tow vessels, they tie barges together into tow units, inspect them periodically, and disconnect them when the destination is reached. When docking or departing, they handle lines. They also perform routine maintenance chores such as repairing lines, chipping rust, and painting and cleaning decks or other areas. Experienced sailors are designated *able seamen* on ocean-going vessels, but may just be called deckhands on inland waters; larger vessels usually have a *boatswain*, or head seaman.

A typical deep-sea merchant ship has a captain, three deck officers or mates, a chief engineer and three assistant engineers, a radio operator, plus six or more nonofficers, such as deck seamen, oilers and QMEDs, and cooks or foodhandlers. The size and service of the ship determine the number of crew for a particular voyage. Small vessels operating in harbors, rivers, or along the coast may have a crew comprised only of a captain and one deckhand. The cooking responsibilities usually fall under the deckhands' duties.

On larger coastal ships, the crew may include a captain, a mate or pilot, an engineer, and seven or eight seamen. Non-licensed positions on a large ship may include a full-time cook, an electrician,

and machinery mechanics. On cruise ships, which also may be considered coastal ships, *bedroom stewards* keep passengers' quarters clean and comfortable.

Working Conditions

Merchant mariners spend extended periods at sea. Most deep-sea mariners are hired for one or more voyages that last for several months, although there is no job security after that voyage. Many are unemployed for weeks or months before they have another opportunity to join another ship's crew.

The rate of unionization for these workers is almost 75 percent, much higher than the average for all occupations. Consequently, merchant marine officers and seamen, both veterans and beginners, are hired for voyages through union hiring halls or directly by shipping companies. Hiring halls prioritize the candidates by the length of time the person has been out of work, and fill open slots accordingly. Hiring halls are typically found in major seaports.

At sea, these workers usually stand watch for 4 hours and are off for 8 hours, 7 days a week. Those employed on Great Lakes ships work 60 days and have 30 days off, but do not work in the winter when the lakes are frozen. Workers on rivers, canals, and in harbors are more likely to have year-round work. Some work 8- or 12-hour shifts and go home every day. Others work steadily for a week or month and then have an extended period off. When working, they are usually on duty for 6 or 12 hours and are off for 6 or 12 hours. Those on smaller vessels are normally assigned to one vessel and have steady employment.

People in water transportation occupations work in all weather conditions. Although merchant mariners try to avoid severe storms while at sea, working in damp and cold conditions is often inevitable. While it is uncommon nowadays for vessels to suffer sea disasters such as fire, explosion, or a sinking, workers face the possibility that they may have to abandon their craft on short notice if it collides with other vessels or runs aground. They also risk injury or death from falling overboard, and hazards associated with working with machinery, heavy loads, and dangerous cargo.

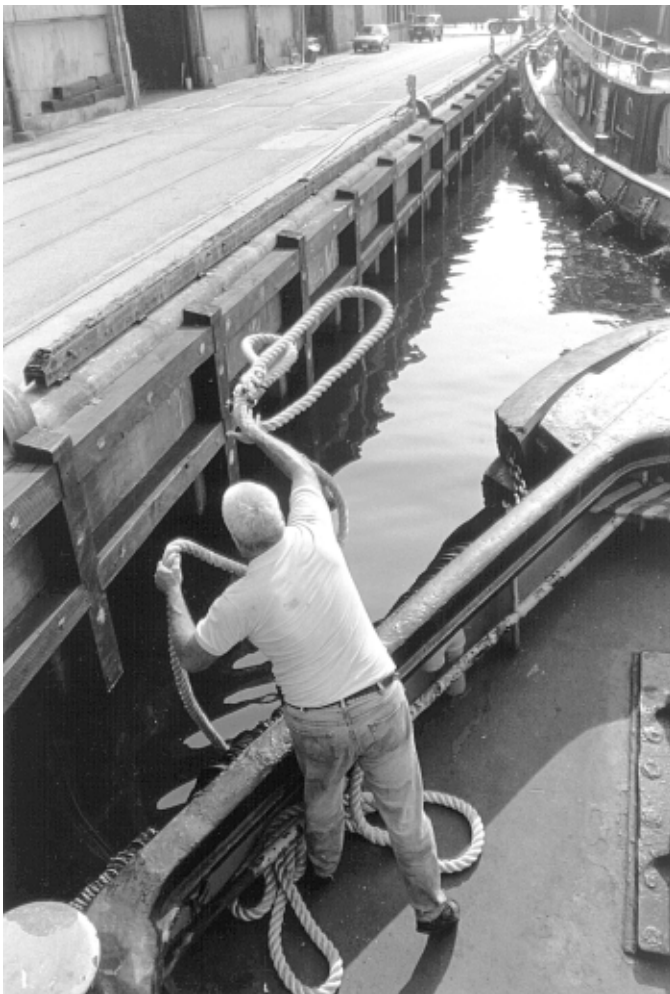
Most newer vessels are air-conditioned, soundproofed from noisy machinery, and equipped with comfortable living quarters. Nevertheless, some mariners dislike the long periods away from home and the confinement aboard ship, and consequently leave the industry.

Employment

Water transportation workers held about 70,000 jobs in 2000. The total number who worked at some point in the year was somewhat higher because many merchant marine officers and seamen worked only part of the year. The following tabulation shows employment in the occupations that make up this group:

Sailors and marine oilers	32,000
Ship and boat captains and operators	25,000
Ship engineers	8,600
All other water transportation workers	4,900

More than 75 percent of these workers were employed in water transportation services. Of these, about 39 percent worked in establishments related to marine cargo handling, towing and tugboat services, marinas, or boat cleaning and marine salvaging. About 25 percent worked in the transportation of freight on the oceans or the Great Lakes, while about 13 percent were employed in the water transportation of passengers on the deep seas, ferries, or sightseeing boats. The Federal government employed approximately 10 percent of all water transportation workers.



Seamen handle lines when docking in or departing from port.

Training and Other Qualifications

Entry, training, and educational requirements for most water transportation occupations are established and regulated by the U.S. Coast Guard, an agency of the U.S. Department of Transportation. All officers and operators of watercraft must be licensed by the Coast Guard, which offers various kinds of licenses, depending on the position and type of craft.

There are two ways to qualify for a deck or engineering officer's license: Applicants either must accumulate sea time and meet regulatory requirements, or must graduate from the U.S. Merchant Marine Academy or one of the six State maritime academies. In both cases, applicants must pass a written examination. Federal regulations also require that an applicant pass a physical examination, a drug screening, and a National Driver Register Check before being considered. Persons without formal training can be licensed if they pass the written exam and possess sea service appropriate to the license for which they are applying. However, it is difficult to pass the examination without substantial formal schooling or independent study. Also, because seamen may work 6 months a year or less, it can take 5 to 8 years to accumulate the necessary experience. The academies offer a 4-year academic program leading to a bachelor of science degree, a license as a third mate (deck officer) or third assistant engineer (engineering officer) issued by the Coast Guard, and, if the person is qualified, a commission as ensign in the U.S. Naval Reserve, Merchant Marine Reserve, or the Coast Guard Reserve. With experience and additional training, third officers may qualify for higher rank.

Sailors and unlicensed engineers working on U.S. flagged deep-sea and Great Lakes vessels must hold a Coast Guard-issued document. Additionally, they must hold certification when working aboard liquid-carrying vessels. Able seamen also must hold government-issued certification. For employment in the merchant marine as an unlicensed seaman, a merchant mariner's document issued by the Coast Guard is needed. Most of the jobs must be filled by U.S. citizens. However, a small percentage of applicants for merchant mariner documents do not need to be U.S. citizens, but must at least be aliens legally admitted into the United States and holding a green card. A medical certificate of excellent health attesting to vision, color perception, and general physical condition is required for higher level deckhands and unlicensed engineers. While no experience or formal schooling is required, training at a union-operated school is the best source. Beginners are classified as ordinary seamen and may be assigned to any of the three unlicensed departments: Deck, engine, or steward. With experience at sea, and perhaps union-sponsored training, an ordinary seaman can pass the able seaman exam and move up with 3 years of service.

No special training or experience is needed to become a seaman or deckhand on vessels operating in harbors or on rivers or other waterways. Newly hired workers are generally given a short introductory course and then learn skills on the job. After sufficient experience, they are eligible to take a Coast Guard exam to qualify as a mate, pilot, or captain. Substantial knowledge gained through experience, courses taught at approved schools, and independent study are needed to pass the exam.

Harbor pilot training is usually an extended apprenticeship with a towing company or a pilot association. Entrants may be able seamen or licensed officers.

Job Outlook

Keen competition is expected to continue for jobs in water transportation occupations. Overall, employment in water transportation occupations is projected to grow more slowly than the average for all occupations through the year 2010. Opportunities will vary by sector.

Employment in deep-sea shipping for American mariners is expected to stabilize after several years of decline. New international regulations have raised shipping standards with respect to safety, training, and working conditions. Consequently, competition from ships that sail under foreign *flags of convenience* (FOCs) should lessen as insurance rates rise for ships that do not meet the new standards. Insuring ships under industrialized countries' flags, including that of the United States, should become less expensive, increasing the amount of international cargo carried by U.S. ships. A fleet of deep-sea U.S. flagged ships is considered to be vital to the Nation's defense, so some receive Federal support through a maritime security subsidy and other provisions in laws limit certain Federal cargoes to ships that fly the U.S. flag.

Newer ships are designed to be operated safely by much smaller crews. Innovations include automated controls and computerized monitoring systems in navigation, engine control, watchkeeping, ship management, and cargo handling. As older vessels are replaced, computer skills will become more important for crews. Possible future developments include "fast ships," ocean-going cargo vessels that use jet propulsion, which would decrease ocean-crossing times significantly. If such plans are successful, the industry will benefit in terms of increased business and employment.

Vessels on rivers and canals and on the Great Lakes carry mostly bulk products such as coal, iron ore, petroleum, sand and gravel, grain, and chemicals. Though shipments of these products are expected to grow through the year 2010, current imports of steel are dampening employment on the Lakes. Employment in water transportation services is likely to rise, however.

Growth also is expected in the cruiseline industry within U.S. waters. Vessels that operate between U.S. ports are required by law to be U.S. flagged vessels. The building and staffing of several new cruise ships over the next 3 to 4 years will create new opportunities for employment at sea in the cruise line industry, which is composed mostly of foreign flagged ships.

Nevertheless, openings within the traditional water transportation sector for mariners, though expanding slightly, will remain tight. Some experienced merchant mariners may continue to go for periods of time without work. However, this situation appears to be changing, as the demand for licensed and non-licensed personnel has been on the rise. Maritime academy graduates who have not found licensed shipboard jobs in the U.S. merchant marine find jobs in related industries. Because they are commissioned as ensigns in the Naval or Coast Guard Reserve, some are selected for active duty in the Navy or Coast Guard. Some find jobs as seamen on U.S. flagged or foreign flagged vessels, tugboats, other watercraft, or enter civilian jobs with the U.S. Navy or Coast Guard. Some take land-based jobs with shipping companies, marine insurance companies, manufacturers of boilers or related machinery, or other related jobs.

Earnings

Earnings vary widely depending on the particular water transportation position and experience, ranging from the minimum wage in some beginning seamen or mate positions to more than \$33.77 an hour for some experienced ship engineers. Median hourly earnings in 2000 of water transportation occupations were as follows:

Ship and boat captains and operators	\$21.62
Ship engineers	22.85
Sailors and marine oilers	13.52
All other water transportation workers	11.70

Annual pay for captains of larger vessels, such as container ships, oil tankers, or passenger ships, may exceed \$100,000, but only after

many years of experience. Similarly, captains of tugboats often earn more than the median reported here, with earnings dependent on the port and the nature of the cargo.

Related Occupations

Workers in other occupations who make their living on the seas and coastal waters include fishers and fishing vessel operators and some members of branches of the armed forces.

Sources of Additional Information

Information on merchant marine careers, training, and licensing requirements is available from:

- Maritime Administration, U.S. Department of Transportation, 400 7th St. SW., Room 7302, Washington, DC 20590. Internet: <http://www.marad.dot.gov>
 - Seafarers' International Union, 5201 Auth Way, Camp Springs, MD 20746.
 - Paul Hall Center for Maritime Training and Education, P.O. Box 75, Piney Point, MD 20674-0075. Internet: <http://www.seafarers.org/phc>
 - International Organization of Masters, Mates, and Pilots, 700 Maritime Boulevard, Linthicum Heights, MD 21090-1941.
 - U.S. Coast Guard National Maritime Center, Licensing and Evaluation Branch, 4200 Wilson Blvd., Suite 630, Arlington, VA 22203-1804. Internet: <http://www.uscg.mil/stcw/m-pers.htm>
- Individuals interested in attending the merchant marine academy should contact:
- Admissions Office, U.S. Merchant Marine Academy, Steamboat Rd., Kings Point, NY 11024-1699.