Order Code RL34365

CRS Report for Congress

Ship Navigation in Harbors: Safety Issues

February 8, 2008

John Frittelli
Specialist in Transportation Policy
Resources, Science, and Industry Division

Prepared for Members and
Committees of Congress

Ship Navigation in Harbors: Safety Issues

Summary

On November 7, 2007, a container ship collided with a tower of the San Francisco-Oakland Bay Bridge, spilling 58,000 gallons of the ship's bunker fuel into the Bay. The incident has raised questions about the role of maritime pilots and vessel traffic services (VTSs) in preventing accidents in U.S. harbors, such as: Is there a need for further independent oversight of pilot performance? Could VTSs operate more like Air Traffic Control centers? Should the pilot and ship captain be required to agree on a passage plan before transiting a harbor?

Because of the additional challenges of navigating large ships through the constricted waters of a harbor, most U.S. ports require shipping lines to hire a maritime pilot. Maritime pilots, through a lengthy apprenticeship process and many years of experience, have gained intimate knowledge of the navigational requirements of a particular harbor. Despite the federal government's prominent role in regulating interstate commerce, Congress has largely left it to the various coastal states to regulate pilotage. Pilots are licensed by the state for ships engaged in foreign trade ("registered" vessels carrying international cargo), which accounts for the vast majority of port calls. Typically a state pilot board oversees the hiring, training, and performance of pilots, as well as setting pilotage rates charged to the shipping lines. The U.S. Coast Guard has jurisdiction only over pilots of ships engaged in domestic trade and the courts have ruled that the Coast Guard does not have the authority to suspend or revoke the license of pilots for violations while piloting a foreign-trade ship. To assist pilots, the busiest U.S. ports have established VTS stations to monitor ship traffic and provide relevant information to pilots, such as the location of other ships. While often compared to an air traffic control tower, a VTS is not directly involved in the movement of vessels and is more accurately described as an advisory service than a traffic control center.

Ever-larger ships, difficult or challenging slow-speed handling characteristics of some of these ships, and rising port traffic that is predominantly foreign-flagged have led to proposals concerning pilotage, VTSs, and other safety-related navigation services in U.S. ports. Given the federal interest in marine environmental protection and the Coast Guard's mission to ensure the safety of shipping in U.S. waters, some experts have advocated stronger federal oversight of pilots. They recommend that the Coast Guard or a national commission establish national standards for pilot training and proficiency or that the Coast Guard be given disciplinary authority over state-licensed pilots. State pilots resist greater federal oversight, arguing that the unique geography and navigational requirements of each port justifies local oversight. Whether VTSs should exert more direct control over vessel movement is also raised as a safety measure, but most acknowledge that an experienced on-board mariner is probably in the best position to direct a vessel's movement. Requiring that a pilot and ship captain first agree on a harbor passage plan, investigating language difficulties between pilots and foreign crews, and Coast Guard rotational staffing practices, are other issues policymakers may examine in assessing the safety of ship navigation in U.S. harbors.

Contents

Ship Navigation in Harbors: Safety Issues

Introduction

On November 7, 2007, at about 8:30 a.m., the container ship *Cosco Busan* sideswiped one of the towers of the San Francisco-Oakland Bay Bridge, ripping a 100-foot by 12-foot gash into the side of the hull and releasing over 50,000 gallons of the ship's bunker fuel into the Bay. Throughout the morning, and at the time of the accident, there was heavy patchy fog, and the pilot had delayed the ship's departure from the Oakland pier by 90 minutes because of the fog.[1] About three minutes before the accident, but apparently too late to avoid the collision, the San Francisco Vessel Traffic Service (VTS), which monitors harbor traffic, contacted the ship's pilot. The VTS told him that he was running parallel to the bridge and inquired whether his intended course was still to pass beneath the delta and echo spans of the bridge, as he had informed VTS earlier.

Although several investigations are pending, the suspected cause of the accident is pilot error.[2] Considering the number of ships transiting U.S. harbors everyday, accidents are rare. This is largely the result of the skill and expertise of pilots and the navigation support services they receive from VTSs. When accidents occur, the public impact of the oil or fuel spilled can be large, as the *Cosco Busan* accident demonstrated.

As a result of tanker safety improvements implemented in the wake of the 1989 *Exxon Valdez* spill, the amount of oil spilled by oil tankers has been declining significantly and is now approaching the amount of oil spilled by non-tank vessels.[3] According to the Coast Guard, the *Cosco Busan* has a fuel capacity of 52,000 *barrels*,[4] larger than the fuel capacity of the majority of ocean-going non-tank vessels calling at U.S. ports which have a fuel capacity between 10,000 and 20,000 barrels.

---

[1] This account of the accident is based on the Statement of Admiral Craig E. Bone, 11th District Commander, U.S. Coast Guard, in a hearing before the House Committee on Transportation and Infrastructure, Subcommittee on Coast Guard and Maritime Transportation, November 19, 2007. The U.S. Coast Guard, the National Transportation Safety Board (NTSB), and the DHS Inspector General are investigating the accident which will provide more details into the causes of the accident and will likely make recommendations for preventing this type of accident in the future.

[2] The San Francisco Bay Pilot commission has suspended the pilot's state license, pending a hearing, and the Coast Guard has requested that the pilot voluntarily turn in his federal license, which he has done.

[3] See Figure 2 in CRS Report RL33705, *Oil Spills in U.S. Coastal Waters: Background, Governance, and Issues for Congress*, by Jonathan L. Ramseur.

[4] One barrel is equal to 42 gallons.

However, 360 vessels calling U.S. ports have a fuel capacity over 50,000 barrels and 100 vessels have a fuel capacity over 70,000 barrels.[5] While the fuel oil carried by non-tank vessels is a relatively small fraction of the oil carried as cargo in tankers, it is still of sufficient quantity to cause an environmental catastrophe and significant economic loss if spilled.

Much attention has focused on the timeliness of the Coast Guard's response to the *Cosco Busan* spill, but the accident has also raised questions about oversight of pilot proficiency and the role of VTSs in harbor navigation. Congress has thus far held three hearings on the accident and has introduced legislation in reaction to the accident. Other, preexisting legislation related to ship navigation is pending (see the last section of this report). Important policy questions for Congress include whether there is a need for further independent oversight of pilot performance; whether VTSs' should operate more like Air Traffic Control centers; and whether the pilot and ship captain should be required to agree on a passage plan before transiting a harbor? Ever-larger ships, difficult or challenging slow-speed handling characteristics of some of these ships, and rising port traffic that is increasingly foreign-flagged may be cause for a review of pilotage, vessel traffic services, and other safety-related navigation services in U.S. ports.

This report describes the role of pilots and VTSs in the safe navigation of ships in U.S. harbors and reviews the controversy over the governance of pilot associations, the appropriate level of interaction between the VTS and pilot, and other proposals for improving the safety of harbor navigation. The report's focus is on the prevention of ship collisions and groundings in harbors and thus does not discuss oil spill response and clean-up.[6] This report also does not discuss the legal liabilities of carriers and mariners in ship accidents.

Background

Peculiarities of Harbor Navigation. The skill and knowledge required to navigate a ship in a harbor versus at sea is significantly different. Most ship collisions, allisions,[7] and groundings occur in harbors, because that is where navigation becomes constricted by land, shallow water, other vessels, and man-made structures like jetties, bridges, and piers. Tide and river currents are also an important factor in harbors but not at sea. A ship's response to the water displacement of a passing vessel, a channel's bank, and minimal under-keel clearance are hydrodynamics peculiar to a harbor's constricted waters. A fully loaded ship moving at typical harbor speed in a channel with a following tide may

---

[5] Statement of Admiral Thad Allen, Commandant U.S. Coast Guard, Hearing before the Senate Committee on Commerce, Science, and Transportation, Subcommittee on Oceans, Atmosphere, Fisheries, and Coast Guard, December 18, 2007, p. 3.

[6] For a discussion of oil spill response and clean-up, see CRS Report RL33705, *Oil Spills in U.S. Coastal Waters: Background, Governance, and Issues for Congress*, by Jonathan L. Ramseur.

[7] Allision is a Coast Guard term for a collision between a moving vessel and a stationary object.

not be able to stop, even with engines in reverse and the assistance of tugs, for one or more miles.

Challenges of Piloting Bigger Ships. Ever-larger ships, increasing port traffic, and ships carrying especially dangerous cargo have put a premium on the skill and knowledge of today's harbor pilots. In 2005, ocean-going vessels over 10,000 deadweight tonnage (dwt) made over 61,000 U.S. port calls, or an average of 167 per day. From 2001 to 2006, container ship calls at U.S. ports increased by 14% while the average size of containerships increased by 25%.[8] The *Cosco Busan*, with a capacity of 5,500 TEUs[9], is a member of the fifth generation of container ships built between 2000 and 2005. The ship is over 130 feet wide and just over three football fields long (901 feet). From 2001 to 2006, port calls by smaller container ships (those with less than 4,000 TEU capacity) decreased by 15%, while port calls by large container ships like the *Cosco Busan* or bigger (those with more than 5,000 TEU capacity) increased by 241%. Unlike the largest oil tankers, which load and unload their cargo at offshore pipelines or transfer their cargo to lightering ships at the harbor's entrance, container and other types of ships must transit the harbor to load and unload. Ships carrying cargo that can be especially dangerous or damaging to the environment have also increased in number. From 2001 to 2005, liquefied natural gas (LNG) and liquefied petroleum gas (LPG) carrier calls increased by 31% and tanker calls increased by nearly 10%.[10] Because of a boom in shipping in recent years, especially in the dry bulk sector, there is also concern that older ships that otherwise would have been sent to the scrap yard are still plying the seas and picking up dry bulk cargo at ports like those along the lower Mississippi River, which is a load center for bulk cargoes.[11]

According to one observer, many ships transiting U.S. harbors may simply be "too big for their ditches."[12] In other words, they exceed the size that the shipping channel was originally designed for. While ships are designed and built for a particular route, over the life of a ship lasting from 20 to 25 years, markets change and ships end up calling other ports.[13] Often, shipping channels are deepened rather than widened, which some argue is an indication that economics (ship productivity) motivates dredging more than safety concerns.[14] In other words, it is argued that

---

[8] Maritime Administration, *U.S. Water Transportation Statistical Snapshot*, May 2007, p. 5.

[9] TEU = one 20-foot container, and is the standard unit of measure for container ship capacity. A 40-foot container is the size most commonly used and is equal to 2 TEUs.

[10] Maritime Administration, *Vessel Calls at U.S. and World Ports, 2005*, April 2006.

[11] "Eye on Substandard Ships, Bulk Cargo Boom Brings Poorly Maintained Vessels into U.S. Ports," *American Shipper*, December 2007, p. 66.

[12] "Channel Design and Vessel Maneuverability: Next Steps," *Marine Technology*, vol. 40, no. 2, April 2003, p. 93.

[13] "Critical Needs for Ship Maneuverability: Lessons From the Houston Ship Channel Full-Scale Maneuvering Trials," *Marine Technology*, vol. 42, no. 1, January 2005, p. 11-20.

[14] "Channel Design and Vessel Maneuverability: Next Steps," *Marine Technology*, vol. 40, (continued...)

efforts are made to accommodate ship displacement but not maneuverability. For example, when two ships pass each other in opposite directions at a certain segment in the Houston ship channel, they perform a maneuver called "Texas Chicken" because the two ships pass so close to one another that they use the displacement from the other vessel for the extra water they need to avoid grounding on the edges of the channel. A certain concrete structure in the Port of Long Beach is referred to as the "can opener" because of the risk it poses to ships transiting the harbor.[15]

Slow-speed Handling Characteristics. In addition to their sheer size, the biggest ships can have some handling characteristics that pilots need to compensate for when maneuvering them in constricted waters.[16] Deep-sea speed is given higher design priority than shallow and restricted water maneuverability in the design of cargo ships. For example, high powered engines designed to achieve faster deep-sea cruising speeds can have a minimum bare steerage speed of about eight knots, which is a relatively high speed in constricted waters. In contrast, deep-sea speed is less important for cruise ships and they exhibit better slow-speed maneuverability. As ships are getting bigger, the relative size of their rudders is getting smaller; not a problem at sea but it does have an adverse impact on controllability at slower speeds in narrow channels and in shallow water. Ships with a higher profile, like car carriers, container ships (when fully stacked with containers on deck), and cruise ships, are much more susceptible than other ships to the influences of cross winds during slow speed maneuvering.

Maritime Pilotage

Maritime pilots are hired by ocean carriers to take command of the navigation of their ships through harbors. They are navigational specialists for a particular harbor. They board ships at the entrance to a harbor (with use of a pilot boat[17] or in rare cases a helicopter) and take position at the bridge alongside the master of the vessel (or the officer in charge of the watch) and other bridge crew. Using his/her experience and intimate knowledge of the navigation through a particular harbor, the pilot will order instructions to the helmsmen to steer the ship through the harbor and may direct tugboats, if they are assisting. While the pilot is in command of the navigation of the ship through the harbor, the captain of the ship remains in command of the ship and retains ultimate responsibility for its safe passage. Only under emergency situations is a captain likely to countermand the pilot's orders. Often the pilot will board the ship with a computer laptop or other handheld device

---

[14] (...continued)
no. 2, April 2003.

[15] "Giants of the Sea; Massive New Container Ships Carry Huge Loads, but Docking Them Is Problematic for Pilots," *Wall Street Journal*, October 10, 2006, p. B1.

[16] "Channel Design and Vessel Maneuverability: Next Steps," *Marine Technology*, vol. 40, no. 2, April 2003.

[17] The boarding from pilot boat to ship and vice versa is done while the ship is moving, and, especially in conditions of heavy seas, cold water, or sea spray ice, is extremely dangerous. Most pilots know of another pilot that lost their life while boarding.

that contains his/her own set of charts for that harbor as well as ship tracking technology. The laptop may also be plugged into the ship's navigation console to incorporate the ship's navigation technology into the pilot's navigation software. When the pilot boards the ship, the captain is required to inform the pilot about the navigation particulars of the ship, such as the draft, air draft (highest point on the vessel), and maneuvering characteristics. A "pilot card" is used for this purpose. Although English is the required language of international shipping, language can be a barrier to expansive communication between the pilot and captain.

Pilotage Requirements Vary Among U.S. Ports. Most U.S. ports require that a ship hire a pilot — that is, it is compulsory. In some ports, hiring a pilot may be voluntary. In these cases, if a ship captain regularly calls at a port and is confident that he/she can navigate the ship through the harbor, the captain may elect not to hire a pilot, but the shipping line will still be charged either the full pilotage fee or some portion thereof. For liability reasons, many shipping lines will take on a pilot even if not compulsory. On the West and Gulf Coasts, the pilot usually navigates the ship from the harbor entrance to the dock (and vice versa), but on the East Coast, some ports require a "docking pilot" to takeover from the pilot when docking the ship. Docking pilots are usually former tugboat captains and are not members of the local pilot association. In Louisiana, in addition to hiring a harbor pilot, shipping lines may also be required to hire one or two "river pilots" depending on how far up the Mississippi River the ship is transiting (to call at the Port of Baton Rouge or South Louisiana). Especially large ships may be required to hire two pilots, or a full pilot and an assist pilot.

Pilot Training. A pilot may be a graduate of a maritime academy with sea experience. If a pilot has little sea experience, he/she may begin with an apprenticeship under the supervision of a senior pilot lasting several years. Eventually an apprentice pilot will have to pass a written exam that includes, among other things, drawing the chart for the harbor, in every detail, by memory. A new pilot will begin solo piloting on smaller vessels and will typically have to have piloted a minimum number of ships in each size range before advancing.

As explained below, there are pilots who hold state licenses and those that hold federal licenses or endorsements. The requirements for obtaining a state license vary from port to port, but states generally require that an applicant hold a federal pilot's license as a minimum requirement. Obtaining a state pilot license generally requires more hands-on experience than obtaining a federal pilot license.

State Pilot Associations. A maritime pilot typically works as an independent contractor in a pilot's association at a given port. The association takes care of administrative functions for the pilots such as dispatching pilots to vessels, maintaining pilot boats, and billing and collecting pilotage fees. Pilots are assigned to ships on a rotating basis and the shipping line has no choice in the selection of the pilot. Pilot associations are regulated by a state board of commissioners, or in some cases, by city government.[18] Typically, a pilot board is comprised of three to ten

---

[18] At the Port of Los Angeles, pilots are city employees overseen by the port. At the Port (continued...)

members who serve part-time. Representation on the board must consist of a specific ratio of pilots, members of the broader maritime industry in the port area, and members of the public not connected with the maritime industry. The pilot board is responsible for ensuring the qualifications of the pilots, setting pilotage fees charged to the vessel operators, and reviewing the performance of pilots. Pilotage fees are based on the draft and/or tonnage of the vessel and, in some cases, the distance piloted. Pilots do not work in a competitive environment and pilot associations are effectively local or regional monopolies. The pilot association only selects enough member pilots to service the traffic at hand. State and local pilot associations only have jurisdiction over the pilotage of ships in the foreign trade — that is, ships carrying international cargo.[19]

Federal Pilots. The federal government has jurisdiction over the pilotage of ships in the domestic trade: for example, a tank vessel carrying oil from Alaska to California.[20] Typically, a sea captain engaged in the domestic trade will carry a Coast Guard pilot's endorsement on his/her captain's license and therefore will not need to hire a pilot upon entrance to a harbor but rather has the authority to pilot the vessel in that harbor. This type of federal pilot authorization is the most common. There are also a few independent federal pilots that are not employed by a coastwise shipping line, but offer their piloting service at the particular port for which they are licensed. Like the state pilot license, the federal pilot license pertains to a specific port, therefore, the ship captain must obtain a pilot license for each port that he/she expects to call on a routine basis. Generally, all state and local pilots licensed to pilot foreign trade vessels also hold a federal license to pilot ships in the domestic trade. As mentioned above, most state and local pilot associations require a federal pilot's license as a minimum requirement for being allowed to work towards a state pilot's license. The federal government will grant a federal pilot's license to anyone that qualifies, unlike the states that limit the granting of licenses based on their perceived need for pilot services.

Dual Oversight. Significantly, the Coast Guard cannot suspend or revoke the license of a pilot for misconduct while he or she is piloting a foreign trade vessel. The courts have ruled that the pilot in this instance is acting solely under the authority of a state license.[21] Conversely, a state cannot do the same to a pilot while piloting a vessel in the domestic trade, because the courts have ruled that in this instance the

---

[18] (...continued)
of Long Beach, one private company provides pilotage services in an exclusive contract with the port.

[19] Statutorily, ships engaged in the foreign trade are referred to as "registered" vessels.

[20] Ships engaged in the domestic trade (a.k.a. "coastwise trade") are statutorily referred to as "enrolled" vessels.

[21] Alex L. Parks, and Edward V. Cattell, J.R., *The Law of Tug, Tow, and Pilotage*, 3rd Ed., Cornell Maritime Press, Centreville, Maryland, p. 997. See, *Soriano v. United States*, 494 F.2d 681, 1974 AMC 283 (9th Cir. 1974) and *Dietz v. Siler*, 414 F. Supp. 1105 (E.D. La 1976).

pilot is acting solely under the authority of his/her federal license.[22] However, the Coast Guard does have the authority (46 U.S.C. 2302) to levy a civil penalty of up to $25,000 against a person who operates a vessel in a negligent manner and charge a person operating a vessel in a grossly negligent manner with a class A misdemeanor.

The dual regulatory structure of piloting dates back to the mid-1800s. As ports in colonial America began to develop, the colonies instituted their own pilotage requirements as pilotage was a long-established tradition in Europe. In 1789, the First Congress allowed the states to continue to govern pilotage practices "until further legislative provision shall be made by Congress."[23] It was not until the mid-1800s after the introduction of steam vessels that Congress began to play a role in pilotage. In 1871, Congress enacted a law that required steam powered ships in the coastal trade to have federally licensed pilots and preventing the states from requiring state pilots for these ships.[24] A 1912 U.S. Supreme Court decision affirmed that federal jurisdiction over pilotage pertains only to ships engaged in the domestic trade while the pilotage of ships engaged in the foreign trade fell to state jurisdiction, until Congress decided otherwise.[25] This bifurcated regulatory structure continues today.

The bifurcated nature of pilot oversight is a product of legislative history and questions have been raised why oversight is not purely based on safety considerations. Whether a ship is carrying domestic or international cargo is not a factor in safe harbor navigation. The NTSB questions how the Coast Guard can adequately perform its safety mission without direct oversight over the pilotage of the vast majority of vessel transits in U.S. harbors. Moreover, with the current trend of substituting oil from Alaska (which accounts for most U.S. coastal shipping) with imported oil, further diminution of U.S. coastal shipping seems probable.[26] On the other hand, one could argue that captains of coastwise trade vessels are deployed on voyages of much shorter duration than international voyages, are likely to call at a limited number of U.S. ports more frequently, and therefore can gain the expertise and knowledge of navigation necessary for safe transit in those ports. In contrast, sea captains on international voyages, it is argued, do not gain the same level of harbor expertise and knowledge because of much longer voyages and potential assignment to voyages with different port callings. It is also argued by state pilot associations that because the geography and the nature of maritime traffic varies tremendously among ports, it is best left to each individual port to decide the level of pilot expertise and performance required to ensure safe harbor navigation .

State Pilot Associations Are Regulated Monopolies. With a handful of exceptions, most ports have just one pilot association servicing that port.

---

[22] See, *Baggett v. Department of Professional Regulation, Board of Pilot Commissioners,* 1984 AMC 1259, 717 F.2d 521 (11th. Cir. 1983).

[23] Section 4 of the Lighthouse Act of August 7, 1789 (1 Stat. 54). [Crowley, p. 173.]

[24] Act of February 28, 1871, 16 Stat. 440.

[25] *Anderson v. Pacific Coast Steamship Company,* 225 U.S. 187 (1912).

[26] In the last half-decade, U.S. foreign waterborne trade increased by nearly 17% while coastwise and Great Lakes shipping declined by 4%.

However, there is generally nothing in state laws prohibiting a competing pilot association from forming. It was only during the sailing era that competition among pilots in a harbor was the norm. Pilot associations defend their monopoly status as being necessary to prevent commercial interests from trumping safety. They contend that in a competitive environment, economic pressures from the shipping lines would inevitably undermine their safety prerogative. Also, pilot associations argue that if they granted licenses to all those who applied and met the requirements, pilots would not obtain an adequate number of transits to maintain their expertise in a given harbor. How an apprenticeship training program would function if senior pilots knew that their trainees would soon be competing against them is also a concern. State licensed pilots further contend that it is important that the pilot be an independent contractor, not a member of the crew employed by the ship operator, as is typically the case with federal pilots. It is argued that an independent contractor status insulates the pilot from cost pressures that could otherwise cloud the pilot's judgement.

The state pilot system has been criticized for being a relatively closed profession and claims of nepotism have been directed at some pilot associations.[27] A study by the Marine Board of the National Academies noted that[28]

> pilots generally have been reluctant to address colleague performance because of social and business relationships, potential loss of earning for affected individuals, and especially concern that any form of oversight might expose them to liability for a colleague's performance.

The integrity and credibility of pilot oversight was highlighted by a 1986 ship and barge collision on the Mississippi River in Louisiana. The NTSB found that the pilot of the ship may have caused or contributed to five of six accidents in the previous five years, but the pilot commission and the pilot performance review panel, both of whose membership was comprised entirely of pilots, had not taken any disciplinary action against the pilot.[29] Since that accident, Louisiana has amended its piloting regulations to include non-pilots on pilot boards, other states have generally done the same, and some states do not allow any pilots to be on the board. However, criticism of the monopoly structure of the pilot system in Louisiana continues[30] and the *Cosco*

---

[27] See for instance, "River Pilot Reform Adrift," *Times-Picayune,* October 3, 2007, p. 99; "River Pilots Say Craft Handed Down Through Generations," *USA Today,* September 28, 2005, p. B5; "Nepotism Continues for New River Pilots," *Times-Picayune,* April 27, 2002, p. 1; "Special Report: River Barons. How Pilots Exploit Their Monopoly on the Mississippi," *Times-Picayune,* November 4 and 5, 2001; "Harbor Pilot: Great Job, But Good Luck Getting It," *Wall Street Journal,* November 29, 1995, p. T-1.

[28] *Minding the Helm: Marine Navigation and Piloting,* Marine Board of the National Resource Council, National Academy Press, 1994, p. 120.

[29] NTSB, *Marine Accident Report: Collision Between the Hong Kong Flag Bulk Carrier "Petersfield" and the U.S. Towboat "Bayou Boeuf" and Tow, New Orleans, Louisiana, October 18, 1986,* January 5, 1988.

[30] "Editorial: When Pilots Police Themselves," *Times-Picayune,* October 6, 2007, p. 6.

Busan accident has raised this criticism against the San Francisco Bar Pilots as well.[31] The pilot of the *Cosco Busan* had been involved in a ship grounding in the same harbor in February 2006.

Pilotage fees also motivate the debate regarding the monopoly structure of pilotage. Ship operators are concerned with the level of pilotage fees they pay. Likewise, port authorities and other maritime service providers in a port are concerned that the level of pilotage fees may drive business away from their port.[32] Thus, in addition to navigation safety, port economics continues to drive a debate over pilot governance.

Vessel Traffic Services

To assist the pilot and crew with safe navigation, the Coast Guard has established vessel traffic services (VTS) in many ports. From the VTS, Coast Guard "watchstanders" can monitor and provide guidance to harbor traffic with the use of electronic communication, radio, radar, differential global positioning system (DGPS),[33] surveillance cameras, and binoculars. A VTS operates 24 hours a day, seven days a week. VTSs vary depending on the geography and the nature and volume of vessel traffic in a port area, but VTSs generally are staffed with both uniformed and civilian Coast Guard watchstanders. Currently there are VTSs in eleven U.S. ports staffed by 155 civilian and 130 active-duty personnel. The Coast Guard estimates that about 43 active-duty watchstanders will transfer in and out of VTSs annually.[34] VTSs may also be staffed by members of a "maritime exchange" from which they have evolved. U.S. ports without a Coast Guard-led VTS have a maritime exchange that provides "VTS-like" services, and are more accurately called Vessel Traffic Information Services (VTIS). A maritime exchange may be jointly operated or run by a pilot association and be staffed by pilots. VTSs and VTISs are funded from some combination of user fees charged to vessel operators, financing from port authorities, state governments, and the Coast Guard.

VTS Development. The original purpose of maritime exchanges was to alert ship service providers in port (i.e., agents, pilots, tugs, stevedores, longshoremen unions, terminals, U.S. Customs, and other vendors and government agencies) of a

---

[31] "Opinion: Ship Pilot, Board Deserve More Scrutiny for Spill," *Sacramento Bee*, December 11, 2007, n.p.

[32] See for instance, "Shippers Bristle at River Pilots' Fees, Louisiana's Woes Felt Across U.S., Experts Say," *Seattle Times*, July 12, 2001, p. A-17; "Changing Course, Louisiana Overhauled its Ship-pilotage Regulation After Reformers Made It an Economic-Development Issue," *Journal of Commerce*, July 5-11, 2004, p. 12-14; and "River Pilot Group's Rates Blasted; Attempt to Create Windfall Alleged," *Times-Picayune*, November 15, 2007, p. 1. "Cruise Lines Attack Planned Fee Increase," *The Virginian-Pilot*, July 13, 2006, p. D1.

[33] DGPS is more accurate than civilian GPS.

[34] "VTS Personnel and Training," *The Coast Guard Proceedings of the Marine Safety and Security Council*, Summer 2007, vol. 64, no. 2, p. 14.

ship's pending arrival. Before the development of current technology, a lookout was posted with a telescope, signal flags, and flashing signal lights.[35] While maritime information exchange is still the central function of marine exchanges, in the 1960s and 1970s they also began offering a VHF radio communication and radar system for pilots and captains to avoid collisions and groundings. Participation was initially voluntary and unregulated and there were no protocols. However, after a ship collision in San Francisco Bay in 1971, Congress passed the Ports and Waterways Safety Act of 1972 (P.L. 92-340), which directed the Coast Guard to establish VTS systems at ports where the Coast Guard deemed necessary.[36] In the 1970s, VTSs were established in San Francisco, Puget Sound, New York, New Orleans, and Houston-Galveston. VTSs were added in Morgan City, Port Arthur, Louisville, Valdez, Los Angeles, and Sault St. Marie thereafter. The Oil Pollution Act of 1990, passed in response to the *Exxon Valdez* oil spill, made participation in the VTS mandatory where they existed.

Safety and Security. As a result of the September 11, 2001 terrorist attack and the heightened concern for port security, harbor traffic monitoring and ship tracking has received a boost in federal attention and funding. The Maritime Transportation Security Act of 2002 (P.L. 107-295) requires ships over 300 gross registered tons (grt) to be equipped with Automatic Identification System (AIS) transponders, which electronically transmit ship information, location, speed, and direction. AIS data can be transmitted ship-to-ship or between ships and shore-side VTSs or maritime exchanges. For security reasons, the Coast Guard is planning to extend shore-side AIS receivers and transmitters nationwide, but currently this technology is fully operational at just several major U.S. ports.

AIS was introduced into the shipping industry as a safety measure prior to 9/11. To some extent, it allows for the replacement of voice radio communications with electronic communication, which is regarded as more efficient, less distracting to the mariner, and a less error-inducing medium for data transmission. Some vessel collisions have been caused, in part, because a pilot was communicating by radio with more than one other vessel and mistook communication from one vessel for another. It is highly desirable that VTS communications to the pilot or master be as non-intrusive on the mariner as possible. For instance, in the *Cosco Busan* accident, when the Coast Guard was asked why the VTS watchstander had not alerted the pilot earlier or repeatedly, the Coast Guard replied that VTS personnel are trained "not to distract the pilot with interruptions during any critical maneuver."[37]

With the introduction of AIS, there was some speculation and debate that a ship could determine its location without the need for navigation buoys and determine the location of other ships without the need for a shore-side VTS. However, now that

---

[35] "Vessel Traffic Service Los Angeles-Long Beach Harbor," A Report to the VTS International Symposium in Hong Kong, China, February 10-13, 2004, p. 3.

[36] In 1972, Congress also passed the Vessel Bridge to Bridge Radiotelephone Act (P.L. 92-63), requiring ships to be equipped with VHF radio telephones for communication among each other.

[37] "Coast Guard Admiral Grilled Over Spill," *Associated Press Online*, November 20, 2007.

ship tracking and monitoring has become a security objective, shore-side communication and tracking facilities are viewed as a necessary component.

VTSs and JHOCs. The Coast Guard has also created Joint Harbor Operational Centers (JHOCs) to improve port security and safety. JHOCs were authorized in the SAFE Port Act (P.L. 109-347, section 108). They are intended to be "fusion centers" for federal law enforcement (namely the Coast Guard, Navy, and Customs and Border Protection) and local law enforcement (port authority police or state or city police assigned to a port area) to share intelligence and equipment (e.g., patrol boats) and coordinate response when the need arises. The Coast Guard is planning to co-locate JHOCs and VTSs. JHOCs are currently operational at Norfolk, San Diego, Charleston, and Seattle; and the Coast Guard plans to create a JHOC at each major port area.

Issues for Congress

Given the trend towards larger ships, an expected increase in port traffic, and a probable lag in the expansion of shipping channels and terminal facilities due to fiscal and environmental constraints, Congress may consider several issues related to the safety of harbor navigation.

Oversight of Pilot Performance

In response to the *Exxon Valdez* oil spill, Congress required that all pilots commanding ships in Prince William Sound be operating under the authority of their Alaska pilot license in addition to their federal license.[38] This created a system of dual accountability — to the State of Alaska and to the U.S. Coast Guard. The National Transportation Safety Board (NTSB) has recommended that all state pilots be required to operate under Coast Guard authority to address a "lack of adequate, consistent accountability of state pilots."[39] Under this requirement, a state-licensed pilot would not be allowed to pilot either a foreign trade vessel or a domestic trade vessel if his/her federal license was revoked. The NTSB contends that the consequences of a major marine accident, particularly in terms of environmental damage, cannot be considered merely local in effect, and therefore, federal oversight of pilot performance is appropriate. The NTSB has also stated that "the near total immunity from Federal control enjoyed by state pilots prevents the Coast Guard from carrying out its congressional mandate to ensure safety on all Federal waterways."[40]

---

[38] Section 4116(a)(2) of the Oil Pollution Act of 1990 (P.L. 101-380).

[39] NTSB Safety Recommendation addressed to Admiral J. William Kime, Commandant, U.S. Coast Guard, October 21, 1991, p. 6.

[40] NTSB, *Marine Accident Report, Collision Between the Hong Kong Flag Bulk Carrier Petersfield and the U.S. Towboat Bayou Boeuf and Tow New Orleans, Louisiana,* October 28, 1986, NTSB/MAR-88/01, p. 51.

However, past Congresses have not favored granting the Coast Guard additional legislative authority over state-licensed pilots. The Coast Guard's response to a 1988 NTSB recommendation regarding this matter states as follows:[41]

> The Coast Guard concurs with the intent of this recommendation, and recognizes the need for establishing better disciplinary control over some State-licensed pilots. However, past Coast Guard efforts to obtain the recommended authority have not been successful in Congress.

The Coast Guard requested this authority as a provision in S. 682, which was enacted as the Port and Tanker Safety Act of 1978 (P.L. 95-474), but the provision was not included in final passage of the bill. At that time, the American Pilots Association argued against the provision on the grounds that the Coast Guard was not as knowledgeable and experienced as local pilots with the local conditions in each harbor, due in part to the continual rotation of Coast Guard staff every two to three years. Therefore, the association argued the local pilots were in the best position to properly judge the performance of their peers.[42] Shipping lines, however, argued in favor of the provision, stating that:[43]

> when there is misconduct, or there is slippage in the quality, the evaluation of that should be at the Federal level so that we have uniform excellency all over the country, and it does not depend on the particular political climate of the State to determine whether you are going to have good pilots or bad pilots.

The desire for an independent assessment of pilot performance was also voiced by the Marine Board of the National Academies, noting that "measures to confirm maintenance of pilot knowledge and skills are informal; systematic measures are not used to detect and correct degraded capabilities before such weaknesses become factors in marine accidents" and that "the effectiveness of corrective action at the state level by pilot associations and pilot boards has been uneven."[44] The Marine Board did not call for the Coast Guard to have disciplinary authority over state pilots, but called for the creation of a national commission on pilotage, chartered by Congress, that would set national baseline standards for pilot training and qualifications and would accredit each port's piloting system.[45]

---

[41] Coast Guard reply dated July 13, 1988, excerpt quoted in NTSB Safety Recommendation addressed to Admiral J. William Kime, Commandant, U.S. Coast Guard, October 21, 1991, p. 4.

[42] Testimony of Captain Ernest A. Clothier, President of American Pilots Association, House Committee on Merchant Marine and Fisheries, Subcommittee on Coast Guard and Navigation, September 13-15, 1977, pp. 410 and 413.

[43] Testimony of James J. Reynolds, President, American Institute of Merchant Shipping, House Committee on Merchant Marine and Fisheries, Subcommittee on Coast Guard and Navigation, September 13-15, 1977, p. 313.

[44] *Minding the Helm: Marine Navigation and Piloting*, Marine Board of the National Resource Council, National Academy Press, 1994, p. 122.

[45] *Minding the Helm: Marine Navigation and Piloting*, Marine Board of the National Resource Council, National Academy Press, 1994, pp. 319-327.

Should VTSs Operate More Like ATCs?

The Coast Guard notes emphatically that VTS is an *advisory* service, not a traffic control center. The Coast Guard describes VTSs as providing a range of four basic services that represent an increasing continuum of involvement: 1) monitoring of harbor traffic, 2) providing information to mariners so that they can navigate more safely or efficiently, 3) advising or recommending a course of action to a vessel (usually infrequently), and (4) in rare circumstances, directing a vessel to move to a certain location or hold at anchor or at the dock until safe to proceed, but without giving direct maneuvering orders.[46] While VTSs are often compared to an air traffic control tower, the major difference is that VTSs do not give specific "conning" orders to the pilots, such as heading and speed.[47] However, the level of VTS involvement in harbor navigation varies depending on the circumstances of the harbor. For instance, in busy harbors or in harbors with a drawbridge, the VTS may enforce a harbor traffic management plan that dictates one-way traffic or order of procession through a waterway.[48] In these cases, the VTS could be described as traffic management, as opposed to positive traffic control.

Whether VTSs could operate more like an ATC, which navigation experts refer to as "shore-based pilotage" or "remote pilotage," is a topic of speculation and debate. Pilots and other navigation experts assert that there is no way of replacing the eyes of an experienced, on-board mariner.[49] Pilots describe turning a ship like to turning a car on ice — it slides through the turn, and pilotage is described as a process of continually watching how the ship responds to a maneuver, which will dictate the pilot's next command. How a ship responds is affected by the characteristics of the ship, weather, and water conditions.[50] A pilot needs to be aware of multiple cues: wind, tide and river currents, (in the case of estuaries); the salt water versus fresh water mix that affects buoyancy. These are all factors that only an on-board mariner is in position to discern. Pilots stress that visual cues and references are still of paramount importance in their trade and doubt whether any kind of advanced VTS system could replace the process of continual evaluation by an on-board pilot.

If conning a ship is beyond the present capability of a VTS, Congress might still move to assess whether the VTS should exert more control over harbor traffic in bad weather conditions. The Coast Guard already has authority to restrict vessel

---

[46] "U.S. Coast Guard Vessel Traffic Services," *Coast Guard Proceedings of the Marine Safety and Security Council,* vol. 64, no. 2, summer 2007, pp. 10-13.

[47] A closer parallel in aviation may be Flight Service Stations (FSS) which provide weather briefings and flight planning services largely to general aviation pilots.

[48] "U.S. Coast Guard Vessel Traffic Services," *Coast Guard Proceedings of the Marine Safety and Security Council,* vol. 64, no. 2, summer 2007, p. 11.

[49] See for instance, Mike Hadley, "Issues in Remote Pilotage," *Journal of Navigation,* vol. 52, no. 1, January 1999, pp. 1-10; and Patrick van Erve, Norman Bonnor, "Can The Shipping-Aviation Analogy Be Used As An Argument To Decrease The Need For Maritime Pilotage?" *Journal of Navigation,* vol. 59, no. 2, May 2006, pp. 359-363.

[50] "Special Report: Marine Pilots," *Journal of Commerce,* May 26, 1999, p. 11A.

movements during hazardous weather conditions, but does not regularly do so. One reason may be that the Coast Guard lacks standards to judge the maneuvering capabilities of vessels in constricted waters (see below).

Ship Design Standards. Lawmakers might consider whether more scientific information and analysis about ship maneuverability in harbor waters is needed.[51] While the IMO in 2002 developed maneuverability standards for ships in deep, unrestricted water at sea speed, no analogous performance standards for ships in shallow, constricted water at slow speed have been established. Because there is no standard, the Coast Guard cannot establish harbor restrictions for certain ships that may be less controllable during hazardous weather conditions. These standards would arguably also help pilots better predict the maneuvering capabilities of vessels and aid in the development of pilot training simulators and manned physical models to more accurately reflect real-life conditions.[52]

Poor Handling Vessels. Given the particular handling characteristics of some vessels, policymakers might elect to consider whether there should be a more systematic method for pilots to share their experiences with vessels requiring special attention, both within their harbor and among pilots from other harbors where the ship regularly calls. This was a recommendation of the U.S. Coast Guard following an investigation into a 1997 ship collision in the Chesapeake Bay.[53]

VTS Expansion. Although the cost effectiveness of VTSs can be disputed on a port by port basis, Congress may act to assess the need for VTSs in other U.S. ports, particularly those that have experienced large traffic growth. For instance, at the Port of Savannah, vessel calls have increased by 34% in the last half-decade[54] and in the last decade, the port jumped from 11th to 4th largest in the country in terms of TEU throughput.[55] The port has also recently become a major gateway for LNG imports.[56]

For security reasons, the Coast Guard is actively pursuing its ability to track ships further from shore using AIS technology. Congress may examine whether there are any safety benefits to this expansion, such as avoiding ship collisions at the approaches to harbors.

---

[51] "Channel Design and Vessel Maneuverability: Next Steps," *Marine Technology*, vol. 40, no. 2, April 2003.

[52] "Critical Needs for Ship Maneuverability: Lessons From the Houston Ship Channel Full-Scale Maneuvering Trials," *Marine Technology*, vol. 42, no. 1, January 2005, p. 11-20.

[53] U.S. Coast Guard, "Investigation into the Circumstances Surrounding the Collision Between the M/V Saudi Makkah and the M/V Turtle Queen on March 12, 1997 in the Chesapeake Bay" September 24, 1997.

[54] Georgia Ports Authority, [http://www.gaports.com].

[55] Maritime Administration, *U.S. Waterborne Foreign Container Trade by U.S. Custom Ports, 1997-2006*.

[56] Maritime Administration, *U.S. Water Transportation Statistical Snapshot*, May 2007, pp. 4 and 6.

Requiring a Passage Plan

The NTSB has consistently recommended that the pilot and master of the vessel first establish a detailed passage plan of how the transit of the vessel is going to proceed through the harbor. The pilot would inform the master of his intended course, noting "the essential features and relevant checkpoints of maneuvers to be undertaken:" such as where he specifically intends to pass under a bridge, maneuver around a shallow area, pass by a channel buoy; and contingency plans for unexpected incidents.[57] Because the master and the bridge crew essentially provide another set of eyes, the NTSB contends that a passage plan would allow the ship's crew to be a more effective check on the ship's position and movement, though some accident investigations reveal a reluctance on the part of the bridge crew to "speak up" or "challenge" the pilot and some masters may consider the pilot's arrival as a chance to get some rest. A passage plan could also foster teamwork, or more specifically, "Bridge Team Management" (BTM, a.k.a. Bridge Resource Management, BRM), a concept adopted from the airline industry that, among other things, emphasizes good communication among those manning the bridge. A common thread that runs through many marine accident reports is a lack of communication between the pilot and bridge crew. BTM has become part of the required training curriculum for pilots and bridge crews.

The Coast Guard has not supported the NTSB's recommendation, arguing that it would "impinge on the traditional master/pilot relationship"[58] and that "the pilot cannot be expected to establish a 'game plan' with the master when so many aspects of a passage cannot be predetermined. The Coast Guard believes there are sufficient Federal regulations[59] and customary practices which apply in master/pilot relationships."[60] A Canadian survey of mariners found that while 80% of the pilots responding claimed that they "always" or "often" inform the master of a passage plan, less than half of the masters said that they do.[61] On the other hand, while 96% of officers of the watch and 95% of masters responded that the officers of the watch always or often monitor the ship's movement, only about 50% of pilots responded that officers of the watch always or often monitor the ship's movement.[62] The report

---

[57] NTSB, *Marine Accident Brief*, Grounding of *New Delhi Express* in Kill Van Kull waterway, New York Harbor, April 15, 2006, NTSB/MAB-07/02, p. 15-16.

[58] NTSB, *Marine Accident Brief*, Grounding of *New Delhi Express* in Kill Van Kull waterway, New York Harbor, April 15, 2006, NTSB/MAB-07/02, p. 15.

[59] Current regulations, codified at 33 CFR 164.11(k), require that "If a pilot other than a member of the vessel's crew is employed, the pilot is informed of the draft, maneuvering characteristics, and peculiarities of the vessel and of any abnormal circumstances on the vessel that may affect its safe navigation."

[60] NTSB Safety Recommendation addressed to Admiral J. William Kime, Commandant, U.S. Coast Guard, October 21, 1991, p. 6.

[61] Transportation Safety Board of Canada, *A Safety Study of the Operational Relationship Between Ship Masters/Watchkeeping Officers and Marine Pilots*, Report No. SM9501, n.d., p. 13.

[62] Transportation Safety Board of Canada, *A Safety Study of the Operational Relationship* (continued...)

noted that foreign masters who are not familiar with local navigation conditions rely largely on the pilots and thus the verification of a pilot's passage plan becomes only a formality but, at the same time, Canadian masters who are well aware of the local conditions may also pay little attention to the pilot's passage plan. In 2003, the International Maritime Organization (IMO), a United Nations body that establishes safety standards for international shipping, recommended that the information exchanged between the pilot and master include, among other things, "general agreement on plans and procedures, including contingency plans, for the anticipated passage."[63] Thus, while a passage plan maybe considered good practice, an unresolved issue is whether it has any consistent value and whether it should become a regulatory requirement.

Language Barriers. Given the global nature of the shipping business, language is always an issue in international shipping operations. English is the standard language of shipping and the IMO has developed a navigational code of basic commands in English.[64] However, the pilot, captain, crew, and VTS can communicate in whatever language everyone is most familiar with, if different from English. On foreign-flagged ships, the captain may be the only crew member that understands English, or at least the basic IMO phraseology, and therefore may need to translate the pilot's commands to the helmsman. The largest single source of ship crews, both officers and unlicensed seamen, is the Philippines, in large part because of their English language skills.[65] More recently, China, India, the Ukraine, and Russia have also become major suppliers of seamen. In light of the increasing diversity of seamen, Congress may wish to examine whether language barriers are an increasing problem in ship navigation and whether there is a need for additional enforcement of English language proficiency among ship crews calling U.S. ports. Congress may opt to examine how the aviation sector has addressed this problem.

Other Issues

Near Miss Data. Congress might consider whether to establish a database of near misses like that in the aviation sector. The Coast Guard and the Maritime Administration looked into establishing a data base of near misses in the marine environment in 1997, but the project was disbanded in part because of legal and practical concerns about mariner confidentiality.[66]

---

[62] (...continued)
Between Ship Masters/Watchkeeping Officers and Marine Pilots, Report No. SM9501, n.d. p. 18.

[63] IMO Pilotage Resolution 960 (Resolution A.960 [23], adopted December 5, 2003), section 5, "Master — pilot information exchange."

[64] The International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW), 1978.

[65] Filipinos accounted for 24% of officers and 46% of unlicensed crew for ships calling at a sample of U.S. ports in 2004. See Maritime Administration, "Foreign-Flag Crewing Practices: A Review of Crewing Practices in U.S.-Foreign Ocean Cargo Shipping," November 2006.

[66] *The Marine Transportation System and the Federal Role: Measuring Performance,* (continued...)

Coast Guard Staffing Practices. An ongoing concern expressed by some Members of Congress and some in the maritime industry is a lack of technical expertise by Coast Guard safety personnel due to its practice of continually rotating staff by subject area and location.[67] This issue has been raised regarding limitations in the capabilities of VTSs to exert more control over vessel movement and the agency's capability to judge pilot performance. Some have called for removing some safety functions from the Coast Guard to a civilian agency, at which professional continuity could be better fostered. The Coast Guard has responded to this criticism with a plan, among other things, to increase civilian positions in the marine safety program, strengthen marine safety career paths, and increase hiring from maritime academies.[68] The Coast Guard further argues that there are synergies between its maritime safety and security missions. Therefore, the Coast Guard maintains that these missions should be carried out by the same agency.

Legislative Activity in the 110th Congress

In the aftermath of the *Cosco Busan* accident, Senators Boxer and Feinstein introduced legislation that would give authority to the VTS to direct a vessel's speed and direction in an emergency and require pilots to use laptop navigational equipment under certain circumstances (S. 2430). The Coast Guard Authorization Act of 2007 (H.R. 2830) would require the Coast Guard to conduct a vessel safety risk assessment for Cook Inlet and the Aleution Islands of Alaska. The Senate version (S. 1892), in addition to this provision, would require the Coast Guard to study and report on human errors that have caused oil spills and near-misses in the last ten years as well as any data deficiencies impeding such a study, and includes several provisions regarding the secure marine transport of especially hazardous cargo. The Hydrographic Services Improvement Act Amendments of 2007 (H.R. 3352/S. 1582) authorizes funding to NOAA through FY2012 for its coastal surveying and nautical chart functions. The Ocean and Coastal Mapping Integration Act (H.R. 2400, which passed the House) and the Ocean and Coastal Exploration and NOAA Act (S. 39, reported by the Senate Commerce Committee) provides funds for updating and integrating survey information for U.S. coastal regions.

The Consolidated Appropriations Act for FY2008 (P.L. 110-161) requires the DHS Inspector General to investigate the role of the San Francisco VTS in the *Cosco Busan* accident and the Coast Guard's response to the spill and issue a report by April 1, 2008.

---

[66] (...continued)
Targeting Improvement, Special Report 279, Transportation Research Board, 2004, pp. 124-125; see also the separate statement of William O. Gray, pp. 164-165.

[67] House Committee on Transportation and Infrastructure, Subcommittee on Coast Guard and Maritime Transportation, Hearing on Challenges Facing The Coast Guard's Marine Safety Program, August 2, 2007.

[68] U.S. Coast Guard, "Enhancing the Coast Guard Marine Safety Program," September 25, 2007.