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FEDERAL LEGISLATION NEEDED TO IMPROVE TOWING VESSEL SAFETY

BY

PAUL J. KEENAN, JR.

A MAJOR PAPER SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF MARINE AFFAIRS

UNIVERSITY OF RHODE ISALND

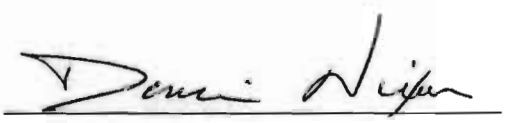
1996

MASTER OF MARINE AFFAIRS MAJOR PAPER

OF

PAUL J. KEENAN, JR.

APPROVED:

Major Professor 

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I. Introduction

If you were to spend a lazy afternoon watching ships move in and out of one of our nation's busy ports, you would probably find yourself in awe of the gigantic tankers, container ships, and other man-made behemoths of the sea. To the casual observer, towing vessels and barges, with their low profile and unassuming presence, may seem to be an uninspiring and small part of the shipping scene. However, tank and dry cargo barges actually carry sixty-nine percent of our nation's domestic waterborne commerce.[1] Indeed, towing vessels and barges are the unsung heroes of domestic trade. These vessels transport a myriad of products in vast quantities to consumers all over the country, most often to ports where large ships are unable to call.

As the cargo space of supertankers grew to unimaginable sizes, so did their destructive potential. Navigational and engineering mishaps have polluted the shores of many coastlines. In an era of acute environmental awareness, it is not surprising that the intense media coverage of these events and the subsequent outcry of the American public have led to strict regulation of the operation and design of these ships. Regulations for large ships, especially oil tankers, have touched every aspect of the shipping industry, including naval architecture, engineering, damage control, manning, training, licensing, etc.

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[1] U.S. Department of Transportation, Maritime Administration, Domestic Waterborne Trade of the United States, (Washington, D.C.: Government Printing Office, 1995), 90.

Towing vessels and barges however, have largely managed to escape the proliferation of regulation. Why? When a barge prematurely discharges her cargo, the relatively small quantities often do not garner the intense nationwide media coverage that a supertanker spill would. Current legislation does not provide for the inspection of sea-going towing vessels under three hundred gross tons or any inland towing vessels.[2] Therefore, the Coast Guard cannot regulate such vessels without new legislation.

Would it surprise you to learn that most towing vessels and barges do not have to be inspected by the Coast Guard? Or that the towing vessels are not required to keep on board basic seafaring necessities such as a compass, charts, or radar? Although they are inspected by the Coast Guard, tank barges are not required to have anchors. Barges that are designed for river voyages are sometimes employed on open water routes with catastrophic results. The lack of legislation has allowed the barge industry to remain in the dark ages of navigation and marine safety.

Many recent and tragic events have clearly demonstrated the need for action. In 1993, a tug pushing barges north up the Mobile River in Alabama wandered off course in a dense fog and struck a railroad bridge. Minutes later, an Amtrak passenger train derailed and slammed into a bayou, killing forty-seven people. A National Transportation

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[2] U.S. Congress, House, Committee on Merchant Marine and Fisheries, Subcommittee on Coast Guard and Navigation, Hearing on H.R. 3282, A Bill to Amend Title 46, United States Code, To Improve Towing Vessel Navigational Safety, 103rd Cong., 2nd Sess., 3 March 1994,
48.

Safety Board investigation revealed that poor training of the tug pilot was to blame.[3] In 1994, near San Juan, Puerto Rico, the towline between a tug and barge parted, allowing the tank barge to strike a coral reef and spill 600,000 gallons of heavy fuel oil onto beaches that are the mainstay of the island's tourist economy.[4] In January of this year, during a fierce winter storm off the coast of southern Rhode Island, the engineroom of a tug caught fire and prompted the crew to abandon the vessel. Attempts to anchor the barge failed, allowing the two vessels to strand themselves on a Rhode Island beach and spill 800,000 gallons of home heating oil.[5] These events, and many others, have begun to focus the attention of the media and the public on the hazards which the unregulated towing industry pose to life, property, and the environment.

The citizens of coastal areas which have been affected by such tragedies have led the call for action. A few states have already passed their own legislation. It may seem odd that a state can regulate an industry engaged in interstate commerce. However, in the case of Askew v. American Waterways Operators, 411 U.S. 325 (1973), the United States Supreme Court held that neither the Constitution nor any federal statute can prevent a state from regulating the operation of oil carrying vessels. This decision upheld the tank barge regulations in Florida and opened the door for other states to do the same. Alaska

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[3] Stephen Labaton, "Barge Pilot Blamed In Fatal Amtrak Wreck," The New York Times, 22 June 1994, A12.
[4] Ronald Smothers, "Tugboat Captain Testifies on Spill, to Incredulity," The New York Times, 13 January, A13.
[5] "*North Cape* Grounding Caused by Fire, Weather, Anchoring Problems," Professional Mariner 18 (April/May 1996): 51.

and Washington have also enacted legislation regulating the towing of tank barges.[6] Each time that a barge wreaks havoc on a coastline, it is very likely that the residents of that state will rally for regulation. Eventually, many coastal, river, and Great Lake states will have their own legislation that will probably differ in some degree from state to state. Eventually, interstate towing vessel and barge operators will be unfairly thrusted into a labyrinth of state regulations, which will make it difficult to comply.

Now is the time for national legislation. Federal regulations will not only protect those states which have yet to pass legislation, it will also bring uniformity to the nascent, yet growing body of state towing and barge legislation. The Supremacy Clause of the Constitution grants Congress the power to legislate over interstate commerce.[7] The only reason that a few states have chosen to enact their own legislation in this area is because Congress has failed to do so.

This research will begin by examining the need for such legislation. The magnitude of the safety problems that plague the towing industry will be illustrated with commerce and casualty statistics, as well as descriptions of actual incidents that demonstrate how the lack of regulation has contributed to many disasters. Next, previous attempts to regulate the towing industry will be examined. Finally, changes in towing vessel equipment, tank barges, manning, and licensing will be proposed.

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[6] Tim Healy, Lieutenant Commander, United States Coast Guard, "How Tugs Can Prevent Pollution," Proceedings of the Marine Safety Council 49/3 (May/June, 1992): 30.

[7] Constitution, art. I, sec. 8.

II. The Potential for Disaster

A. Towing Vessels and Barges in U.S. Commerce

As previously mentioned, towing vessels and barges move sixty-nine percent of our nation's domestic waterborne commerce. A great number of vessels are required to support this trade. Table 1 shows that in 1990, the Department of Transportation reported that there were 5,218 towing vessels pushing or towing 3,913 tank barges and more than 27,000 dry cargo barges through American waters. It is easy to surmise how towing vessels and barges earned their sobriquet, "the workhorses of the sea."

At first glance, it may appear that the majority of tugs and barges do not perform their work on the ocean because the numbers for "inland waterways" are so high and the figures for "domestic ocean" trade are so low. However, as defined by the Department of Transportation, the term "inland waterway" encompasses a wide variety of waters. The inland waterway trade includes traffic on the Western Rivers, such as the Mississippi and the Ohio, and the navigable internal waterways of the Atlantic, Pacific, and Gulf coasts. Not only are the Atlantic and Gulf Intracoastal Waterways included in this category, but so are vast areas that are normally thought of as the ocean, such as areas in the Atlantic from Maine to New Jersey, areas of the Pacific surrounding Los Angeles, Sacramento, and San Francisco, and also the large sounds of the Pacific Northwest.[8] In 1990, over 99.5

[8] U.S. Department of Transportation, 7.

million short tons of cargo were transported by barge in these Atlantic and Pacific "inland waterway" areas.[9] In light of this expanded definition, it is evident that the large number of towing vessels and barges that serve in inland waters do not constitute a purely fresh water fleet, rather many of them sail exclusively, or at least in part, on waters that most people simply think of as the "ocean."

The definition of domestic ocean trade is also worth examining. There are three sectors of oceanborne trade: noncontiguous, coastwise, and intercoastal. Noncontiguous trade identifies the commerce between the continental United States and Alaska, Hawaii, and any island territories and possessions. Also included is any trade between Hawaii, Alaska, and any territories or possessions. Coastwise trade includes any trade along the Atlantic, Gulf, or Pacific coasts, as well as between the Great Lakes, Atlantic, and Gulf coasts. Intercoastal trade includes any trade between the eastern and western seaboards of the United States via the Panama Canal. The Great Lakes trade includes any trade that is between the states that lie on the Great Lakes. [10]

[9] Ibid., 43.
[10] Ibid., 6.

U.S. Flag Fleet Engaged in Domestic and Foreign Trade, 1990
Number of Vessels and Capacity in Thousands of Short Tons[11]

	Domestic Ocean		Great Lakes		Inland Waterways	
	Vessels	Capacity	Vessels	Capacity	Vessels	Capacity
Tugs and Other Work Boats	1,722	---	190	---	3,306	---
Dry Cargo Barges	3,500	4,842	271	376	23,320	32,756
Tank Barges	632	3,610	30	60	3,231	6,960

	Total	
	Vessels	Capacity
Tugs and Other Work Boats	5,218	---
Dry Cargo Barges	27,091	37,974
Tank Barges	3,913	10,630

Table 1

Everyday, these vessels transport an enormous quantity of raw material and other products safely, and on time. Table 2 reveals that over 780 million tons of cargo is transported by barge every year. This table also classifies barge traffic into the domestic ocean, Great Lake, and inland waterway categories.

Admittedly, not all of this barge traffic could be regulated by Congress. Congress only has the power to regulate interstate, not intrastate, commerce. Unfortunately, it is impossible to determine how much cargo that is transported by barge is interstate or intrastate commerce because the data available does not differentiate between the two types of commerce.

[11] Ibid., 13.

Some of this trade undoubtedly moves cargo between ports in the same state, and therefore would not fall under the purview of Congress. However, given the earlier definitions of ocean and inland waterway trade, it is easy to imagine how most of this commerce probably serves ports in different states. Of the three types of domestic ocean commerce, noncontiguous and intercoastal are exclusively interstate. The third, coastwise, may or may not constitute interstate commerce. There are eighteen states that line the Atlantic and Gulf coasts. With such a high density of states, especially in the Northeast, much of the coastwise and internal waterway trade in the eastern half of the United States could probably be classified as interstate commerce. Much of the traffic on the Western Rivers and intracoastal waterways also would probably constitute interstate commerce.[12] Although any legislation that attempts to improve the safety of interstate commerce transported by barge would not affect every ton of cargo in Table 2 and every vessel in Table 1, it would most certainly affect the majority of them.

U.S. Domestic Waterborne Commerce by Trade Area and Barge Type, 1990
Thousands of Short Tons[13]

	Tank Barge	Dry Cargo Barge	Tank and Dry Cargo Barge
Domestic Ocean	64,929	35,969	100,898
Great Lakes	1,697	4,133	5,830
Inland Waterways	251,174	424,839	676,013
Total	**317,800**	**464,941**	**782,741**

Table 2

[12] A.E. Henn, Rear Admiral, United States Coast Guard, "Inland River Barge and Towing - A Unique Industry," Proceedings of the Marine Safety Council 49/5 (September/October, 1992): 2.
[13] U.S. Department of Transportation, 10.

B. Commodities Moved by Domestic Barge Traffic

The myriad of products that are transported by barge is just as surprising as the amount of material that they carry. Tables 3, 4, and 5 illustrate the astounding array of material that is transported by barge in domestic commerce. Table 3 reveals that approximately 250 million tons of petroleum and petroleum products are moved on barges. This represents almost sixty percent of the total domestic traffic of these products. Again, although these statistics do not reveal how much of this commerce is interstate and would be affected by Congressional statutes, much of this material is undoubtedly moved between two different states.

These statistics were compiled by the Corps of Engineers in the Department of the Army and unfortunately they employ a different method classifying the different types of barge traffic. However, the two methods are roughly analogous. In the following three tables, *coastwise* traffic is nearly same as the previous ocean traffic, except that *intraterritory* traffic refers to noncontiguous trade. *Lakewise* traffic moves solely on the Great Lakes and *internal* traffic refers to trade on inland waterways. *Intraport* traffic describes cargo that moves to different sites within a single port.[14] Although the actual terms used to describe the type of traffic are different, the same arguments can be used to conclude that most of the trade in the following three tables is interstate.

[14] Department of the Army, Corps of Engineer, Waterborne Commerce of the United States, Washington, D.C.: Government Printing Office, 1995, 3.

The economics of the transportation industry have been the driving force behind the creation and growth of the barge industry. Managers of shipping companies routinely analyze traffic studies in order to determine how goods and materials should be transported from one port to another.[15] Often these studies demonstrate that the most efficient and economic route for bringing a given material to market may combine different modes of transportation. Directing a supertanker loaded with crude oil to every port is not likely to be the most economical employment of such a ship. Nor is it even possible. Many ports do not have the capability to refine crude into useful products, nor do their harbors have deep enough water to welcome large tankers.

This situation is readily apparent in the importation of petroleum to the United States. For example, after crude oil is imported from abroad to the ports of New York and New Jersey, it is often refined into other petroleum products and destined for other ports along the Atlantic coast. Many of these smaller ports do not have the refining capabilities of larger ports, nor do their waters have the depths to accomodate deep draft vessels such as supertankers.[16] Shallow waters and limited refining capabilities have been the driving force behind the growth of the tank barge industry. Table 3 supports this assertion. While only twenty-nine percent of the domestic trade of crude oil is moved by

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[15] Lane C. Kendall, and James J. Buckley, The Business of Shipping, (Centreville, Maryland: Cornell Maritime Press, 1994), 265.

[16] U.S. Department of Energy, Energy Information Administration, Office of Oil and Gas, Petroleum Supply Annual, 1991, Volume 1, Washington, D.C.: Government Printing Office, 1992, 84.

barge, seventy-seven percent of the refined petroleum products listed are transported by barge.

Domestic Barge Traffic by Type of Traffic and Commodity, 1993
In Thousand Tons[17]

Commodity	Total Domestic Traffic	Total Domestic Barge Traffic	Percent Carried by Barge	Barge Traffic by Type of Traffic				
				Coastwise	Lakewise	Internal	Intra-port	Intra-territory
Total Petrol. & Petrol. Products	**416,858**	**249,782**	**59.9**	**53,408**	**1,583**	**151,280**	**38,977**	**4,534**
- Subtotal Crude Petrol.	**147,479**	**42,712**	**29.0**	**1,415**	**---**	**38,699**	**2,598**	**---**
- Subtotal Petrol. Products	**269,379**	**207,070**	**76.9**	**51,993**	**1,583**	**112,581**	**36,379**	**4,534**
Gasoline	95,060	65,229	68.6	23,552	366	33,808	6,046	1,458
Kerosene	1,728	1,371	79.3	307	---	823	216	24
Distillate Fuel Oil	58,597	44,487	75.9	11,693	198	21,773	9,707	1,115
Residual Fuel Oil	81,398	67,173	82.5	12,134	180	35,053	17,897	1,909
Lube Oil & Greases	5,042	3,201	63.5	453	---	2,459	289	---
Petrol. Jelly & Waxes	234	223	95.2	56	---	165	1	---
Naphtha & Solvents	6,422	5,424	84.5	394	---	4,140	885	5
Asphalt, Tar & Pitch	11,391	10,874	95.5	2,690	811	6,871	501	---
Petrol. Coke	3,216	3,194	99.3	3	28	2,840	324	---
Liquid Natural Gas	2,540	2,500	98.4	302	---	2,171	26	---
Petrol. Products Nec	3,749	3,394	90.5	408	0	2,479	485	22

Table 3

[17] Department of the Army, 36.

Crude oil and petroleum products are not the only materials moved by barge. Table 4 details the gamut of chemicals and their derivatives that are also transported by barge. As noted by the percentage of the total domestic traffic that is carried by barge, the vast majority of such domestic waterborne movement is carried by barge. In most cases, barges account for eighty to one hundred percent of the movement.

Various fertilizers are transported in great quantities along the inland waters of the United States, mostly to the agricultural markets that are near the Western Rivers.[18] A significant amount of fertilizers is also carried along the Pacific, Atlantic, and Gulf coasts.

Over forty-eight million tons of chemicals and other related products were carried by barge in 1993, and again, the vast majority of those products were moved through the inland waters of the United States. Among the most common commodities are hydrocarbons, alcohols, and sodium hydroxides.

[18] Henn, 14.

Domestic Barge Traffic by Type of Traffic and Commodity, 1993
In Thousand Tons[19]

Commodity	Total Domestic Traffic	Total Domestic Barge Traffic	Percent Carried by Barge	Barge Traffic by Type of Traffic				
				Coastwise	Lakewise	Internal	Intra-port	Intra-territory
Total Chemicals & Related Products	**72,822**	**63,041**	**86.6**	**6,025**	**115**	**48,206**	**8,694**	**---**
- Subtotal Fertilizers	**15,011**	**14,930**	**99.5**	**2,459**	**8**	**12,153**	**310**	**---**
Nitrogenous Fertilizers	6,356	1,608	99.5	532	8	5,741	44	---
Phosphatic Fertilizers	1,608	1,608	100.0	315	---	1,291	1	---
Potassic Fertilizers	1,565	1,565	100.0	62	---	1,454	49	---
Fertilizers & Mixes Nec	5,483	5,432	99.1	1,550	---	3,667	215	---
- Subtotal Other Chemicals & Related Products	**57,811**	**48,111**	**83.2**	**3,567**	**108**	**36,053**	**8,384**	**---**
Acyclic Hydrocarbons	1,808	1,788	98.9	4	---	1,659	125	---
Benzene & Toulene	5,200	4,932	94.8	7	---	3,587	1,338	---
Other Hydrocarbons	11,961	10,006	83.7	697	---	7,454	1,856	---
Alcohols	7,066	6,277	88.8	235	---	5,071	971	---
Nitrogen Func. Comp.	1,209	1,199	99.1	1	---	1,191	6	---
Organic Comp. nec	1,479	1,392	94.2	112	---	1,217	63	---
Sulfur (liquid)	4,534	2,385	52.6	8	---	2,278	99	---
Sulfuric Acid	1,714	1,713	99.9	17	---	1,259	437	---
Ammonia	2,388	1,970	82.5	364	---	1,590	15	---
Sodium Hydroxide	6,877	6,341	92.2	1,158	5	4,782	396	---
Metallic Salts	1,480	1,452	98.1	102	102	1,187	61	---

Table 4

[19] Department of the Army, 36 and 37.

The last table which details the types of commodities moved by barge displays the domestic traffic of vegetable oils and waste. Table 5 reveals that nearly all of the 1.4 million tons of vegetable oils that are transported over water are moved by barge. Most of this movement occurs in internal waters.

In 1993, 5.8 million tons of waste and scrap were moved across the water and all of that work was performed by barges. 3.3 million tons of that total was moved within one port, which might constitute interstate commerce only in a few cases, such as in the Port of New York. A significant amount of waste and scrap, 1.8 million tons, is carried along our country's internal waters.

Domestic Barge Traffic by Type of Traffic and Commodity, 1993
In Thousand Tons[20]

Commodity	Total Domestic Traffic	Total Domestic Barge Traffic	Percent Carried by Barge	Barge Traffic by Type of Traffic				
				Coastwise	Lakewise	Internal	Intra-port	Intra-territory
Total Vegetable Products	**1,800**	**1,515**	**84.2**	**146**	**---**	**1,345**	**24**	**---**
Vegetable Oils	1,398	1,389	99.4	55	---	1,311	24	---
Vegetables & Prod.	402	126	31.2	91	---	35	---	---
Total Waste and Scrap nec	**5,836**	**5,834**	**100**	**34**	**---**	**1,854**	**3,345**	**---**

Table 5

[20] Ibid., 39 and 40.

This impressive variety of material should not only evoke a sense of appreciation for the role that barges play in our nation's transportation industry, but it should also make the reader aware of the destructive potential of the cargoes that are carried by barge. The hazards of crude oil and petroleum products are well known. One of the most recent examples of this destructive power was demonstrated off the coast of Rhode Island last January. After a barge spilled 800,000 gallons of fuel, 14,000 lobsters were found dead and a large section of the Block Island Sound was closed for fishing.[21] These tragic consequences of an ill-fated voyage had a severe impact on the lives of those who depend upon the economic health of the local waters for their living.[22] As evidenced by an oil spill in San Juan, Puerto Rico in 1994, an oil spill can also seriously threaten a thriving tourist industry.[23] Since tourism is a large part of the economy of many coastal areas, an oil spill caused by a towing vessel and barge is a threat that must be taken seriously.

Although there are fewer examples of how a major spill of chemical products, vegetable oils, waste, or scrap have impacted the environment and economy of a coastal community, it is not difficult to imagine how such products could have devastating effects if uncontrollably released into rivers, lakes, and oceans. Tables 4 and 5 show that the vast majority of these cargoes are transported across internal waters, often carrying them very close to population centers. For the heavily populated areas along the Mississippi River,

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[21] "*North Cape* Grounding Caused by Fire, Weather, Anchoring Problems," 48.
[22] Gregory Smith, "Damaged Jewels: Fishing and Tourism," The Providence Sunday Journal, 28 January 1996, B5.
[23] "Big Spill Off Puerto Rico Fouls Beach at Height of Tourist Season," The New York Times, 8 January 1994, A1.

pollution by these commodities is a justifiable cause of concern because many of those communities depend on the river as their primary source for drinking water.[24] Oil spills have fouled the drinking water for entire communities. After a mere 4,200 gallons of heavy oil spilled into the Mississippi River, more than twenty-five water utilities in three different Louisianan parishes were forced to closed their intake systems.[25] Pollution by chemical products, vegetable oil, or waste would likely cause the same precautionary actions to be taken. These commodities would also adversely affect coastal marine communities by endangering healthy fisheries and perhaps an economy dependent on tourism.

Although the capacity of a barge to carry goods may appear to be dwarfed by larger self-propelled vessels, the potential for serious damage to life, property, and the environment is just as real. An analysis of the Coast Guard's casualty statistics will reveal that this potential has manifested itself in many instances.

C. Towing Vessel and Barge Casualty Statistics

Unfortunately, many of these "workhorses of the sea" do not reach their intended ports of destination and their cargo never reaches consumers. On any given voyage, there are a multitude of perils which face the towing vessel, barge, and their crew. These perils

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[24] Henn, 1.
[25] "Barge Hits a Bridge Near New Orleans, Spilling Heavy Oil," The New York Times, 11 April 1993, 21.

include collisions, allisions, groundings, founderings, fires, and many others. Such unpleasant encounters can be caused by error(s) on the part of the operator or crew, or simply by fate.

Table 6 describes the total losses of towing vessels and barges in 1990. These are the latest statistics available. After a vessel is lost, the investigations that follow may take months, or even years to complete. Usually, there are several complex causes that contribute to the loss of a vessel. Determining which particular cause should be considered *the* cause is a subjective and often difficult decision. The Coast Guard and National Transportation Safety Board usually do not publicly announce the cause of a loss until every possibility has been thoroughly investigated. For this reason, the publication of casualty statistics can be delayed for a long time.

A *total loss* occurs when a vessel has sunk and the insurer has determined that it would be economically unviable to salvage the vessel.[26] A total of 147 towing vessels and barges were totally lost in 1990. Most of these losses were founderings (sinkings) of towing vessels and freight barges. The second most common identified cause of a total loss was collision, and again, this most often occurred among towing vessels and freight barges. Towing vessels and freight barges account for the majority of total losses because these vessels greatly outnumber tank barges and are also more often found in rivers and other confined waterways that are congested with traffic and other navigational hazards.

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[26] Jim Law, Office of Marine Safety Council, United States Coast Guard, interview by author, 22 March 1996, phone conversation.

It is important to remember however, that even though the number of total losses of tank barges is relatively small, each one of those losses can have a disproportionate effect on the environment and people's lives. Tank barges carry liquid commodities such as crude oil, petroleum products, chemicals, vegetable oils, etc. These are the types of commodities that are far more likely to harm the environment and cause the economic ruin of a coastal community.

Towing Vessel and Barge Total Losses, 1990[27]

	Foundered	Fire/ Explosion	Collision	Grounding	Hull/ Mach Damage	Missing	Other	Total
Freight Barge	19	0	25	2	1	0	36	83
Tug/Towboat	33	4	11	1	2	0	5	56
Tank Barge	0	0	5	1	1	0	1	8
Total	52	4	41	4	4	0	42	147

Table 6

Table 7 categorizes towing vessel and barge non-total losses for 1990. There were 2,655 non-total losses declared for 1990 and most of those were caused by groundings. As mentioned earlier, one of the primary advantages of towing vessels and barges is that they can navigate through waters that are too shallow to accomodate deep draft ships. These shallow waters place towing vessels and barges in a situation where they are often restricted to narrow channels for safe navigation. Even a slight deviation from the proper course could cause a grounding.

[27] "Casualty Statistics, 1990," Proceedings of the Marine Safety Council 51/1 (January/February, 1994), 21.

Collision is the second most common cause of non-total loss. This is probably due to the fact that towing vessels and barges spend most of their underway time on internal waters, where the density of vessel traffic is likely to be high. The more dense the traffic, the more likely it is that a mistake will lead to a collision.

Towing Vessel and Barge Non-Total Losses, 1990[28]

	Flooded	Fire/ Explosion	Collision	Grounding	Hull/ Mach Damage	Weather	Other	Total
Freight Barge	4	5	317	440	45	0	122	933
Tug/Towboat	17	26	374	574	110	7	77	1185
Tank Barge	4	8	164	292	37	11	21	537
Total	25	39	855	1306	192	18	220	2655

Table 7

Determining the cause of a total or non-total loss is a very subjective decision. For example, if a vessel is transiting her route in extremely heavy weather, and the rough seas cause a fuel line to break, which creates a fire in the engineroom, which causes the crew to abandon the vessel, and then the vessel finally grounds itself, what is the cause of the loss? If this incident were placed in one of the tables above, in which one of the columns would this casualty be placed? Would this loss be attributed to weather, machinery damage, fire, or grounding? Or is it a combination of all of these? These are the questions that the federal officials investigating the spill in Rhode Island must answer. Any conclusions drawn from marine casualty statistics such as these must consider the subjective decisions made by the persons who perform the investigations.

[28] "Casualty Statistics, 1990," 18.

Table 8 gives us a more detailed look at towing vessel losses. This table further classifies the vessels lost by the size of the vessel in gross tons. Table 8 reveals that a large majority of tugs and towboats that are declared a total loss are less than three hundred gross tons. What explains this curiosity? One possible explanation is that smaller tugs and towboats are more likely to work in shallow and congested waters, thereby increasing the marine perils which these vessels face.

There is another interesting fact which may shed more light on this data. Towing vessels under three hundred gross tons do not need to be inspected by the Coast Guard, and the operator and crew members of these vessels are not required to have the extensive training and experience required of the master and crew of larger towing vessels.[29] The sparse regulation of "uninspected towing vessels," as the Coast Guard refers to them, probably accounts not only for the high number of casualties, but also for the unusual number of towing vessels which are designed to weigh in at just under three hundred gross tons.

[29] Gregory D. Szczurek, U.S. Coast Guard Licenses and Certificates, (River Ridge, Louisiana: Azure Communications, 1988), 19.

Towing Vessel Total Losses by Size, 1990
Vessel Size in Gross Tons (gt)[30]

	Foundered	Fire/ Explosion	Collision	Grounding	Hull/ Mach Damage	Missing	Other	Total
< 100 gt	19	2	2	0	1	0	2	26
100-199 gt	10	0	2	1	1	0	3	17
200-299 gt	2	0	1	0	0	0	0	3
300-999 gt	2	2	5	0	0	0	0	9
≥ 1000 gt	0	0	1	0	0	0	0	1
Total	33	4	11	1	2	0	5	56

Table 8

Table 9 describes the tug and towboat vessel non-total losses for 1990 by size. This data also shows that vessels under three hundred gross tons account for the majority of losses. However, there is a significant number of larger vessels which were declared a non-total loss. Most of the losses, regardless of the size of the vessel, were caused by collisions and groundings.

Towing Vessel Non-Total Losses by Size, 1990
Vessel Size in Gross Tons (gt)[31]

	Flooded	Fire/ Explosion	Collision	Grounding	Hull/ Mach Damage	Weather	Other	Total
< 100 gt	4	6	71	99	28	3	41	252
100-199 gt	7	11	133	195	41	1	19	407
200-299 gt	2	5	49	54	14	0	4	128
300-999 gt	3	4	106	202	20	3	12	350
≥ 1000 gt	1	0	15	24	7	0	1	48
Total	17	26	374	574	110	7	77	1185

Table 9

[30] "Casualty Statistics, 1990," 16.
[31] Ibid., 18.

Tables 10 and 11 describe tank barge total and non-total losses by size, respectively. Very few tank barges were declared a total loss in 1990. One reason for this is the relatively small number of tank barges. Another possible explanation of this is that since the construction of a tank barge is relatively simple, the salvage and repair of a tank barge is more likely to be economically viable. This is most likely the reason why far more barge casualties are considered non-total losses than total losses.

Tank Barge Vessel Total Losses by Size, 1990
Vessel Size in Gross Tons (gt) [32]

	Foundered	Fire/ Explosion	Collision	Grounding	Hull/ Mach Damage	Missing	Other	Total
< 500 gt	0	0	0	0	0	0	0	0
500-999 gt	0	0	1	1	1	0	0	3
≥ 1000 gt	0	0	4	0	0	0	1	5
Total	0	0	5	1	1	0	1	8

Table 10

While the sparse data on total losses of tank barges precludes any strong conclusions, the large number of non-total losses offers some insight. The fact that most of the barges that were damaged were over five hundred gross tons can be explained by the fact that the vast majority of tank barges carry over five hundred gross tons.[33] What is more interesting is how the data for non-total losses of tank barges supports the information on the cause of tug and towboat losses. The most frequent causes of damage

[32] Ibid., 16.
[33] Frank Paskewich, Lieutenant Commander, United States Coast Guard, "A Barge Is Not Just A Barge," Proceedings of the Marine Safety Council 49/3 (May/June, 1992): 20.

to tank barges and towing vessels are collisions and groundings. Since tank barges are always escorted by towing vessels, it is obvious that if one is imperiled, so is the other.

Tank Barge Vessel Non-Total Losses by Size, 1990
Vessel Size in Gross Tons (gt)[34]

	Flooded	Fire/ Explosion	Collision	Grounding	Hull/ Mach Damage	Weather	Other	Total
< 100 gt	0	0	0	4	0	0	1	5
100-499 gt	2	1	2	3	0	0	0	8
500-999 gt	1	0	41	58	8	3	6	117
≥ 1000 gt	1	7	121	227	29	8	14	407
Total	4	8	164	292	37	11	21	537

Table 11

These casualty statistics only list the direct physical causes of a total or non-total loss. In order to draft effective legislation, policy makers must investigate and determine what the underlying causes of these losses are. Towing vessels do not ground themselves. Mistakes by mariners and the inaction of lawmakers are the true reasons for these losses. Any new legislation must address the true causes of these losses.

The reality is that most mariners who find themselves in such dire straits only have themselves to blame. The United States Coast Guard estimates that of the nearly 13,000 casualties that occurred on uninspected towing vessels (towing vessels under three hundred gross tons) from 1980 to 1991, more than sixty percent resulted from human

[34] "Casualty Statistics, 1990," 18.

error. For the same period, only fifteen percent of those casualties were caused by mechanical or material problems.[35]

These are not faceless statistics. Each loss represents a property loss not only to the owners of the vessel, but also to the cargo owners (or at least to their insurers). And, in many of these cases, there was also serious injury to the property and lives of those who inhabit coastal areas or depend on the affected waters for their livelihood. In an effort to bring a human face to these statistics, and also to help draw conclusions from these figures, a sampling of tug and barge casualties are presented here.

D. The Amtrak Disaster

In the early morning hours of September 22, 1993, the *Mauvilla* was pushing barges loaded with cement and coal up the Mobile River in Alabama. A thick fog blanketed the area and the operator of the barge wandered off course, left the channel of the river, and headed into a bayou. After unwittingly navigating up the bayou, the vessel struck a train trestle. Unbeknownst to the master and crew of the tug, the allision deformed a portion of the train rails.

Meanwhile, the Sunset Limited, an Amtrak passenger train, was cruising from Los Angeles to Miami at seventy miles per hour with one hundred and eighty-nine passengers

[35] Perry Stutman, "Concerns Rise for Towing Safety," Proceedings of the Marine Safety Council 51/4 (July/August, 1994): 3.

and a crew of seventeen. Minutes after the barge had allided with the trestle, the train, unaware of the danger, derailed as it crossed the bridge. All three engines and the first four cars derailed, including two passenger cars. One of the engines caught on fire, killing two people. Forty-five others were drowned, trapped beneath the murky waters of the bayou. This is probably the single most disastrous event in terms of loss of life that has ever been caused by a towing vessel and barge.[36]

It was later revealed that the barge pilot did not know how to read his radar and had left his chart and compass at home.[37] Without these basic navigational tools and knowledge, it is not surprising that an allision occurred in low visibility.

E. The San Juan Spill of 1994

On January 7, 1994, near the height of the Caribbean's tourist season, a towing vessel and barge departed San Juan harbor, Puerto Rico, bound for the Virgin Islands and then Antigua. The *Emily S.* was towing a barge, the *Morris J. Berman*, which was carrying 1.5 million gallons of heavy grade fuel oil. After the towline connecting the two vessels broke, the barge helplessly drifted toward a reef until it became grounded. The grounding occurred just before dawn, in calm weather. The barge allowed 600,000 gallons of its cargo to foul the beaches of Escambron Point, which is home to some of the

[36] Peter Applebome, "Tracks Apparently Remained Intact When Barge Hit Bridge Before Wreck," The New York Times, 24 September 1993, A22.
[37] Ibid.

island's premier resort hotels and beaches.[38] Fortunately, the Coast guard had spill containment and clean up gear close at hand, allowing the Coast Guard to contain the spill to a relatively small area.[39]

Hearings held soon after the accident revealed that this particular towline had broken twice before. The 1,200 foot cable had parted four months earlier, was repaired in port, and placed back into service. Also, the crew testified that the cable broke only an hour after it commenced the ill-fated voyage. After retrieving the barge and repairing the cable while underway, the towing vessel and barge continued their voyage. Then the cable parted again, and this time the ocean currents grounded the barge onto a reef.[40]

Further questioning by Coast Guard officials led to the discovery that the second repair to the cable had been inadequate. Members of the crew took the bitter end of the cable and made an eye, which was then secured with U-shaped clamps. The crew failed to install a thimble, a curved piece of metal which covers the part of the cable on the inside of the eye. The thimble serves to strengthen and maintain the shape of the eye and also to protect it from friction that would wear the cable. Coast Guard personnel noted that towing vessels usually carry such items on board as part of an underway towing line repair kit.[41]

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[38] "Big Spill Off Puerto Rico Fouls Beach at Height of Tourist Season," A1.
[39] Ronald Smothers, "Stockpiled Equipment Aids Cleanup of Oil in San Juan," The New York Times, 8 January, 1994, 12.
[40] Ronald Smothers, "Boat in Oil Spill Had Faulty Cable, Crewman Says," The New York Times, 12 January 1994, 12
[41] Ibid.

The towing vessel's operator later stated that he was in too much of a hurry to continue the voyage in order to follow standard repair procedures for a broken towline. He also said that he rarely read or made entries in the boat's deck log. Only a month earlier, the vessel's alternate operator noted that the cable needed to be replaced. The Coast Guard openly questioned the operator's decision to proceed with the voyage after the first break and not to return to port to make a more permanent repair, or replace, the cable. In addition, the operator was harshly criticized for not standing a proper watch. An estimated two hours elapsed before the operator had noticed that the barge was missing.[42]

F. Tragedy Visits Southern Rhode Island

On Thursday evening, January 19, 1996, the tank barge *North Cape* had completed the onload of her cargo, seven million gallons of home heating oil. Although the National Weather Service had warned that gale winds and heavy seas would ravage her route from Bayonne, New Jersey to Providence, Rhode Island, the captain and owners of the vessel, Eklof Marine, decided to commence the twenty hour voyage. Every hour that the barge remained at the pier in New Jersey was another hour that she would be late in delivering the cargo to its destination. As is true in many industries, time is money.

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[42] Ronald Smothers, "Tugboat Captain Testifies on Spill, to Incredulity," The New York Times, 13 January, A13.

As the barge and her escort, the *Scandia*, made way to their destination, the National Weather Service warned that the strong and fast-moving northeaster was intensifying and heading for Southern New England, square in the path of their intended track. As the intensity of the system increased, the warnings were upgraded from gale to storm. The Coast Guard considered the storm so serious that it sent a Falcon jet from its Cape Cod air station straight into the path of mother nature's menace in order to warn any unsuspecting mariners.[43]

The Coast Guard's final warnings of imminent danger were too late for the *Scandia* and *North Cape*. They had already journeyed too far from their homeport. They could have sought solace by anchoring in a nearby harbor, however, the anchor windlass had been removed from the barge. An anchor windlass is the piece machinery which hoists the anchor back onto the barge. If the captain had deployed the anchor, it is doubtful that he would have been able to recover it.[44]

By mid-afternoon Friday, the *Scandia* and *North Cape* were approximately three miles south-southeast of Point Judith, Rhode Island. At 1:57 p.m., the *Scandia* transmitted her first distress signal. The operator calmly reported that the engineroom was engulfed in flames. Only two minutes later, a panicked voice cried "Mayday!" and reported that the crew was abandoning the vessel.

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[43] Gerald Carbone, "'Mayday! We Are Abandoning!'" The Providence Sunday Journal, 28 January 1996, B2.
[44] "*North Cape* Grounding Caused by Fire, Weather, Anchoring Problems," 51.

When the Coast Guard first arrived on the scene, the six crew members were still on the burning towing vessel. Upon arrival of a second Coast Guard vessel, the treacherous evacuation of the crew began. By this time, the wind was gusting to more than thirty knots, fog had reduced the visibility to almost zero, and the seas peaked at twenty feet. After a risky transfer of the crew, which rewarded a Coast Guard swimmer with a case of hypothermia, the concern shifted to plight of the vessels.[45]

The two vessels were still attached by their towline, and the ill-fated pair were being driven by the wind and seas toward the south coast of Rhode Island. At great peril, the engineer and first mate from the *Scandia* boarded the barge in order let go her anchor. Since the anchor windlass had been removed, the anchor chain was secured by several lengths of rope, a 5/8-inch wire rope, and a shackle. In the face of a fierce northeaster and without the proper tools, the two men were again forced to abandon the vessels, unable to let go the anchor and allowing the vessels to run aground.

This disaster had a profound impact on many Southern New England residents. Not only were portions of a residential beach polluted with oil, but a ban on fishing covered a two hundred and fifty square mile area of the Block Island Sound for several weeks, putting hundreds of fisherman out of work. Lobstermen were also hard hit. An estimated 14,000 lobsters were washed up on the beach and many of their traps were

[45] Ibid.

fouled with oil and dead lobsters. In addition, one Rhode Island fish processing company claimed that since its tanks drew water from the polluted waters, it was forced to destroy one million pounds of live herring, at an enormous economic loss to the company.[46]

G. The Potential Is Real

Towing vessels and barges are the backbone of our nation's waterborne commerce. Although the available statistics do not differentiate between interstate and intrastate commerce, this analysis demonstrates that a large portion of trade carried by the towing industry is undoubtedly interstate. Large quantities of material that is potentially hazardous to the environment, economy, and public health are transported by barge across our rivers, lakes, and oceans. The Coast Guard's casualty statistics prove that many towing vessels suffer some type of loss, and as the incidents in Mobile, San Juan, and Rhode Island show, these losses have resulted in the loss of life, property, and have had a severe impact on the environment.

In its casualty statistics, the Coast Guard announces that the causes of such losses are groundings, founderings, explosions, fires, etc. However, it is human error, unchecked by federal legislation, that is the true cause of these casualties. Many casualties, including the three related above, might not have occurred if the United States Congress had

[46] Ibid.

enacted legislation that required towing vessels and barges to be equipped and operated in a prudent manner.

III. Previous Attempts to Regulate Towing Vessels

At present, there is very little legislation regulating the towing industry. Only inland and seagoing tugs of three hundred or more gross tons are required to be inspected, which allows the vast majority of tugs to sail uninspected, a unique situation in the maritime industry.[47] These tugs are not required to carry basic seafaring necessities such as a compass, charts, navigational publications, sonic depth finder, and radar. Nor are they required to be equipped with anchors or a towing repair kit.

Although the design of tank barges is scrutinized by the Coast Guard, once barges are placed in service, there is no legislation that prevents these vessels from being used for voyages for which they were not designed. If barges designed for river voyages are towed onto exposed waters, the voyage could easily end in disaster. Tank barges are also not required to have anchors. In addition, the current manning and licensing regulations for towing vessels do not provide a sufficient number of properly trained personnel. In order to effectively regulate the industry, a holistic approach should be utilized. Towing vessel equipment, barge design and operation, manning and licensing must all be addressed in one comprehensive piece of legislation.

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[47] U.S. Congress, House, Introduction of the Towing Safety Act, 103rd Cong., 2nd Sess., H.R. 4058, Congressional Record, Vol. 140, No. 29., Daily ed., (16 March 1994), E454.

A. The Towing Vessel Navigational Safety Act of 1993

There have been two attempts to enact national legislation that would promote safety in the towing industry. The first was the Towing Vessel Navigational Safety Act of 1993, H.R. 3282, which was introduced by Representative W.J. Tauzin (D-LA) on October 14, 1993. Congressman Tauzin proposed the legislation in response to the Amtrak derailment that took forty-seven lives.[48]

H.R. 3282 would have amended federal marine safety law to require every towing vessel to be equipped with certain navigational equipment and publications. The Act also would have directed the Secretary of Transportation to require applicants for uninspected towing vessel operator licenses to demonstrate proficiency in the use of the prescribed navigational safety equipment. The Act did not address equipment requirements or the design specification of barges.[49]

A hearing was held before the House Subcommittee on Coast Guard and Navigation on March 3, 1994. The bill died quietly as the congressional session concluded without its passage. After the 1994 elections, the Republicans emerged as the majority party in the House and Senate. In an effort to fulfill a campaign promise to

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[48] U.S. Congress, House, Introduction of the Towing Vessel Navigational Safety Act, 103rd Cong., 1st Sess., H.R. 3282, Congressional Record, Vol. 139, No. 138, Daily ed., (14 October 1993), H8001.
[49] Hearing on H.R. 3282, 36.

eliminate congressional committees, the GOP majority eliminated the House Merchant Marine and Fisheries Committee, and transferred the bulk of that committee's responsibility to the Public Works and Transportation Committee. Since no effort has been made to submit a new version of the bill, it appears that the issue of towing safety has been lost in the legislative shuffle.[50]

B. The Towing Safety Act of 1994

On March 16, 1994, Representative Gerry E. Studds (D-MA) introduced H.R. 4058, which is more commonly known as the Towing Safety Act.[51] This Act was more comprehensive than H.R. 3282. The Towing Safety Act would have subjected to inspection all vessels that push or pull inspected barges, regardless of which geographic area the vessel operates. The law would have required that such vessels carry radar, electronic position finding equipment, adequate communications equipment, a sonic depth finder, a compass or swing meter (which will be described in detail later), adequate towing equipment, current charts and navigational publications. This Act also would have furthered the personnel requirements for towing vessels by requiring officers (masters and mates) to man towing vessels. The bill also called for an increase in the number and qualification of other personnel that are required on board.[52]

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[50] "Most Maritime Proposals Fade Away With 103rd Congress," Professional Mariner 10 (December/January, 1995), 5.
[51] Introduction of the Towing Safety Act, E454.
[52] U.S. Congress, House, Committee on Merchant Marine and Fisheries, Subcommittee on Coast Guard and Navigation, The Towing Safety Act, H.R. 4058, 16 March 1994, available in LEXIS-Nexis library.

The Towing Safety Act met the same fate as its predecessor, the Towing Vessel Navigational Safety Act. No hearings were even held for the Towing Safety Act. The last action taken was the addition of a cosponsor on June 30, 1994. As a result of the restructuring of Congress, the subject matter of these bills was relegated to a committee with a much larger scope, the Public Works and Transportation Committee, and has thus far failed to win the attention of its new committee.[53]

Each of the bills proposed changes to the equipment required aboard towing vessels. However, neither of the bills addressed anchors or towing repair kits on towing vessels. The 1993 Act did not propose any changes to manning and licensing, while the 1994 Act proposed radical changes to manning and licensing requirements. Neither bill addressed the design and operation of tank barges. A future proposal must include all of the pertinent issues in order to improve safety in the towing industry.

IV. Towing Vessel Equipment

As noted earlier, there are very few regulations that mandate any specific equipment to be kept on board uninspected towing vessels. Uninspected towing vessels are subject to the Bridge to Bridge Radio Telephone Act, which requires that such vessels carry a VHF radio.[54] Also, uninspected towing vessels must comply with the navigational

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[53] "Most Maritime Proposals Fade Away With 103rd Congress," 5.
[54] Hearing on H.R. 3282, 4.

lighting and sound signal provisions of the *International* and *Inland Navigational Rules*.[55] Other than a radio, lights, and a sound signaling device, no navigational equipment is required to be kept onboard an uninspected towing vessel.

Any legislation which attempts to reduce the number of towing vessel and barge casualties must require the following equipment to be held on board the towing vessel: (A) current charts for the vessel's operating area and the publications necessary to update and effectively use those charts; (B) an electronic position fixing device; (C) radar; (D) compass or swing meter; (E) sonic depth finder; (F) adequate towing equipment; (G) an anchor that can be deployed and retrieved. The merit of each one of these items will be discussed in turn.

A. Current Charts and Publications

Both the Towing Safety Act and the Towing Vessel Navigational Safety Act would have required that charts be kept on board all towing vessels. In good visibility and with proper knowledge of the *Navigation Rules*, a towing vessel operator could navigate on many internal waters without the use of a chart, by simply following the color-coded and sequentially numbered buoys. However, there are many easily conceivable situations in which a chart would be necessary for safe navigation.

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[55] U.S. Department of Transportation, United States Coast Guard, Navigation Rules, International-Inland, Washington, D.C.: Government Printing Office, 1990, 2.

In a waterway such as the Mobile River, with its many tributaries, a navigator could easily become confused by the buoys marking diverging channels. Also, a chart would be absolutely essential for navigating in low visibility, such as in fog or on a dark night. In the Amtrak derailment incident, the operator of the towing vessel deviated from the river's channel and wandered off into a bayou and then struck the railroad bridge. The Mobile River is a narrow meandering waterway that is lined with countless bayous and many tributaries. The visibility was very low due to fog and the vessel's operator had left his charts at home.

In low visibility, a navigator must have some way of ascertaining his position and charts on which he can plot his position. If a position fixing device and charts had been required for uninspected towing vessels and the operator was knowledgeable in navigation, the towing vessel's operator would have been able to correlate his position on a chart and probably would not have wandered into the bayou. These requirements would improve not only the navigational safety of towing vessels operating on rivers, but also the operation of vessels navigating in any location. Even if a towing vessel spends most of its underway hours out on the open ocean, it must eventually return to a port. Every port is marked with navigational hazards that could be concealed in low visibility. Updated charts must be on board in order for an operator to avoid losing his vessel and cargo on sand bars, reefs, bridges, etc.

Neither of the proposed Acts suggested particular navigational publications that should be held on board towing vessels. Presumably, the Coast Guard would designate the required publications during the rulemaking process. There are a few publications that have proven to be essential to safe navigation. One such publication is the *Light Lists*, which supplements the information about aids to navigation found on nautical charts. The *Light Lists* provides enough data for a navigator to locate, identify, and use aids to navigation.[56] For those vessels that operate in waters affected by the tides of an ocean, the appropriate volume of the *Tide Tables* would be an indispensable tool.[57] No chart room would be complete without the *Notice to Mariners*, a weekly pamphlet which notifies mariners of changes to nautical charts and the *Light Lists*.[58] These three publications can already be found in the chart room of nearly all commercial vessels. At a minimum, the requirement for these three publications should be codified after the passage of an act.

River captains and pilots frequently make use of a "bar book." A bar book is a personalized compilation of notes concerning landmarks, currents, and other peculiarities of the vessel's route. Many captains religiously update these logs in an effort to maintain and increase their local knowledge, as well as to detect any trends, such as permanent changes in the river's current or course. Although such personal logs can be very useful

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[56] Elbert S. Maloney, Dutton's Navigation and Piloting, 14th ed., (Annapolis, Maryland: Naval Institute Press, 1985), 93.
[57] Ibid., 95.
[58] Ibid., 98.

to a river navigator, they can only supplement, not replace the information on nautical charts and publications.[59]

Whether transiting a river or the open ocean, a towing vessel operator will eventually maneuver his vessel close to navigational hazards. Whether sailing in daylight, on a dark night, or in a dense fog, nautical charts and other navigational publications are crucial for a safe passage. However, these publications alone cannot save a mariner from danger.

B. Electronic Position Fixing Device

If the driver of an automobile cannot see out of the car's window, a road map is useless. Similarly, a chart is useless in low visibility if the navigator does not know his true location. This is why some type of electronic position fixing device must be on board a towing vessel. Until recently, radio direction finders and Loran receivers were the most widely used positioning devices. Now, however, the Global Satellite Positioning System (GPS) has emerged as the first choice of most navigators.

GPS can provide mariners with precise latitude and longitude coordinates as well as a wealth of other navigational data.[60] With these coordinates and the proper training, a navigator can accurately plot his position on a chart and determine a course that will steer

[59] Ibid., 42.
[60] Hearing on H.R. 3282, 10.

his vessel clear of any hazards to navigation. If the operator of the *Mauvilla* had this capability, he most likely would not have wandered into the bayou and struck the bridge, causing the deaths of forty-seven people. Again, this device would not only benefit vessels operating on rivers, it would ensure the safe navigation of a vessel in any area where both low visibility and hazards to navigation are present.

There is a disadvantage to relying solely upon GPS and a chart to navigate in low visibility. The chartroom, where these items are usually placed, is off the bridge on most towing vessels.[61] This means that a captain or pilot will have to leave the bridge long enough to plot their position on the chart and determine a safe course. As the following incident illustrates, leaving the helm unmanned for even a few minutes can have disastrous consequences.

On May 29, 1993, the towboat *Chris* was pushing an empty freight barge upriver in New Orleans. The captain of the tug brought his vessels alongside the river bank in order to allow him to go below and assist the engineer in changing a fuel oil filter. After completing the task, the captain went to the bridge to survey his surroundings and then went below again to wash his hands. While doing so, the vessel broke free from the riverbank and struck the Judge Seeber Bridge. A one hundred and fifty foot section of the bridge collapsed and two automobiles plunged into the Mississippi River, killing one

[61] Ibid., 80.

person and critically injuring two others.[62] This accident demonstrates that in waters surrounded by many navigational hazards, which is common in internal waters, leaving the bridge unmanned for only a few minutes can produce catastrophic results.

This situation also presents a conundrum for the Coast Guard. Current regulations require that towing vessels must be under the control of an operator at all times. The Coast Guard has interpreted this to mean that the operator must be on the bridge. Federal authorities actually used this interpretation to charge the operator of the *Chris* with negligence.[63] Employing the same logic, an operator who was off the bridge in order to examine his charts could be charged with negligence if disaster strikes. One remedy to this situation is to increase the personnel requirements for towing vessels and this will be discussed in the section analyzing manning requirements. Another solution is for the operator to rely more heavily on radar, which is usually installed on the bridge.

C. Radar

A chart and electronic position fixing device are not the only equipment which prudent mariners rely on for safe navigation. Radar is a piece of gear which provides a navigator with the ability to see through darkness and fog. One of the advantages of radar

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[62] U.S. Congress, House, Committee on Merchant Marine and Fisheries, Subcommittee on Coast Guard and Navigation, Hearing on the Safety of the Inland Tug and Barge Industry and Investigation of the Circumstances Surrounding Two Fatal Bridge Accidents Involving This Industry, 103rd Cong., 2nd Sess., 12 October 1993, 58.
[63] Ibid., 16.

is that it can detect other vessels in low visibility. This ability will allow a towing vessel to maneuver in accordance with the Coast Guard's *Navigation Rules*, which are designed to prevent collisions between two vessels. This utility is reflected in the radar observer courses that are offered and approved by the Coast Guard, which impart the skills needed to practice collision avoidance using radar.[64]

Without radar and in low visibility, a captain would have to greatly reduce the speed of his vessel or delay the voyage. Given the competitive nature of the towing industry, vessel owners undoubtedly would prefer to see their captains complete their voyages in a timely manner. Having a radar on board will not only greatly reduce the chances of colliding with a vessel, it will also allow an operator to proceed more quickly to his destination.

Radar can also be used to supplement other aids to navigation. As mentioned earlier, it can be cumbersome, and perhaps even legally negligent, to frequently leave the bridge to plot a fix on a chart and determine a safe course while navigating in low visibility. Radar navigation can provide a better solution. Radar not only reflects the images of other vessels, it also reflects land masses, bridges, piers, etc. A skilled navigator can easily guide his vessel through a treacherous fog or dark night by using the images on his radar screen to determine a safe course.[65] Since radars are usually found in the wheel house, this would allow the captain to better maintain a proper lookout.

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[64] Hearing on H.R. 3282, 62.
[65] Maloney, 229.

The proper employment of radar navigation techniques could have prevented the Amtrak derailment incident. If the operator of the *Mauvilla* was using his radar and was trained to interpret the images on the display, he certainly would have noticed that his vessel was on a collision course with a stationary object. By plotting his position on a chart using GPS, he would have then discovered that this stationary object was a bridge. Radar navigation would prevent such tragic mistakes in the future.

D. Compass or Swing Meter

In the days before satellites, compasses were used in order to estimate the approximate position of a vessel. Employing a method called dead reckoning, a navigator would plot his starting position on a chart, take the vessel's course from the compass, and be able to determine the vessel's current or future position by factoring the vessel's speed and time traveled.[66] This method of navigation can be very inaccurate because it does not account for the effects of wind and current on the vessel's speed and course. GPS satellites track the actual position of the vessel and provide much more accurate data. Almost all GPS receivers can also display the true course and speed of a vessel.

Despite this advance in technology, compasses can still serve a useful purpose on board some towing vessels. While navigating on a river or another enclosed waterway in

[66] Ibid., 118.

good visibility, it may be unwise to continually leave the bridge to update the vessel's position using GPS. Since compasses are kept on the bridge, many river captains rely on compasses for routine navigation. Also, a vessel operator in an enclosed area will usually have to make many turns prior to reaching his destination. It is a common practice in navigation to execute these turns once a particular landmark is on a predetermined bearing from the vessel.[67] In addition, many navigators note the course of a section of a channel from a chart and then use a compass to help maintain the vessel on the proper course. While it is true that compasses do not account for effects of wind and current, the current licensing exams ensure that operators can anticipate and account for these variables.

Rate of turn indicators, more commonly known as swing meters, are found on many river vessels in lieu of compasses. These devices are similar to compasses because they use the earth's magnetism to indicate changes in a vessel's course. These are essentially simplified compasses and can readily reveal to an experienced navigator how the current and wind are affecting the barges.[68] After enacting towing vessel legislation, the Coast Guard could easily devise a plan to allow towing vessels engaged in river commerce to substitute swing meters for compasses.

Although a compass cannot possibly provide information that is as accurate as GPS, it still has its advantages. A compass is usually located in the center and forward area of the bridge, which allows the vessel operator to keep his eyes on the water as much

[67] Ibid., 189.
[68] Ibid., 42.

as possible. When plotting a fix taken from GPS, a mariner will have his attention temporarily off the bridge. A compass, chart, and GPS together will provide a mariner with several reliable methods of navigation.

E. Sonic Depth Finder

Sonic depth finders may or may not be useful to a towing vessel. Many mariners argue that on routes in which there is little variation of depth or there are wide channels which provide plenty of water, a fathometer would have little utility. Thus, towing vessels which operate primarily on the open ocean may have little use for a fathometer. Even when these vessels are entering or departing a port, GPS, a compass, or radar, if used properly, can prevent a vessel from entering shallow water.

For these reasons, officials of the Coast Guard have testified that sonic depth finders should not be required on every vessel. Only vessels operating over ocean bottoms with steep contours would benefit from the device. Admiral Henn, Chief of the Coast Guard's Office of Marine Safety, Security, and Environmental Protection, testified that this is one reason why he would prefer that any Act concerning towing vessel safety give the Coast Guard the authority to delete items from list of required equipment for certain vessels.[69] The Coast Guard has also asked for the authority to delete the requirement for a compass for some river vessels.[70]

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[69] Hearing on H.R. 3282, 49.
[70] Ibid.

The rationale for the deletion of items for certain vessels assumes that a vessel will only operate on the same type of route during its lifetime. If a vessel were to make a "change of employment," the industry's term for the reassignment of a vessel to a different geographic area, then a sonic depth finder or compass could be very useful. If the Coast Guard desires to have the authority to delete items from the list of required equipment for certain vessels, then that vessel must be obligated to navigate only in an area specified by the Coast Guard. Regulations must be provided that will allow the Coast Guard to restrict vessels which have a waiver for any equipment to a specified geographic area. If the vessel's owner wishes to change the employment of a vessel, then an application for the continuance of the waiver should be filed with the Coast Guard beforehand, or the owner should equip the vessel with the previously waived items. Neither of the proposed Acts called for such action, nor was this discussed during the hearing for the Towing Vessel Navigational Safety Act. If the Coast Guard desires to have this type of deletion authority, then they must implement a method to prevent unauthorized changes of employment.

F. Adequate Towing Equipment

The San Juan spill in 1994 demonstrates that the crew of a towing vessel may be called upon to make underway repairs. After the towing line parted and a repair was made, the new eye of the towing was cut due to friction. If a thimble had been attached to

the inside of the eye, the eye would not have been cut through. Most vessel owners stow such items on their tugs.

An adequate supply of towing repair gear should be required for all towing vessels. The type of gear would vary, depending on the service of the vessel. Towing vessels which pull tanker barges through open waters should have the capability to repair parted lines and rescue a stray barge. Tugs which push freight barges do not need the same repair items. The Coast Guard should solicit the opinions of industry leaders during the rulemaking process and then publish what gear should be on vessels engaged in different types of commerce. The regulations should also stipulate that any changes of employment be accompanied by the procurement of the appropriate repair items.

G. A Workable Anchor

Neither of the proposed Acts require that towing vessels have a functioning anchor. Since towing vessels under three hundred gross tons are not subject to inspection, the Coast Guard currently does not have the means to require such vessels to carry anchors. In many casualty situations, an anchor could help prevent a tug and tow from running aground and releasing its cargo into the environment.

There are a variety of ways by which an operator could lose control of a towing vessel and barge. The vessel's engine could fail due to fire, or due to a loss of lubricating

oil or cooling water. A vessel could also lose control of its rudder due to electrical problems or a loss of hydraulic fluid. If one of these problems arises, the operator's only hope of preventing a catastrophe, such as running aground and spilling oil, may be by letting go the tug's anchor.

Before the *Scandia* and *North Cape* ran aground in Southern Rhode Island, the crew had to abandon the tug because of a fire. Once the crew was brought safely to shore by the Coast Guard, the engineer and first mate returned to the barge in an effort to let go the anchor and prevent both of the vessels from running aground. If their efforts had been successful, the tragedy in Rhode Island could have been averted. The crew was unable to let go the anchor because the windlass had been removed and the anchor chain was shackled to the deck. The engineer and first mate could not complete their task due to the heavy weather.[71]

As recounted earlier, the entire episode could have been avoided if the *Scandia's* captain had a functioning anchor windlass. If the captain had the ability to deploy and retrieve his anchor, he would have had the option to seek a sheltered anchorage in order to escape the stormy seas.

The following section will make the case for requiring anchors on board tank barges. However, having an anchor installed on a barge does not preclude the need for

[71] "*North Cape* Grounding Caused by Fire, Weather, Anchoring Problems," 50.

one on the towing vessel. The investigation into the Rhode Island spill brought to light the concern that even if the tank barge's anchor had been successfully let go, it may not have been enough to halt the movement of the two vessels due to their combined weight and the rough seas.[72] A working anchor should be installed on the towing vessel and the tank barge.

V. Tank Barges

A. Design and Operating Routes

Neither of the proposed Acts addressed the construction and equipping of barges. Currently, the majority of the regulations concerning barges affects tank barges only. Tank barges often carry hazardous liquid material which may pose a threat to life, property, and the environment. Dry cargo barges usually carry raw or agricultural material in bulk, cargoes that do not pose the same threat as hazardous liquid materials. The marine casualty statistics and incidents reviewed earlier demonstrate that many tank barges do not reached their destinations safely and have caused serious damage to many ocean and fresh water environments. If an act regulating the towing industry is to effectively reduce the number of tank barge casualties occurring on our waters, it must address the safe construction and operation of tank barges.

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[72] Ibid., 50.

At present, Title 46 of the Code of Federal Regulations states that plans for the construction of all new tank barges must be approved by the Coast Guard's Marine Safety Council in Washington, D.C.. In addition, any tank barges that carry flammable, combustible, or hazardous liquid cargoes must meet class specifications.[73] There are three classes of tank barges and each class is designated for particular hazardous cargoes. Tank barges that carry hazardous material must also meet rigid stability requirements, unless the tank barge exclusively carries Grade A and lower flammable or combustible liquids on inland waters.[74] The American Bureau of Shipping inspects and provides the classification for barges.[75] The Coast Guard conducts operational inspections of tank barges annually. Every three years tank barges undergo an internal inspection and are dry-docked for an external hull inspection.[76]

The federal Oil Pollution Act of 1990 has directed that all new oil carrying vessels, including tank barges, be designed with double hulls. All single-skinned tank barges that are now in service will eventually be phased out.[77] The Towing Safety Advisory Committee (TSAC), a federally appointed board of industry representatives, has voiced concern over the large number of aging inland tank barges that are single-skinned. Their concern is that these barges are literally breaking up before they are retired.[78]

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[73] Phil Miller, Lieutenant, United States Coast Guard, "Birth of A Barge," Proceedings of the Marine Safety Council 49/3 (May/June, 1992), 24.
[74] Paskewich, 23.
[75] Ibid., 20.
[76] Marvin Pontiff, Lieutenant Commander, United States Coast Guard, "More Barge Inspections," Proceedings of the Marine Safety Council 47/2 (March-June, 1990), 6.
[77] Paskewich, 21.
[78] Ibid., 6.

The Coast Guard shares the Committee's concerns. In 1990, the Coast Guard ordered its field offices to review the structural soundness of tank barges over twenty years old that operate on "other than still water routes." Coast Guard officers relayed that their main concern was for tank barges carrying petroleum products on exposed internal waters, such as sounds and large bays. These barges, which have experienced a high rate of hull failure, are single-skinned and transversely framed. (See Figure 1) Transversely framed hulls have stiffeners that are laid across the hull and longitudinally framed vessels have stiffeners laid fore and aft. By not having any longitudinal framing, the bottom of these vessels will be subjected to too much compression in heavy seas and could possibly lead to a catastrophic failure of the hull.[79]

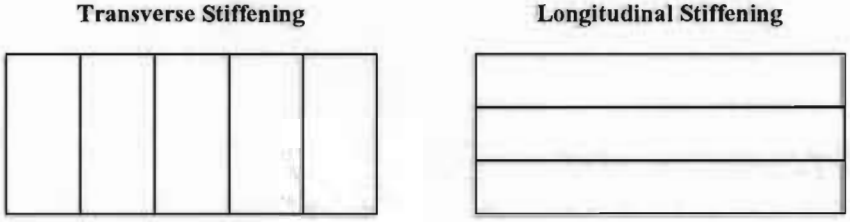

Figure 1

Barge Frames as viewed from above or below.

Older barges and barges designed solely for river voyages tend to only have one set of stiffeners, either longitudinal or transverse. On still water routes, one set of stiffeners is adequate. However, even in an environment with only moderate seas, these

[79] Pontiff, 6.

hulls will "sag" and "hog." (See Figure 2) In the sagging mode, the bottom of barge's hull sags downward as the bow and stern of the vessel ride on wave crests. In the hogging mode, the crest of a wave forces the bottom of the hull upwards. After repeated sagging and hogging, a weak hull will eventually buckle and break.

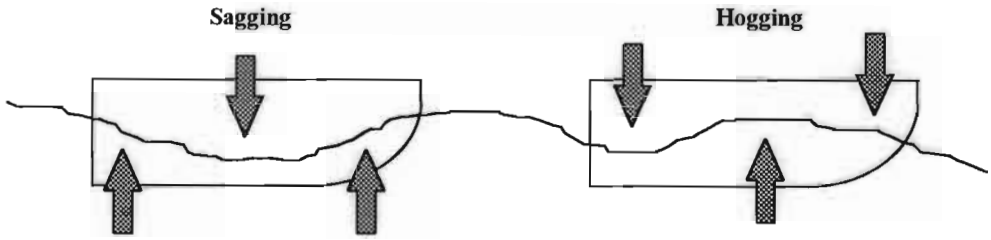

Figure 2

These fears are not unfounded. In 1984, the towing vessel, *Celtic*, was towing a scrap barge, the *Cape Race*, across Long Island Sound. The *Cape Race* had a double hull that was reinforced with transverse stiffeners only. The barge was aging, and had many weld repairs performed on its hull. Due to the forces of sagging and hogging, one of the repairs failed, and the void between the two hulls quickly filled with water. The barge took on a heavy list and sank, pulling the tug down with it. The vessels sank so quickly that none of the crew members had time to escape. All four men died.[80] Although the *Cape Race* carried scrap and was not a tanker barge, this incident illustrates the devastating consequences of a barge's loss of buoyancy due to deterioration and an outdated design. Since there are many tank barges of similar design and operating on similar routes, it is entirely possible that tank barge and towing vessel could be lost in a

[80] "The Tug *Celtic* and Barge *Cape Race*," Proceedings of the Marine Safety Council 43/8 (August, 1986), 181.

similar manner. If a tank barge were to sink, the inevitable release of its hazardous cargo could devastate a coastal community.

The Coast Guard's marine casualty statistics revealed that there have been many total and non-total losses of tank barges. Many of these losses were caused by an improper change of employment. For example, one shipowner allowed a barge that was originally designed for river traffic to carry ethyl alcohol across the Gulf of Mexico from Houston to Tampa. A thunderstorm closed in on the tug and tow, creating five foot seas. Without warning, the barge exploded.

The subsequent investigation quickly determined that this barge was only suited for voyages on rivers because the design of the bow rake was for calm waters and could not withstand the pound from the sea, even with wave height as little as five feet. The bow rake is the forward section of a barge, and is designed to allow the barge to move as smoothly as possible through the water. In enclosed waters where the wave height is small, bow rakes are long and shallow, which minimizes the resistance caused by the hull's movement through the water. (See Figure 3) This type of bow rake is called a "spoon bill."[81]

[81] Joe Brusseau, Lieutenant Commander, United States Coast Guard, "On Ocean Service: Two River Barge Casualties," Proceedings of the Marine Safety Council 44/10 (November, 1987), 265.

Two Types of Bow Rakes

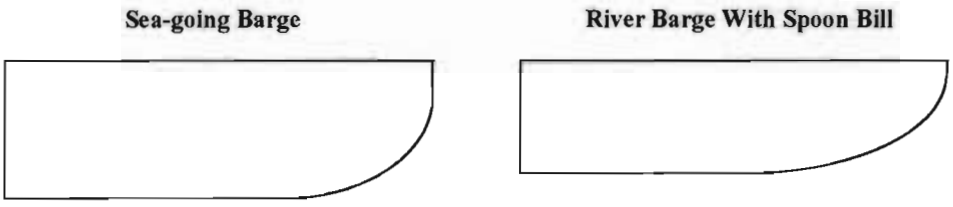

Figure 3

Although a spoon bill maximizes the efficiency of a barge's movement through the water, this type of bow rake is inappropriate for a sea-going barge. In an area where the wave height can be as high as only a few feet, oncoming waves will slam into the bottom of the spoon bill, causing the metal to buckle, and eventually rip open. This effect is exacerbated if the barge is proceeding with a small draft due to a light load. By sitting high on the water, more bottom area is exposed to the pounding of the sea.[82]

The barge that was transiting to Tampa had a spoon bill. After the bottom of the spoon bill had been pounded by the seas, the hull fractured in several places. Compression also caused the metal plates lining the cargo holds to rupture. This allowed some of the cargo, ethyl alcohol, to escape from the hold, vaporize, and become trapped in the bow rake void. Sparks from the twisting metal, or possibly lightning, most likely ignited the flammable gases, causing the an explosion.[83]

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[82] Ibid., 265.
[83] Ibid., 264.

This is not the only example of disaster striking a barge that embarked on a voyage for which it was intended. Another barge designed for river service was being towed up the Atlantic coast to Charleston, South Carolina, when the towline suddenly parted. Once the towing vessel brought the line on deck and returned to the barge, the crew saw that half of the barge was missing! The investigation determined that the ten foot seas caused the bottom of the hull to compress and eventually rupture. The force from the sinking of half the barge caused the towline to part.[84]

The vessels bound for Tampa and Charleston were typical of river barges. They were both single-skinned, only longitudinally reinforced, and had spoon bills. These losses demonstrate that vessels designed for river routes should not be taken into areas such as the open ocean, large bays, and sounds. Any act which intends to decrease the number of towing casualties must include provisions which would prevent river barges from serving on open waters.

The American Bureau of Shipping already classifies barges for certain geographic routes.[85] Such classifications should be mandatory for all barges and shipowners should be compelled to obey these restrictions. Congress should give the Coast Guard the authority to fine vessel owners who direct their river barges to operate on open waters.

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[84] Ibid.
[85] Ibid., 265.

B. Anchors

As discussed earlier, towing vessels and barges should be equipped with functioning anchors. The *North Cape* spill could have been prevented if the engineer and first mate had been able to deploy the barge's anchor. In addition, the operator could have avoided the stormy seas altogether if he had been able to wait out the storm at a safe anchorage.

As mentioned earlier, requiring an anchor on the towing vessel alone is not sufficient, both vessels must have anchors. If the hawser connecting the towing vessel and barge parts and cannot be repaired, the barge a spill could still be averted if the crew of the towing vessel boards the barge and lets go the anchor. The spill in San Juan could have been avoided in this manner.

VI. Manning and Licenses

A. Current regulations

Until the mid-1940's, most towing vessels were subject to inspection because they were propelled by steam engines. After diesel engines emerged as the most common means of propulsion, the federal government lost its ability to regulate personnel

requirements and qualifications on towing vessels. At present, there is relatively little regulation concerning the manning and licensing of towing vessel personnel.[86]

1. Manning Requirements

Although the requirements are few, the maze of regulations for the manning of uninspected towing vessels has confused many. The number of personnel that are required to man a towing vessel will vary according to the geographic area of service, the length of the route in nautical miles, the length of the route in time, and of course, the size of the vessel. The only common denominator is that all uninspected towing vessels must have a licensed operator on board. The easiest manner to explain the remaining requirements is by examining each of the geographic areas individually.

On the Great Lakes, no crew member is allowed to work more than eight hours per day on a vessel of any tonnage. Therefore, a voyage of twenty-four hours or more would require at least three licensed individuals aboard the vessel. At least one of the individuals must hold an Operator of Uninspected Towing Vessels (OUTV) or superior license, the remaining two must possess at least a Second Class Operator license.[87]

On other inland waters, licensed personnel are allowed to work up to twelve hours per day on a vessel of any tonnage, which requires a vessel on a voyage lasting more than

[86] Stutman, 4.
[87] Szczurek, 133.

twelve hours to be manned by only two people. Again, at least one of the two individuals must hold an OUTV license, the other must have a Second Class Operator license at a minimum. [88]

On waters up to two hundred miles offshore, only two licensed operators are required to be aboard an uninspected towing vessel. One must posses an OUTV license, the other must possess at least a Second Class license. For voyages longer than six hundred miles, a third licensed person must be added. For all areas of service, there is no requirement for a licensed engineer.[89]

2. Qualification Requirements

In order to qualify as an OUTV, one must have documented three years of experience, including six months in the wheelhouse and three months of service in the geographic area for which a license is sought. The licenses are further classified by route endorsements. For an OUTV on near coastal or inland water routes, a Second Class license must first be obtained after eighteen months of service and the successful completion of a Coast Guard examination.[90] Recently, the Coast Guard amended the prerequisites for an OUTV license by requiring the completion of a radar observer course,

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[88] Ibid.
[89] Ibid., 134.
[90] Ibid., 19.

even though uninspected towing vessels are not required to have radars.[91] In order to receive an oceans domestic endorsement, one must hold a current Able Seaman certificate and complete a firefighting course.[92]

B. Previously Proposed Amendments

After the Amtrak derailment incident, many criticized the Coast Guard and legislators for not requiring a radar observer certificate prior to obtaining of an OUTV license. After deciding that it did have the authority under current law, the Coast Guard amended its regulations to require a radar observer course for the OUTV license. However, Coast Guard officials have testified that the current laws would have to be amended in order to rule that all uninspected towing vessels carry radar.[93] The inclusion of a radar certificate seemed to quiet most of the criticism of the qualifications of operators of uninspected towing vessels. Instead many critics have called for changes to the manning requirements of such vessels.

On November 26, 1991, after a spill near the Hawaiian Islands, Representative Neil Abercombie (D-HI) introduced H.R. 3942, a bill to increase the watch requirements for towing vessels. The bill would require that a licensed engineer be on board all towing

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[91] "Radar Training Required of All Towboat Skippers," Professional Mariner 11 (February/March, 1995), 38.
[92] Szczurek, 19.
[93] Hearing on the Safety of the Inland Tug and Barge Industry and Investigation of the Circumstances Surrounding Two Fatal Bridge Accidents Involving This Industry, 24.

vessels and that the engineroom be manned at all times. The bill also would have required that a seaman be on watch on the bridge in addition to a licensed operator. Finally, all vessels engaged on voyages over two hundred miles would have to employ a three-watch system, requiring three operators and three seaman.[94]

This was an ambitious bill. At a minimum, all uninspected towing vessels would have to ensure that both an operator and a seaman are on the bridge at all times. A licensed engineer would have to be provided, plus enough personnel to support a watch rotation in the engineroom. On a voyage less than eight hours on the Great Lakes or less than twelve hours on the Western Rivers or inland waters, this would increase the number of required personnel from one to three. For longer voyages, the minimum manning would grow from three to nine on the Great Lakes and from two to six on inland waters and the Western Rivers.

The manning for offshore routes would also increase significantly. For example, uninspected towing vessels embarked on voyages over two hundred miles previously needed only two operators on board. With the passage of H.R. 3942, three operators, three deck seaman, and three engineering watchstanders (one of whom would have to be a licensed engineer) would be needed to satisfy federal regulations.[95]

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[94] U.S. Congress, House, Committee on Merchant Marine and Fisheries, Subcommittee on Coast Guard and Navigation, Hearing on H.R. 4394, A Bill to Expand the Requirement for Merchant Mariner's Documents for Personnel on Tugs and H.R. 3942, A Bill to Establish Requirements for Manning and Watches on Towing Vessels, 102nd Cong., 2nd Sess., 17 March 1992, 43.

[95] Hearing on H.R. 3942, 47.

The necessity and potential outcomes of this bill were hotly debated. During the congressional hearing, groups representing mariners supported the bill and those representing the interests of shipowners opposed the bill. These opinions did not surprise anyone. What did come as a shock to some lawmakers was the reluctant and lukewarm support of the Coast Guard.

Coast Guard officials argued that the bill was not needed and went too far. They argued that while it would be appropriate to mandate that a licensed engineer be on board all uninspected towing vessels, creating a new watch requirement for the engineroom was unnecessary. The Coast Guard agreed with industry representatives that the modern automation of diesel engines eliminated the need for a continuous watch in the engineroom.[96]

The Coast Guard also agreed with the lobbying groups representing the owners that there is no need for a second watchstander on the bridge. Since this person would only be an ordinary seaman, they would contribute as nothing more than as an extra lookout. In a Senate report commenting on the *International Navigation Rules* in 1980, Congress and industry agreed that the licensed operator on the bridge would satisfy the requirement for a lookout on uninspected towing vessels. Also, members of the House subcommittee and representatives of the Coast and towing industry agreed that the

[96] Ibid., 19.

additional cost of the personnel required by H.R. 3942 could total as much as forty million dollars for a small "fleet" of vessels. Several members and guests at the hearing considered this cost unacceptable.[97]

C. Manning Requirement Proposals

Proper equipment and experienced seamanship are both necessary for a successful voyage. Any legislation which purports to increase the safety of the towing industry must address not only the vessels and the equipment on board, but also manning issues. Legislation related to technology and personnel should be addressed together, not separately.

In the days of old, many people were needed to sail a large ship. Now with advanced technology, far fewer people can handle a much larger vessel. However, the regulations currently in place require only one person to be on board for some short voyages! This is clearly not sufficient.

The mandate for a licensed engineer on board has merit. By having a licensed engineer aboard, effective repairs could possibly be made in instances where there is a loss of propulsion, steering, etc. In addition, licensed engineers are required to be graduates of an approved firefighting course, which is not mandated for the operators of uninspected

[97] Ibid., 23.

towing vessels.[98] The qualified engineer could even be one of the licensed operators. Although this double qualification would probably increase the salary of the individual, it would probably still save some money for the towing company.

The requirement for a manned engineroom is not as convincing. The statistics examined earlier reveal that very few towing vessel and barge casualties are caused by machinery failure. Even for those few casualties, it is unclear whether having the engineroom manned would have made a difference. The Coast Guard and industry experts agree that the automation of modern diesel engines requires little, if any, human intervention. If a mechanical problem does arise, the licensed engineer on board could work on the problem. If the engineer is on watch on the bridge, he could be relieved by one of the other operators while he goes below.

Despite objections from the towing industry and the Coast Guard, the argument for requiring an extra seaman on the bridge does have merit. As discussed earlier, an operator could actually be charged with negligence for being in the chart room to plot a fix while the vessel is underway. By having a seaman on the bridge, the operator could still have a proper lookout, as prescribed in Rule 5 of the *Navigation Rules*. Also, the seaman could be positioned elsewhere on the vessel as a lookout during low visibility. If the towing line parted, this seaman could board the barge to let go the anchor or assist the operator in repairing the hawser and retrieving the barge. Towing vessels are charged

[98] Szczurek, 133.

with a great responsibility, the safe passage of their cargo. In the event of low visibility or mechanical failure, this extra body can be used to take the precautions necessary to avoid a casualty.

A legislative proposal should include changes to the manning requirements for uninspected towing vessels. An engineer should be aboard, but the engineer should be allowed to double as one of the operators or deck seaman. Using the current watch rotation requirements, an extra person should be on the bridge with the operator to aid as a lookout and assist the operator during casualties.

VII. Recent Legislation

A. The Rhode Island Oil Spill Pollution Prevention and Control Act

On August 6, 1996, Rhode Island Governor Lincoln Almond signed the Oil Spill Pollution Prevention and Control Act. Public support for the Act was generated earlier in the year as a result of the *North Cape* oil spill which tarnished the south shore of Rhode Island and adversely affected the lives of many fishermen and lobstermen. As mentioned earlier, the United States Supreme Court ruled in the case of Askew v. American Waterways Operators, 411 U.S. 325 (1973), that individual states may regulate the operation of oil carrying vessels without violating the Commerce Clause of the

Constitution. Rhode Island decided to use this ruling to improve the safe navigation of oil carrying vessels on its waterways.

The Act requires extensive drug testing of mariners who serve on Rhode Island waters.[99] It also provides for the establishment of the Narragansett Bay/Rhode Island Sound Safety Committee, which will outline plans for the safe operation and navigation of tank vessels, including tank barges.[100]

The Rhode Island Act also contains several mandates concerning barge manning and navigation. The navigation sections require towing vessels to carry GPS, a functional radar, a magnetic and gyrocompass, and two very high frequency radios (VHF), one of which shall be powered independently of the vessel's electrical system.[101]

As noted earlier, the federal Bridge to Bridge Radio Telephone Act already requires uninspected towing vessels to carry a VHF radio. The Rhode Island law takes this one step further by necessitating two radios, each with a different power source. This laudable arrangement will greatly increase the likelihood that a vessel in distress will be able to communicate their needs to those who can help. The Act again improves the safe conduct of towing vessels through equipment redundancy by requiring both a gyrocompass, which uses electricity, and a magnetic compass, which does not need a

[99] Rhode Island, Oil Spill Pollution Prevention and Control Act (1996), 46-12.5-18.
[100] Ibid., 46-12.5-25.
[101] Ibid., 46-12.5-23.

power source.[102] Therefore, even if an engineering casualty eliminates a vessel's ability to produce electricity, the vessel could still navigate and communicate with others. The mandate for a functional radar nicely complements the Coast Guard's recent rule that all OUTV licensees graduate from an approved radar observer course.

The Act does not simply require that towing vessels carry an electronic position fixing device, it specifies that a GPS should be on board. This is not surprising nor unreasonable because GPS is the most accurate, dependable, and cost effective electronic position fixing device available.

At first glance, the Rhode Island law appears to lose its effectiveness by not specifically requiring charts and other navigational publications. As argued earlier, such publications are essential for safe navigation. However, the Act does require that all tank vessels, both self-propelled and tank barges, formulate a voyage plan prior to getting underway. The voyage plan must include details on the following: channel depths and widths, appropriate speeds, navigational obstructions and aids, traffic separation schemes, and predictions for weather, current, and tides.[103] In order to draft such a plan, a towing vessel operator must consult nautical charts, as well as tide and current tables. Although the Rhode Island law does not specifically state that such publications must be held on board, it does achieve the goal of ensuring that operators consult them.

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[102] Ibid.
[103] Ibid., 46-12.5-22.

The main weakness in the Act is the section concerning anchors. The Act states that towing vessels "shall employ anchoring equipment which can be manually deployed by a crew member manning the tank barge during coastal tow *or another method of retrieving a lost tow*."[104] At first, this statement correctly requires that all tank barges have a workable anchor. However, the Act then grants the vessel owner a way to avoid this mandate. Some may interpret this sentence to mean that by having extra line and cleats on the towing vessel, an operator could come alongside a runaway barge and secure it to the towing vessel with the extra line. If vessel owners are permitted to interpret this section in this manner, it would free them from the obligation of having a functioning anchor aboard the barge. Such an interpretation would render this section ineffective.

Ironically, a perfect example of the ineffectiveness of this section can be seen in the *North Cape* incident which occurred on Rhode Island Sound. In that case, the rough weather and high seas would most likely have made it impossible for the operator to secure the barge alongside the towing vessel. The only probable way that the barge could have been prevented from running aground would have been through the use of an anchor. In this instance, and many other easily conceived scenarios, an effective statute must flatly require a working anchor aboard all tank barges.

The Oil Spill Pollution Prevention and Control Act also requires towing vessels to have fire and flooding detection systems.[105] This is undoubtedly in response to the *North*

[104] Ibid., 46-12.5-23.
[105] Ibid.

Cape incident, which was a cascade of casualties that began with a fire aboard the towing vessel. A *detection* system may have allowed the operator to learn of the fire sooner, but that still may not have necessarily given the crew time to extinguish the fire. A fire *suppression* system would probably be more effective in improving barge safety. Such systems would be required by a recently proposed federal law which will be discussed shortly.

The Rhode Island Oil Spill Pollution Prevention and Control Act also establishes new manning requirements for towing vessels and tank barges. The Act requires one licensed operator to be on the bridge at all times. There also shall always be a total of three licensed operators aboard. As noted earlier, current federal law only restricts licensed personnel from working more than twelve hours per day when sailing on inland waters. Therefore, any voyage lasting more than twelve hours must have two licensed operators. The Rhode Island Act increases this number to three. However, unlike the federal law, the Rhode Island Act does not state whether or not the second and third operators need to have a OUTV license or just a Second Class Operator license. This distinction will have to be made during Rhode Island's rulemaking process. In either case, the increased manning requirement will lessen the likelihood that a catastrophe will be caused by an operator's fatigue.

The Act also requires that a certified tankerman be on board the barge.[106] In order to qualify as a tankerman one must demonstrate experience and knowledge in the handling and transfer of flammable liquids.[107] Rhode Island should be commended for including this provision. Although the argument was previously made that manning barges would be costly and not as effective as some of the other proposals, having a manned barge could potentially lead to fewer devastating spills. However, this result will only come about if the tankerman has the equipment necessary to secure a runaway barge. If the wording on anchors is allowed to be loosely interpreted, then the tankerman on the barge may not even have an anchor at his disposal. The success of this extra manning requirement will depend upon whether or not the tankerman will have the equipment needed to secure a drifting barge.

The Rhode Island legislation contains many of the recommendations suggested in this research, and it will undoubtedly improve the safe passage of tank barges through Rhode Island waters. Unfortunately, if the section concerning anchors is interpreted poorly, many vessel owners may be able to run their barges without an effective means of retrieving a lost tow. Also, without a working anchor, a watch aboard a barge would not be able to prevent the barge from grounding, especially if heavy seas prevent the towing vessel from coming alongside.

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[106] Ibid., 46-12.5-21.
[107] Szczurek, 111.

B. The Oil Spill Prevention and Response Act

The Oil Spill Prevention and Response Act (S1730), which was introduced by Senator John Chafee (R-RI) on May 6, 1996,[108] is a much weaker piece of legislation than the Rhode Island state statute. Although the proposed legislation provides for accident response measures in lengthy detail, the only new hardware that the bill requires is a fire suppression system and an electronic position fixing device. It does not require a towing vessel to carry radar, charts, nautical publications, compass, or depth finder; nor does it require tank barges to have a functioning anchor.[109]

As this research demonstrates, the most effective way to curb the number of navigational mishaps involving towing vessels and barges is by requiring such vessels to carry appropriate equipment for ocean voyages.

This bill offers a loophole to similar to the one found in the Rhode Island statute. S1730 requires only single hull barges over five thousand tons to have either a manned barge with an operable anchor *or* any other method of preventing the barge from grounding.[110] Again, it will be interesting to observe how the rulemaking process defines

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[108] U.S. Congress, Senate, Introduction of the Oil Spill Prevention and Response Act, 104th Cong., 2nd Sess., S 1730, Congressional Record, Vol. 142, No. 62, Daily ed., (7 May 1996), S4805.
[109] U.S. Congress, Senate, Environment and Public Works Committee, The Oil Spill Prevention and Response and Improvement Act, S1730, 7 May 1996, available in LEXIS-Nexis library.
[110] Ibid.

the latter. The best manner to secure a drifting barge is by anchoring it to the ground. Other methods, such as attempting to secure another towline or taking the barge alongside may not be possible in rough weather. Although it was difficult in the *North Cape* incident, the towing vessel was able to put men aboard the tank barge. However, it would been extremely difficult, if not impossible, to make fast the barge alongside the towing vessel or to employ another towing cable. Once again, the most certain way to prevent any runaway vessel from running aground would be by letting go an anchor.

VIII. Conclusion

Towing vessels and barges are a mainstay of the American transportation industry. Each year, tens of thousands of vessels carry millions of tons of cargo across our oceans and internal waters. Navigational mishaps involving any type of barge or towing vessel not only endanger the lives of mariners, but also automobile drivers and train passengers. Tank barges present an additional hazard. Tank barges carry commodities such as crude oil, petroleum products, chemical products, and waste are transported in vast quantities over our nation's inland waters. Inland waters refers not only to the navigable rivers and lakes of the United States, but also describes most large bays and sounds, and much of our coastal ocean areas. Nearly all of this cargo promptly arrives at its intended destination. However, in the relatively few cases in which it does not, the consequences can be severe.

The transportation of these commodities poses a great risk to the environment and the economies of coastal communities. The Rhode Island and Puerto Rico incidents demonstrate that spills of hazardous material can have an enormous adverse impact on the lives of fishermen, lobstermen, and those who depend on tourism. Such spills also have ability to contaminate the drinking water for communities along the water's edge. The Amtrak and Judge Seeber bridge allisions illustrate that navigational errors have the potential to kill many people. These tragic scenes were caused by human error and a lack of prudent legislation.

There have been several recent attempts to regulate the towing industry. None of the bills were enacted by the end of their respective Congressional terms, allowing the bills to die. The new House majority disbanded the House Merchant Marine and Fisheries Committee and subrogated its responsibilities to the Transportation Committee, a committee with much wider scope.

The Towing Vessel and Navigational Safety Act of 1993 was proposed in reaction to the Amtrak derailment. This Act was modest in scope; it proposed that a small number of navigational equipment be required for towing vessels and would have ordered the Coast Guard to investigate and report on the adequacy of towing vessel manning and licensing. The Towing Safety Act of 1994 was far more aggressive. Not only did this bill mandate navigational equipment, it also greatly increased, by at least tripling, the number

of personnel required to man a towing vessel. This bill was severely criticized for the prohibitive costs it would impose on vessel owners.

A new bill must be proposed soon, lest another unnecessary tragedy take or economically devastate more lives. The 1993 bill would not have had a great impact on the industry's safety record because it only addressed navigational devices. The 1994 bill was more comprehensive, but it failed to win any support because the increased manning requirements were seen as too costly. Neither bill addressed anchors nor did they cover barge design and operation.

A new bill should be proposed that prescribes equipment that must be on board all uninspected towing vessels. The equipment should include: current charts and navigational publications; an electronic position fixing device; radar; a compass or swing meter; sonic depth finder; adequate towing equipment; and a workable anchor. The Coast Guard should be given the authority to waive the requirement for a sonic depth finder and to prescribe a swing meter in lieu of a compass for certain vessels. However, these vessels should only be allowed to make a change of employment after a continuance of the waiver is granted or the previously waived items are obtained.

An anchor ready for use should also be aboard all towing vessels. During the rulemaking process, the Coast Guard should canvass the towing industry to determine

what repair items should be kept on board towing vessels. Again, these items could be tailored to the different types of employment of towing vessels.

The bill should address the design and operation of tank barges as well. Many tank barges were designed specifically for still water voyages. If these vessels embark on an open water voyage, the results could be disastrous. Spoon bill bow rakes and the smaller number of stiffeners make river barges inappropriate for ocean open water routes. Adherence to the classifications by the American Bureau of Shipping should be required. Also, a working anchor should be installed on all tank barges.

The current federal regulations for the manning of towing vessels are insufficient. On some short voyages, only one person is required to be aboard, the operator. A seaman should be on watch with the operator. Although only a few foolhardy owners presently allow their vessels to depart with as few as one or two individuals on board, the current regulations do allow it. An extra person is needed on watch to aid the operator as a lookout, especially when the operator is not on the bridge, and also to assist the operator in making repairs, deploying an anchor, or in any other necessary work.

A licensed engineer should always be aboard, even if that person is also one of the operators. An engineer is needed for the technical expertise necessary to solve mechanical problems that might otherwise doom a vessel. A watch in the engineroom is not

suggested due to the automation of modern diesels, the high cost of additional personnel, and the low probability that it would improve the safe operation of towing vessels.

Legislation should be passed that addresses all of the safety issues presented here. Towing safety legislation will lessen the number of vessels and cargo lost, protect coastal communities from more hardship, and most importantly, save human lives.

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