American
Waterways
Operators

U.S. Coast Guard - American Waterways Operators
Annual Safety Report

August 4, 2021

Established Safety Metrics

For 21 years, the National Quality Steering Committee has used three measures to track overall trends in safety and environmental protection. While not all-encompassing, the measures are considered useful indicators of towing industry trends. The measures are as follows:

- Crew fatalities per 100,000 towing industry workers
- Gallons of oil spilled from tank barges per million gallons transported
- The number of vessel casualties (overall and by incident severity)

This report contains freight carrying towing industry data and measures for calendar years 1994 to 2020.

This report also includes summary statistics on crew member injuries, which the National Quality Steering Committee began tracking in 2006, for calendar years 2006 to 2020.

Crew Fatalities

In 2020, there were 23 deaths reported to the Coast Guard involving freight carrying towing industry vessels. A review of these casualties revealed that eleven (11) of the 23 deaths were directly related to towing vessel operations and involved crewmembers. The following is a summary of these incidents:

- Four crewmembers were ejected into the water when a tug and tow collided with another tug and tow. Subsequently, a bulk carrier also collided with this group of vessels. One crewmember was recovered from the water and the other three crewmembers were listed as missing.
- While repositioning barges, a crewmember was pulled off balance due to unexpected tension in the wire. As a result, the crewmember fell overboard and drowned.
- During a locking evolution, a crewmember was struck in the head by a severed wire. The crewmember died as result of the head injury.
- While removing a depth sounder pole from the bow of a barge, a crewmember was thrown off balance and fell into the water when the pole hit a piece of debris in the water. The crewmember was separated from his personal floatation device and was listed as missing.
- While the vessel was moored and taking on stores, two crewmembers were over the side and painting the rub rail. The chain guard for the working platform parted and one crewmember fell into the water and drowned. The crewmember was not wearing a personal floatation device.
- While unmooring the tug and barge, a crewmember was utilizing the "pigeon holes" on the side of the barge to remove the stern mooring line. The crewmember fell overboard and drowned. The crewmember was wearing an inflatable personal floatation device that inflated properly.
- While preparing to swap tows with another vessel, a crewmember was moving wires and tripped on a deck fitting. The crewmember fell into the water and was pushed beneath the barges and drowned.
- While moored and preparing to swap tows, two crewmembers were walking on deck and inspecting the vessels and gear. One of the crewmembers fell into the water and drowned.
- While inspecting gear during fleeting operations, a crewmember fell overboard and drowned.

Twelve (12) of the 23 reported deaths were not directly related to towing vessel operations. The following is a summary of these incidents:

- Seven deaths were attributed to natural causes or pre-existing medical conditions.
- Two deaths were attributed to fentanyl overdoses.
- One death was reported as a suicide.
- One incident resulted in the death of two towing vessel crewmembers and a summary is provided for industry awareness. While moored, four crewmembers departed their towing vessel by skiff. When returning to the towing vessel, the skiff collided with the bow of a barge being pushed in the vicinity. As a result of the collision, all four crewmembers were ejected into the water. Two of the crewmembers swam ashore and two crewmembers drowned. The skiff was operated at night and was not equipped with running lights. Alcohol use by the skiff operator and other crewmembers was listed as a contributing factor.

Chart 1 shows the operational crewmember fatality count and the 5-year moving average for calendar years 1994 through 2020.

Chart 1 – Operational Crewmember Fatalities per Calendar Year

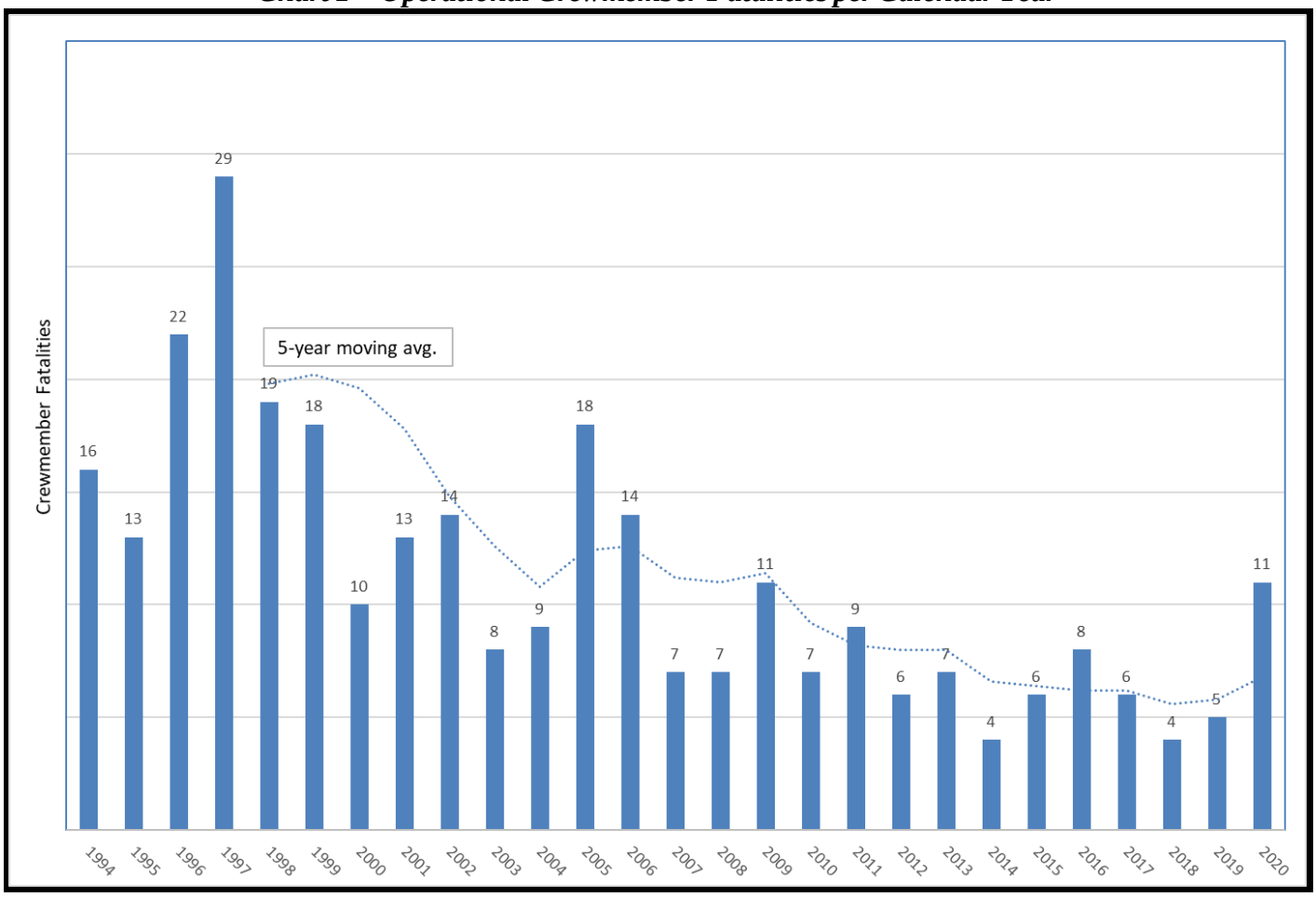


Chart 2 shows the distribution of crew fatalities by accident type for calendar years 2000 through 2020. The largest number of crew fatalities is attributed to contact injury - falls into water (83 of 183, 45.1%). The next largest group of fatalities is attributed to asphyxiation[1] (34 of 183, 18.5%).

Chart 2 - Crew Fatalities by Accident Type (cumulative for 2000-2020)

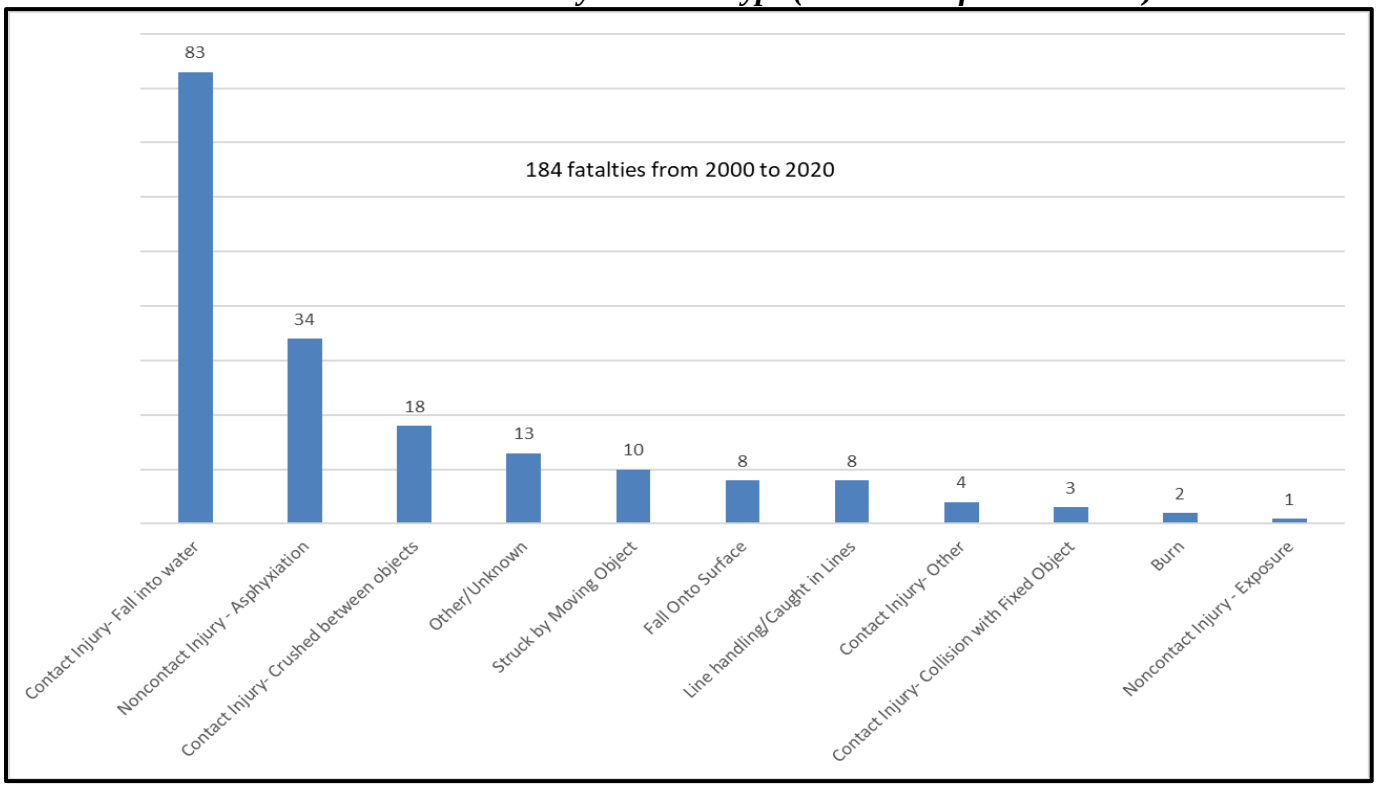


Table 1 provides a comparison of crew fatalities by accident type for years 2016 through 2020 versus the cumulative total for years 2000 through 2020. This table allows for comparison of more recent fatality data against the cumulative fatality data.

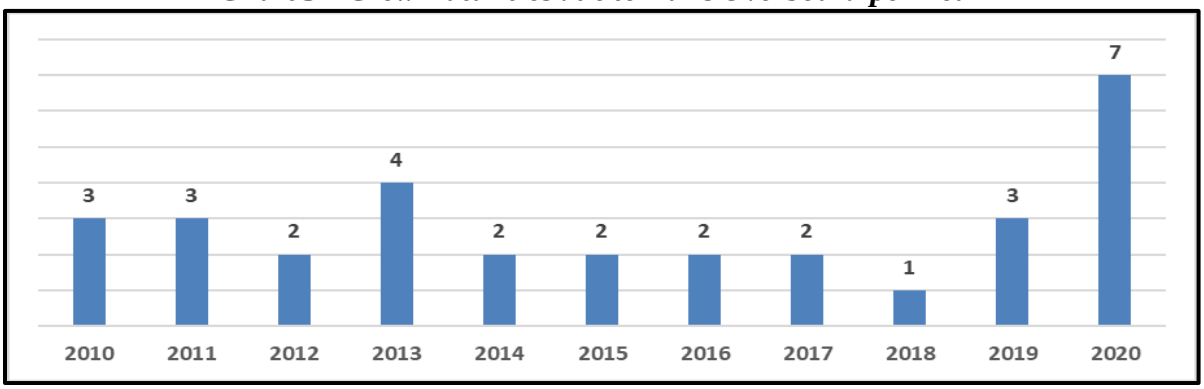
Table 1 - Crew Fatalities by Accident Type 2016-2020 versus Cumulative Totals 2000-2020

Accident Type	2016	2017	2018	2019	2020		Cumulative 2000-2020	Accident Type %
Contact Injury- Fall into water	0	1	0	1	3		83	45.1%
Noncontact Injury - Asphyxiation	4	3	2	1	4		34	18.5%
Contact Injury- Crushed between objects	4	0	1	2	0		18	9.8%
Other/Unknown	0	0	0	1	3		13	7.1%
Struck by Moving Object	0	0	0	0	1		10	5.4%
Fall Onto Surface	0	0	0	0	0		8	4.3%
Line handling/Caught in Lines	0	0	0	0	0		8	4.3%
Contact Injury- Other	0	0	0	0	0		4	2.2%
Contact Injury- Collision with Fixed Object	0	0	1	0	0		3	1.6%
Burn	0	2	0	0	0		2	1.1%
Noncontact Injury - Exposure	0	0	0	0	0		1	0.5%
TOTAL	**8**	**6**	**4**	**5**	**11**		**184**	**100.0%**

[1] Fatalities where "Asphyxiation" is listed as the accident type are normally associated with drowning incidents.

Chart 3 shows the number of crew fatalities resulting from falls overboard for calendar years 2010 to 2020. Note: The data in Chart 3 is based on a review of the casualty investigation and accounts for all fatalities where the crewmember entered the water, regardless of the "accident type" selected by the marine investigator which is summarized in Chart 2 and Table 1.

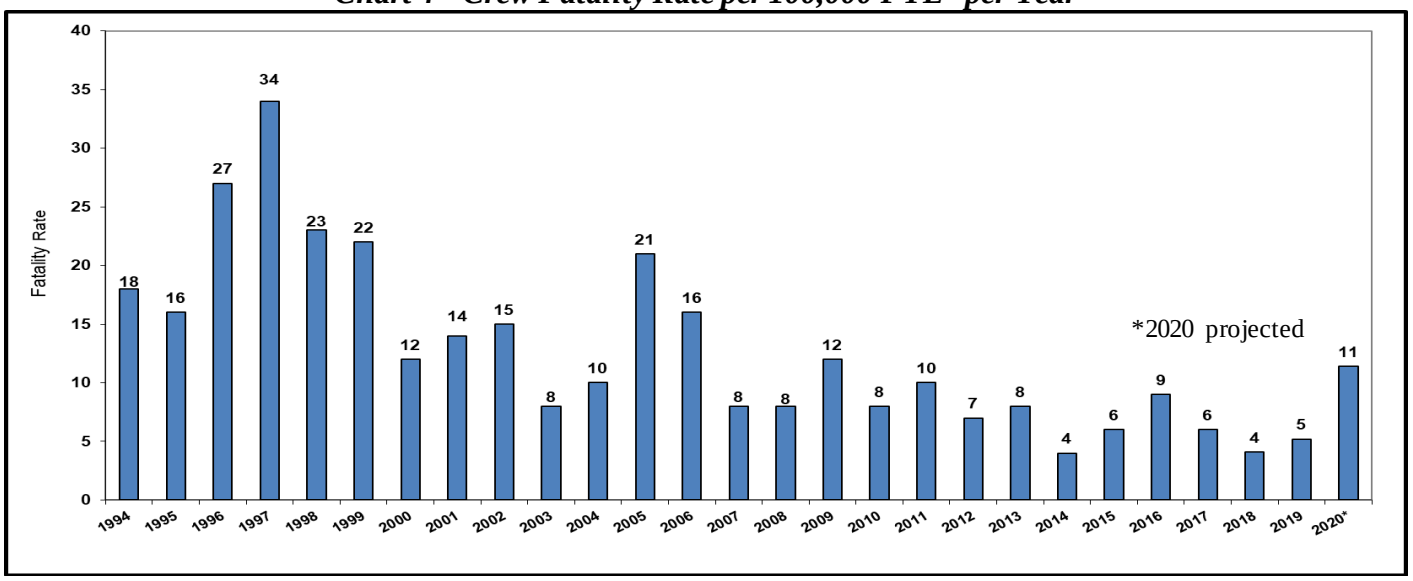
Chart 3 - Crew Fatalities due to Falls Overboard per Year



Crew Fatality Rate

The crew fatality rate is calculated using the "Mercer Model", which was developed through AWO-funded research. It is derived from the number of towing vessels in operation and their respective horsepower, as reported by the U.S. Army Corps of Engineers (USACE)[2]. The crew fatality rate enables comparison against other labor statistics which are expressed by the number of fatalities per 100,000 Full Time Employees (FTE). The crew fatality rate for 2019 was 5.2, and the projected crew fatality rate for 2020 was 11.4. The 2020 rate is a projection based on the 2019 USACE data, which is the latest available data. Chart 4 shows the crew fatality rate from 1994 to 2020 with rates rounded to the nearest whole number.

Chart 4 - Crew Fatality Rate per 100,000 FTE[3] per Year



[2] The crew fatality rate is based on data from *Waterborne Transportation Lines of the United States* report published by the Army Corps of Engineers.

[3] One FTE or Full Time Employee is the equivalent of one person working a 40-hour work week, for 50 weeks of the year.

Table 2 shows the fatality rates as calculated by the Bureau of Labor Statistics (BLS) for all workers from 2012 to 2019[4] as well as the BLS worker fatality rates for the transportation sector. For 2019, the towing industry fatality rate was 5.2, which is less than the 2019 BLS worker fatality rate for the transportation sector (13.9) but higher than the 2019 BLS worker fatality rate for all fatal work injuries (3.5).

Table 2 - Comparison of Worker Fatality Rates per Year

	Worker Fatality Rates per 100,000 FTE							
Data Source	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
Bureau of Labor Statistics (BLS), All Fatal Work Injuries	3.4	3.3	3.4	3.4	3.6	3.5	3.5	3.5
BLS, Transportation Sector Fatal Work Injuries	14.6	14.4	15.4	14.7	15.4	15.1	14.0	13.9
Towing Industry, Crewmember Operational Fatal Work Injuries	6.7	7.8	4.4	6.7	8.6	6.2	4.1	5.2

For additional comparison, Table 3 shows the BLS worker fatality counts and rates for all sectors for 2019.

Table 3 – Number and Rate of Fatal Work Injuries for 2019 by Industry Sector

Industry Sector	Number of fatal work injuries	Fatal work injury rate per 100,000 FTE
Agriculture, forestry, fishing, and hunting	573	23.1
Mining, quarrying, and oil and gas extraction	127	14.6
Transportation and warehousing	913	13.9
Construction	1,061	9.7
Wholesale trade	178	4.9
Other services (exc. Public admin.)	210	3
Leisure and hospitality	271	2.2
Retail trade	291	2
Government	426	1.8
Educational and health services	197	0.8

Other items from the 2019 BLS Census of Fatal Occupational Injuries Summary:

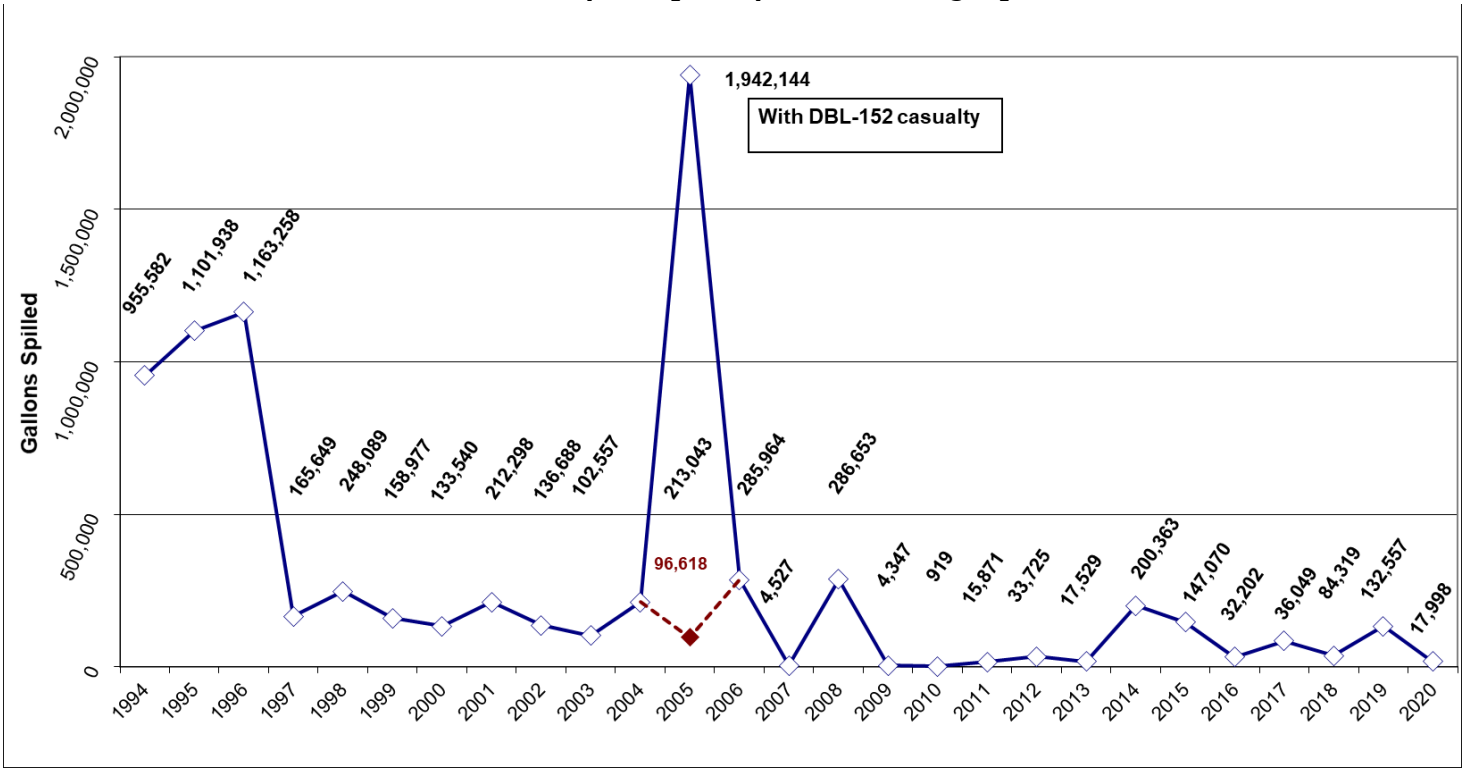
- There were 5,333 fatal work injuries recorded in the United States in 2019, a 2 percent increase from the 5,250 in 2018.
- The 5,333 fatal occupational injuries in 2019 represents the largest annual number since 2007.
- Workplace deaths due to suicides (307) and unintentional overdoses (313) increased slightly in 2019.
- Transportation incidents increased 2 percent in 2019 to 2,122 cases, the most cases since this series began in 2011. Events involving transportation incidents continued to account for the largest share of fatalities.
- Falls, slips, and trips increased 11 percent in 2019 to 880.
- Unintentional overdoses due to nonmedical use of drugs or alcohol increased for the seventh consecutive year to 313 in 2019.

[4] *Census of Fatal Occupational Injuries Charts, 1992-2019*, https://www.bls.gov/iif/oshcfoi1.htm

Oil Spill Volumes

Coast Guard records indicate approximately 17,998 gallons of oil was spilled into U.S. navigable waterways as a result of 85 operational tank barge pollution incidents in 2020. Chart 5 shows the total gallon quantity of oil spilled from tank barges for calendar years 1994 to 2020.

Chart 5 - Gallons of Oil Spilled from Tank Barges per Year



The largest tank barge oil spill in 2020 occurred when a line parted and the operator lost control of the lead barge. The barge collided with another barge, and opened up a 1.5 foot hole above the water line in the expansion trunk of a cargo tank. The collision resulted in a discharge of approximately 14,441 gallons of oil into the water.

The second largest tank barge oil spill in 2020 occurred when a hopper barge broke away and hit the head of a tank barge during transfer operations. This allision caused the tank barge to break away from the facility and consequently ruptured the transfer hose, resulting in a discharge of approximately 1000 gallons of diesel into the water.

These two spills accounted for 91.3% of the total volume of oil spilled from tank barges in 2020.

Table 4 shows the number of tank barge oil spills by spill size category, as well as the amounts (in gallons) of the six largest oil spills.

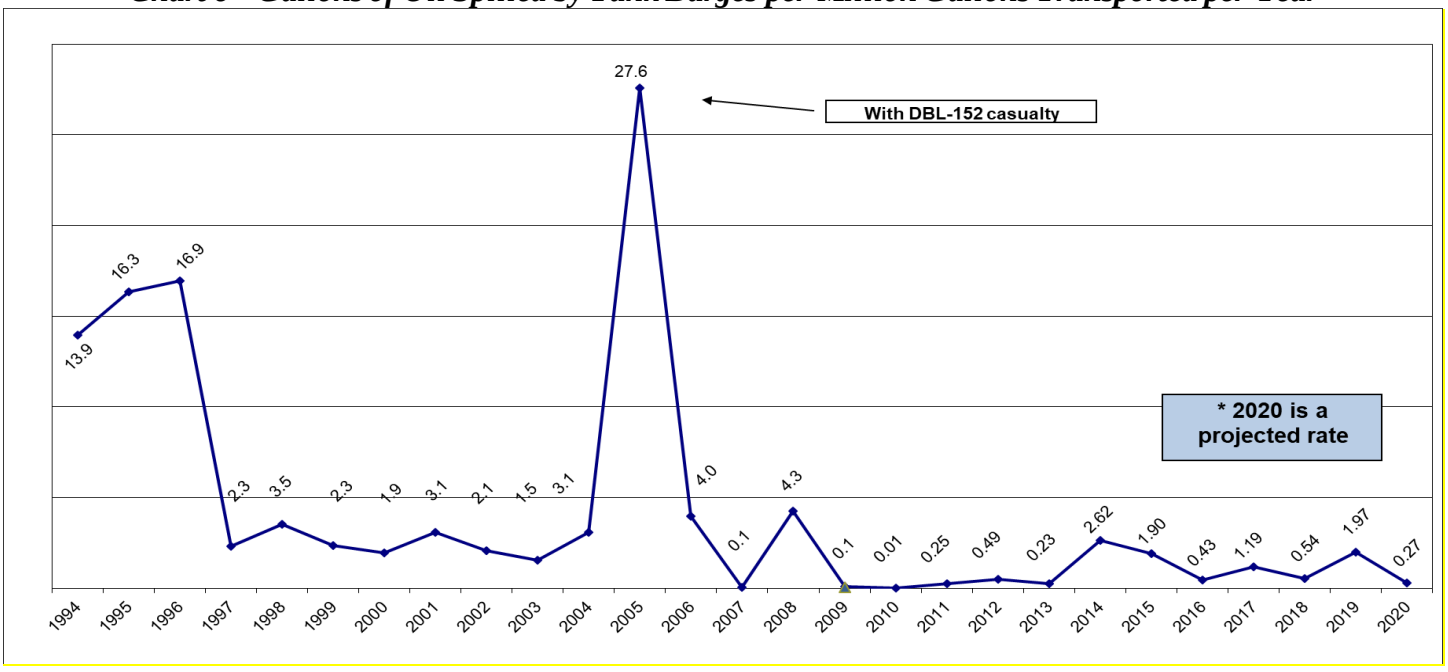
Table 4 - Tank Barge Oil Spills by Spill Size Category for 2020

Discharge Category	Number of Tank Barge Pollution Incidents	Amount of oil discharged into water (in gallons) For oil spills > 100 gallons (6 largest oil discharges)
less than 1	16	---
1 to 10	54	---
10 to 100	9	----
100 to 1000	4	126, 250, 420, 500
1000 to 10000	1	2000
more than 10k	1	14441
Total	**85**	

Oil Spill Rate

The tank barge oil spill rate is calculated using oil spill data from Coast Guard and the commodity transportation data from the USACE. The latest available commodity data from the USACE is for 2019. Chart 6 shows the oil spill rates from 1994 to 2020. As noted in Chart 6, the oil spill rate for 2020 is a projection based on the 2019 USACE data and assumes that the petroleum transportation quantity by tank barge remains the same for 2020.

Chart 6 - Gallons of Oil Spilled by Tank Barges per Million Gallons Transported per Year



For reference, table 5 shows the tank barge commodity data for years 2014 through 2019.

Table 5 – Petroleum Transported by Tank Barge per Year
Commodity data provided by the USACE[5]

Calendar Year	Petroleum Transported by Tank Barge (in short-tons)	% change (year to year)
2014	278,851,000	+2.11%
2015	282,993,000	+1.49%
2016	272,757,000	-3.62%
2017	258,582,089	-5.20%
2018	244,432,497	-5.47%
2019	245,970,000	+0.63%

[5] From the *Waterborne Commerce of the United States: Part 5 National Summaries, 2019* published by the USACE https://publibrary.planusace.us/document/fa096952-1d29-4d4e-a0db-5f192bbb19a8

Severity of Vessel Incidents

In 2020, there were 1,262 incidents involving towing vessels that resulted in reportable marine casualties. All incidents for 2020 were scored using the AWO Severity Scale (shown below) which was developed by the AWO National Quality Steering Committee. In 2020, there were 157 (12.4% of total) High Severity incidents, 130 (10.3%) Medium Severity incidents, and 975 (77.3%) Low Severity incidents. Each incident is counted only once, regardless of the number of vessels involved or events recorded in the Coast Guard casualty database. Table 6 shows the number of towing vessel incidents reported and classified by the AWO Severity Scale from 2016 to 2020.

Table 6 – Incidents by AWO Incident Severity per Year

AWO Severity Scale	2016	2017	2018	2019	2020	Total
Low	1,041	767	912	1,024	975	**4,719**
Medium	120	92	139	130	130	**611**
High	70	75	73	124	157	**499**
Total:	**1,231**	**934**	**1,124**	**1,278**	**1,262**	**5,829**

USCG-AWO Severity Classes for Towing Vessel Casualties

Incident Severity	Description
Low	Damage: $0 - $50,000 or not reported No injuries or deaths Pollution: 0 - 10 gallons of oil spilled CG Casualty Class: None/Routine
Medium	Damage: $50,001 - $250,000 No injuries or deaths Pollution: 11 - 1,000 gallons of oil spilled CG Casualty Class: "Significant"
High	Damage: $250,001 or more ANY injuries or deaths Pollution: 1,001 or more gallons spilled CG Casualty Class: "Serious" or "Major"

The most common initiating events[6] associated with the 287 Medium and High Severity incidents from 2020 are as follows:

- Personnel Casualty – Injuries, 83 events, 28.9% of Medium & High Severity casualties
- Allision, 61 events, 21,3%
- Grounding, 27 events, 9.4%
- Material Failure/Malfunction, 23 events, 8.0%
- Discharge/Release of Pollution, 21 events, 7.3%

[6] The Initiating Event is the first unwanted event in a sequence of events associated with a marine casualty. For example, if a vessel's engine breaks down due to a mechanical failure and the vessel subsequently runs aground, then the mechanical failure is considered the initiating event.

Crew Member Injuries

In 2020, there were 105 incidents involving towing vessels or barges that resulted in 107 injuries to crewmembers. Table 7 provides a breakdown of the injuries by the USCG injury severity category. For reference, the USCG Injury Severity Scale is on the following page.

Table 7 - Number of Injuries by Severity Category for 2016 to 2020

Injury Severity	2016	2017	2018	2019	2020	Total (%)
Critical	0	0	1	0	1	0.39%
Severe	5	2	5	5	3	3.88%
Serious	20	15	22	21	21	19.22%
Moderate	39	35	50	40	51	41.75%
Minor	36	37	42	33	31	34.76%
Total:	**100**	**89**	**120**	**99**	**107**	**100%**

Table 8 provides a breakdown of the critical, severe, and serious injuries by accident type for 2020.

Table 8 - Critical, Severe, Serious Injuries by Accident Type for 2020

Accident Type	Critical	Severe	Serious	Grand Total
Contact Injury- Fall onto surface		2	6	8
Contact Injury- Line handling/caught in lines	1	1	3	5
Contact Injury- Crushed between objects			4	4
Contact Injury- Struck by Moving Object			3	3
Contact Injury- Other			2	2
Contact Injury- Collision with Fixed Object			1	1
Other Injury Type			1	1
Noncontact Injury- Burn			1	1
Total	**1**	**3**	**21**	**25**

The following is a summary of the four critical and severe injuries from 2020:

- Critical injury. A crewmember was injured when the tow wire jumped out of the bit and struck two crewmembers. One crewmember sustained minor injuries, and the other suffered broken bones in the pelvic region and damaged internal organs.
- Severe injury. While handling lines, a crewmember broke his arm when the slack was pulled out of the line and he was pulled into the timberhead.
- Severe injury. While moving between barges, a crewmember slipped and fell 6 feet onto the deck of another barge. The crewmember sustained a leg and knee injury.
- Severe injury. While handling lines, a crewmember had his hand crushed between the wire and timberhead when an unexpected vessel maneuver caused tension in the wire. The crewmember lost three finger tips.

There were 21 serious injuries to crewmembers. 19 of the 21 serious injuries were "contact injuries" related to falls or impact with objects.

USCG Injury Severity Scale