American
Waterways
Operators

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

December 2020

Established Safety Metrics

For 20 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:

- 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 2019.

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 2019.

Crew Fatalities

In 2019, there were five operational towing vessel crew fatalities. While ten deaths were reported to the Coast Guard involving freight carrying towing industry vessels, only five of the deaths were directly related to towing vessel operations and involved crewmembers. The following is a summary of the five crew deaths related to towing vessel operations:

- In two separate incidents, the crewmember fell overboard while working on deck and subsequently drowned. In one of these incidents, the crewmember was not wearing a PFD.
- One crewmember fell overboard while working on deck and fell between the barge and lock door.
- One crewmember was found deceased in the vicinity of the retractable wheelhouse and it appears he was crushed under the wheelhouse.
- In one incident, the Captain went down with the towing vessel when it capsized and subsequently drowned. Two other crewmembers involved in this same incident were able to escape before the capsizing. Both were wearing lifejackets and were recovered from the water.

Of the five, non-operational deaths reported: four deaths were due to pre-existing medical conditions, and one death was the result of a suicide.

Chart 1 shows the annual crew fatality count, the linear trend line, and the 5-year moving average for calendar years 1994 through 2019.

Chart 1 - Crew Fatalities per Calendar Year

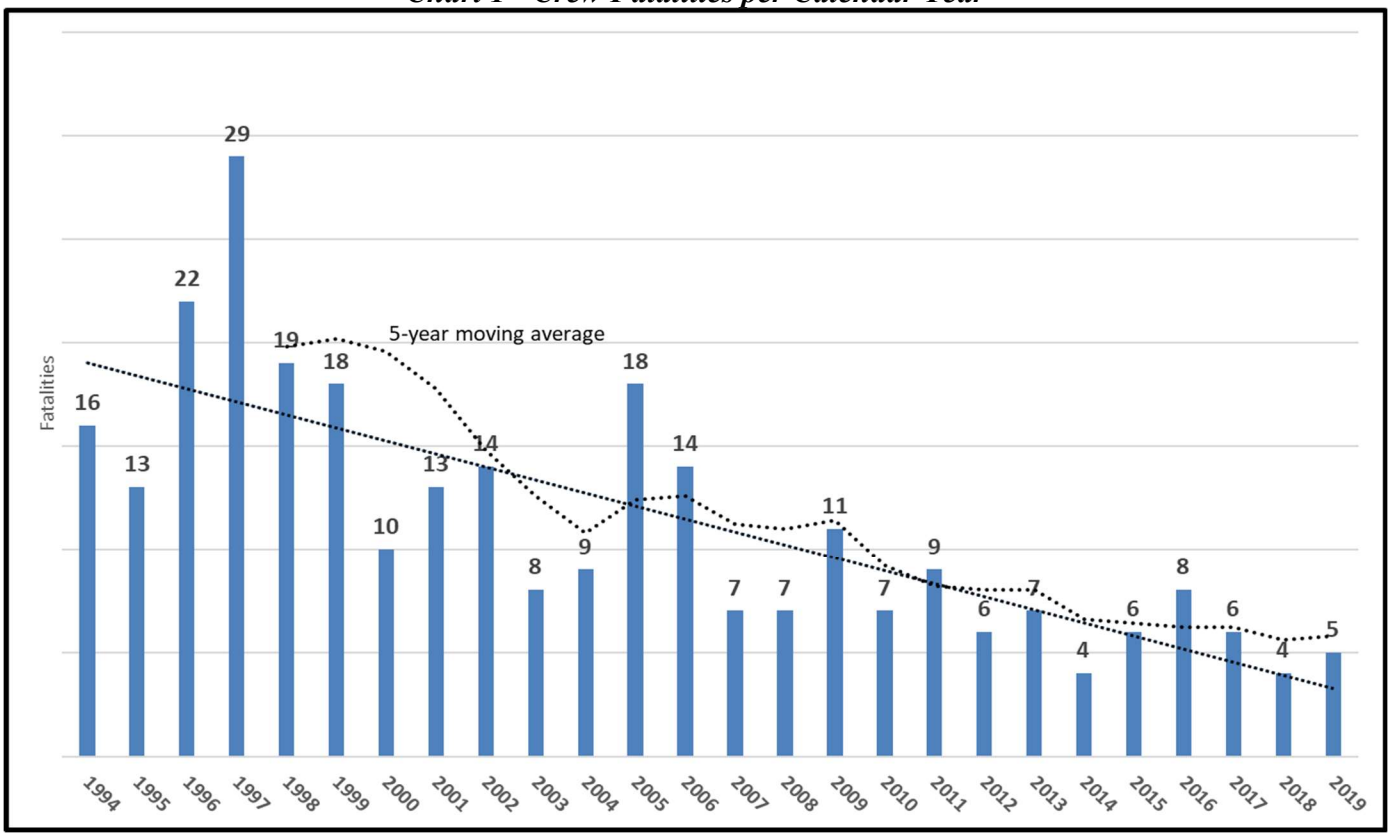


Chart 2 shows the distribution of crew fatalities by accident type. The largest number of crew fatalities is attributed to falls overboard (80 of 173, 46.2%). The next largest group of fatalities is attributed to asphyxiation (30 of 173, 17.3%).

Chart 2 - Crew Fatalities by Accident Type (cumulative for 2000-2019)

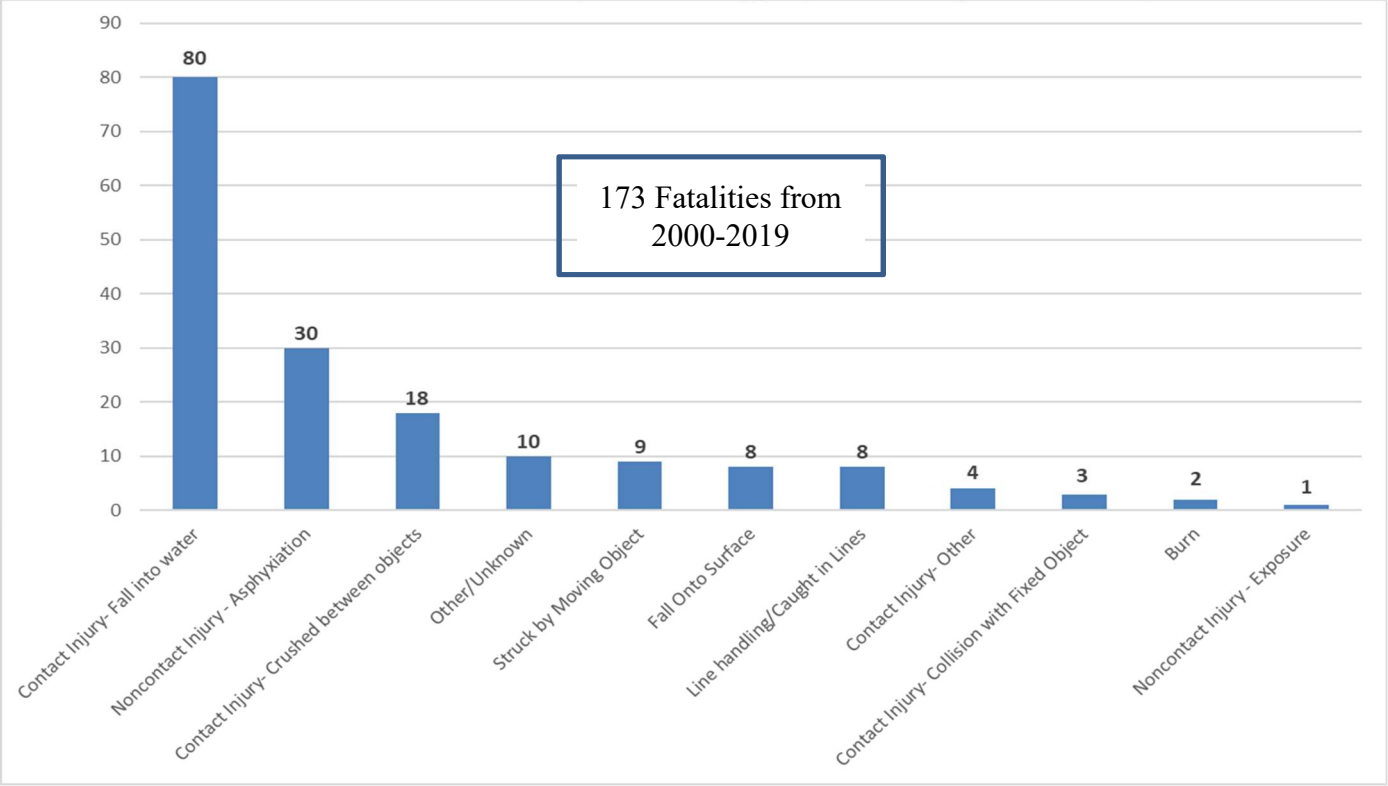


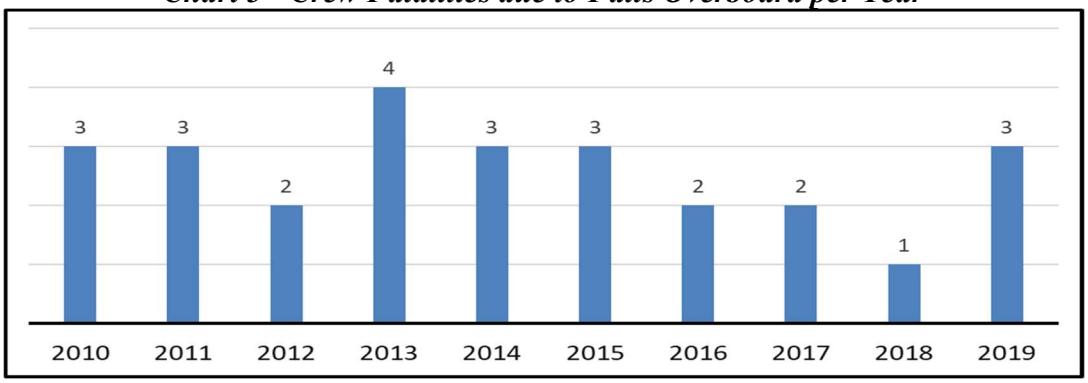
Table 1 provides a comparison of crew fatalities by accident type for years 2015 to 2019 versus the cumulative total for years 2000 to 2019. This table helps to assess more recent fatality trends against cumulative data. It should be noted that fatalities due to asphyxiation are normally associated with drowning. Furthermore, drownings may also be associated with falls into the water, or capsizing and being trapped underwater.

Table 1 - Crew Fatalities by Accident Type
2015-2019 versus Cumulative Totals

Accident Type	2015	2016	2017	2018	2019		Cumulative, 2000-2019	% of Accident Type
Contact Injury- Fall into water	0	0	1	0	1		80	46.2%
Noncontact Injury - Asphyxiation	5	4	3	2	1		30	17.3%
Contact Injury- Crushed between objects	0	4	0	1	2		18	10.4%
Other/Unknown	0	0	0	0	1		10	5.8%
Struck by Moving Object	0	0	0	0	0		9	5.2%
Fall Onto Surface	0	0	0	0	0		8	4.6%
Line handling/Caught in Lines	0	0	0	0	0		8	4.6%
Contact Injury- Other	0	0	0	0	0		4	2.3%
Contact Injury- Collision with Fixed Object	0	0	0	1	0		3	1.7%
Burn	0	0	2	0	0		2	1.2%
Noncontact Injury - Exposure	1	0	0	0	0		1	0.6%
TOTAL	**6**	**8**	**6**	**4**	**5**		**173**	**100.0%**

Chart 3 shows the number of crew fatalities resulting from falls overboard for calendar years 2010 to 2019. Note: The data in Chart 3 is based on a review of the full 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.

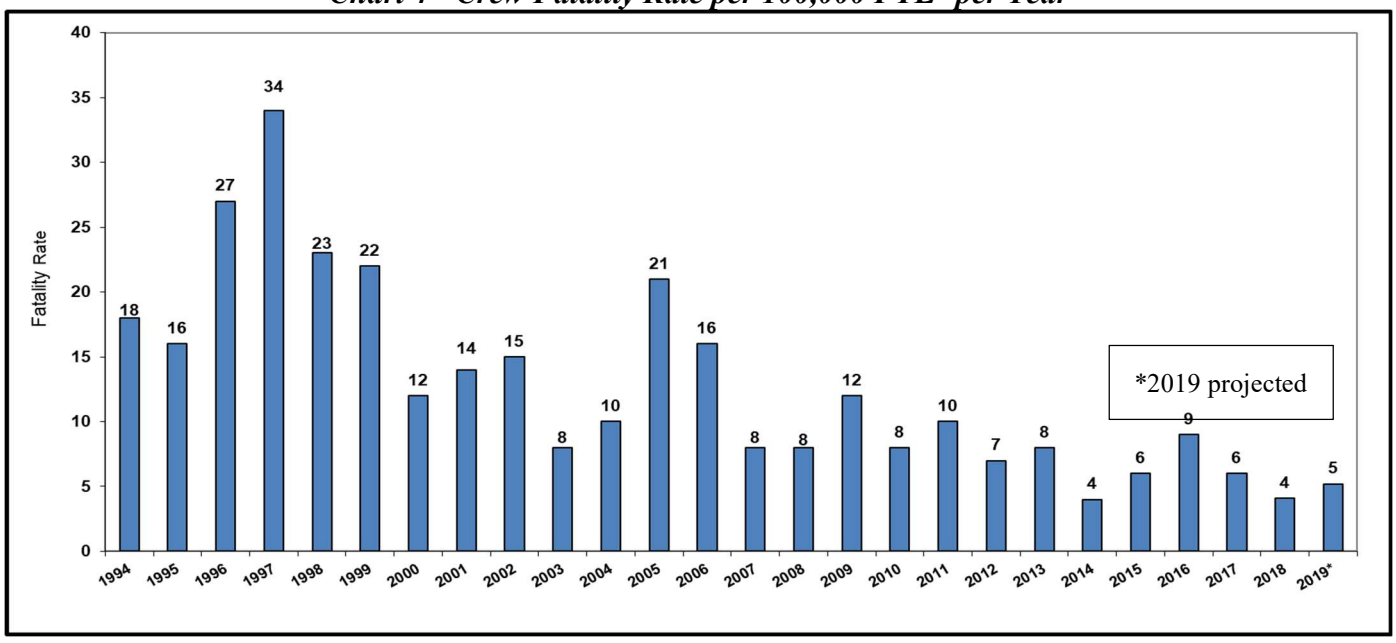
Chart 3 - Crew Fatalities due to Falls Overboard per Year



Crew Fatality Rate

The crew fatality rate is calculated using the "Mercer Model", which was developed through AWO-funded research. The denominator for this rate is derived from the number of towing vessels in operation, as reported by the U.S. Army Corps of Engineers (USACE)[1]. The crew fatality rate normalizes the data and enables comparison against other labor statistics. The crew fatality rate for 2018 was 4.1 per 100,000 FTE, and the projected crew fatality rate for 2019 was 5.2 per 100,000 FTE. The 2019 rate is a projection based on the 2018 USACE data, which is the latest available data. Chart 4 shows the crew fatality rate from 1994 to 2019 with the rates rounded to the nearest whole number.

Chart 4 - Crew Fatality Rate per 100,000 FTE[2] per Year



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

[2] 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 per 100,000 FTE as calculated by the Bureau of Labor Statistics (BLS) for all workers from 2012 to 2018[3]. Additionally, Table 2 shows the fatality rates for the transportation sector and towing industry. For 2018, the towing industry fatality rate was 4.1, which is less than the 2018 BLS worker fatality rate for the transportation sector (14.0), and slightly higher than the 2018 BLS worker fatality rate for all fatal work injuries (3.5).

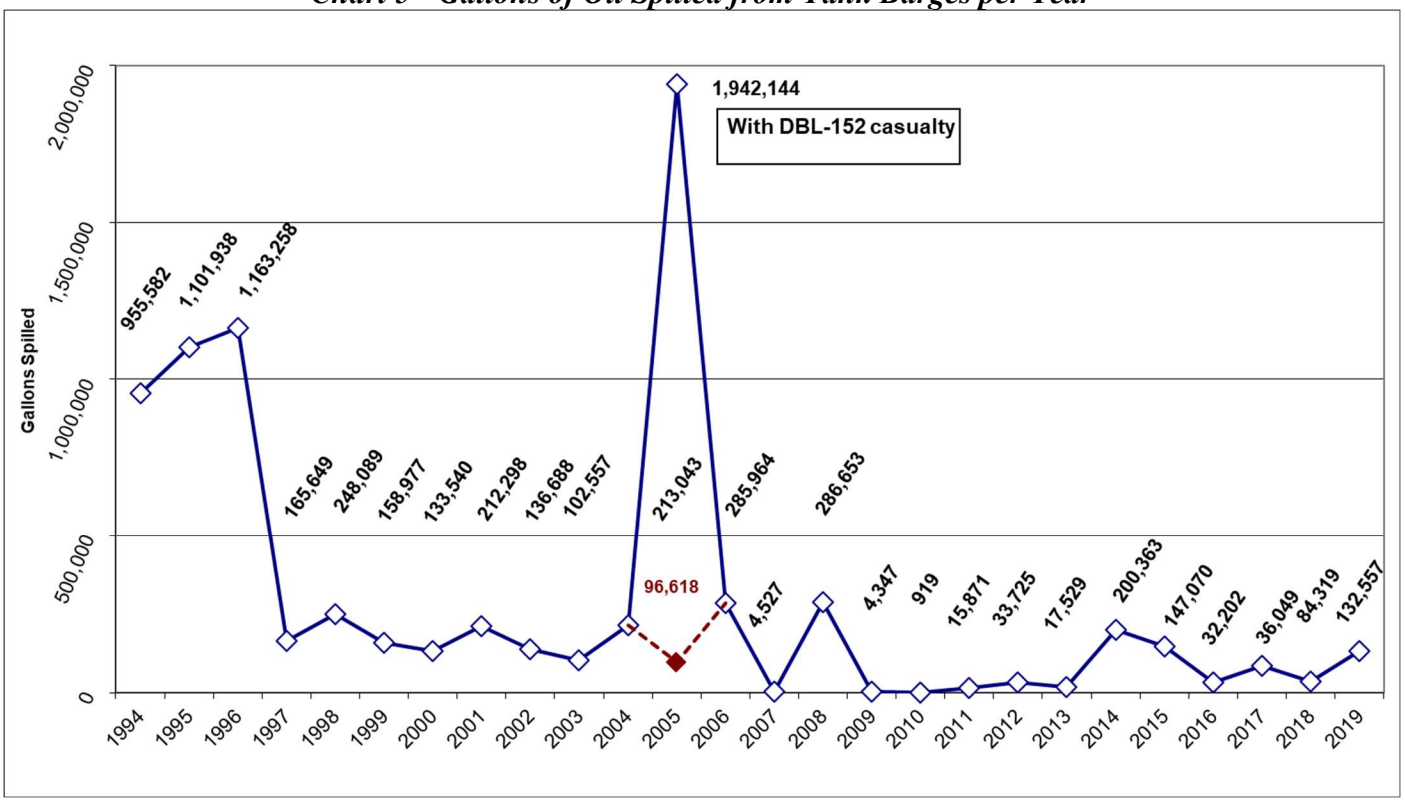
Table 2 - Comparison of Worker Fatality Rates per Year

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

Oil Spill Volumes

Coast Guard records indicate 132,557 gallons of oil was spilled into U.S. navigable waterways as a result of 94 operational tank barge pollution incidents in 2019. Chart 5 shows the total gallon quantity of oil spilled from tank barges for calendar years 1994 to 2019.

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



[3] *Census of Fatal Occupational Injuries Charts, 1992-2018*, https://www.bls.gov/iif/oshcfoi1.htm

The largest tank barge oil spill in 2019 occurred when two loaded barges were being pushed into a lock, and the push knees on the stern of one the barges landed and got hung up on the miter sill of the lock. As a result, a cargo tank was breached and discharged approximately 117,000 gallons of crude oil into the lock.

The second largest tank barge oil spill in 2019 was the result of a collision between a tankship and two barges being pushed by a towing vessel. The collision caused extensive structural damage to one of the barges and breached two tanks. As a result of the breached tanks, approximately 10,000 barrels of oil product was discharged into the water and caused closure of the waterway.

The third largest tank barge oil spill in 2019 was the result of an undetected cargo tank leak and hull fracture that resulted in the barge listing and discharging of 2,000 gallons of oil in the water.

The fourth largest tank barge oil spill in 2019 was the result of a collision. Four barges were damaged in the incident, and one of the barges ruptured a cargo tank spilling 1,680 gallons of oil into the river.

These four spills accounted for 98.8% of the total volume of oil spilled from tank barges in 2019

Table 3 shows the number of oil spills by spill size category, as well as the amounts (in gallons) of the four largest oil spills.

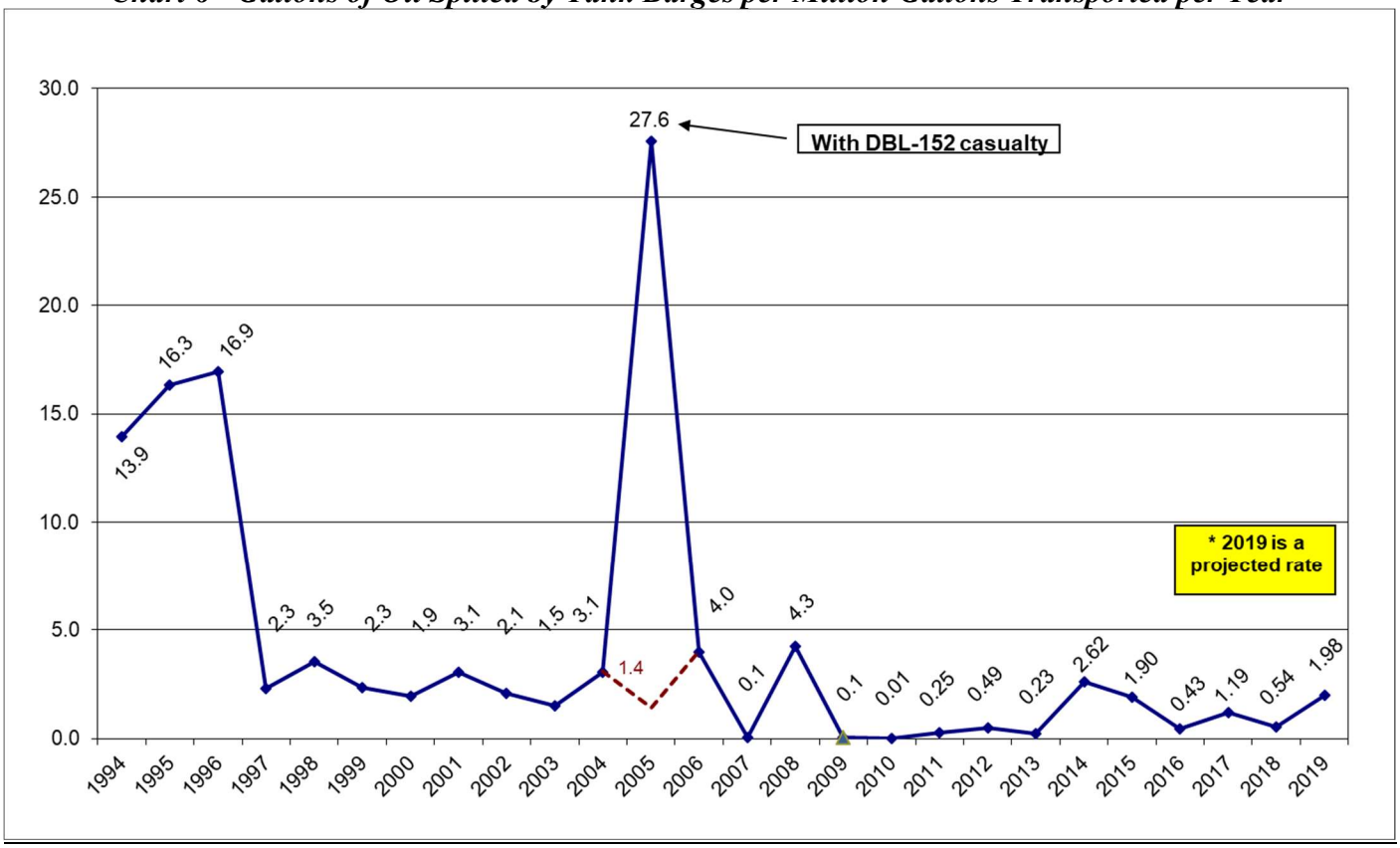
Table 3 - Tank Barge Oil Spills by Spill Size Category for 2019

Spill Size Category (gallons)	**Number of Tank Barge Oil Spills**	**Amount of oil discharged, Four largest oil spills only (gallons)**
less than 1	11	---
1 to 10	67	---
10 to 100	8	---
100 to 1000	4	---
1000 to 10000	3	10,000 2,000 1,680
more than 10000	1	117,000
Total	**94**	**132,557**

Oil Spill Rate

The tank barge oil spill rate is calculated using data from both the Coast Guard and the USACE. Based on the latest available data, in 2018 approximately 0.54 gallons of oil was spilled for every million gallons of oil transported. Chart 6 shows the oil spill rates from 1994 to 2019. As noted in Chart 6, the oil spill rate for 2019 is a projection based on 2018 USACE data, and it is approximately 1.98 gallons of oil spilled for every million gallons transported.

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



For reference, the following table shows the tank barge commodity data from the USACE for the years from 2014 to 2018. The amount of petroleum transported by tank barge has gradually decreased since 2015. The 2019 commodity data from the USACE is not yet available.

Table 4 - Petroleum Transported by Tank Barges per Year

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%

Severity of Vessel Incidents

In 2019, there were 1,278 incidents involving towing vessels or barges that resulted in Reportable Marine Casualties. All incidents for 2019 were scored on the AWO Severity Scale (shown below) that was developed by the AWO National Quality Steering Committee. In 2019, there were 124 (9.7% of total) High Severity incidents, 130 (10.2%) Medium Severity incidents, and 1,024 (80.1%) Low Severity incidents. Towing vessel incidents include all reportable marine casualties that involve a towing vessel or barge. Each incident is counted only once, regardless of the number of vessels involved or events recorded in the Coast Guard casualty database.

Table 5 shows the number of towing vessel incidents reported and classified by the AWO Severity Scale from 2015 to 2019. While previous annual reports presented the incident severity data starting from 1994, this report starts with incident severity data from 2015. The main reason for this change was the impact of Navigation and Vessel Inspection Circular (NVIC) 15-01 on both casualty reporting and casualty investigations for incidents occurring after 2015. As a result, there was a significant decrease in the number of marine casualties reported by industry, as well as investigated and documented by the Coast Guard, which makes it difficult to analyze or compare the data before and after this policy change.

Table 5 – Incident Severity per Year

AWO Severity Scale	2015	2016	2017	2018	2019	Total
Low	991	1,041	767	912	1,024	**4,735**
Medium	68	120	92	139	130	**549**
High	39	70	75	73	124	**381**
Total:	**1,098**	**1,231**	**934**	**1,124**	**1,278**	**5,665**

Of the 124 high severity incidents in 2019, 4 incidents were associated with pollution discharges of over 1,000 gallons of oil, 50 incidents were associated with damage amounts of $250,000 or greater, and 75 incidents were associated with a crewmember fatality or injury.

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[4] associated with the 254 Medium and High Severity incidents from 2019 are as follows: Allision (30.2% of total), Material Failures or Malfunctions (16.4%), Grounding (12.2%), Vessel Maneuver (11.6%), and Collision (6.9%). Table 6 shows the Initiating Event associated with Medium and High Severity incidents for the period of 2001 to 2019.

Table 6 - Initiating Event of Medium and High Severity Incidents (2001-2019)

Initiating Event	Cumulative Total	% of Events
Allision	1,152	31.7%
Material Failure/Malfunction	709	19.5%
Collision	377	10.4%
Grounding	374	10.3%
Vessel Maneuver	308	8.5%
Flooding - Initial	171	4.7%
Sinking	144	4.0%
Fire	127	3.5%
Set Adrift	75	2.1%
Other	52	1.4%
Capsize	37	1.0%
Fouling	35	1.0%
Loss of stability	26	0.7%
Loss of electrical power	14	0.4%
Explosion	13	0.4%
Loss/Reduction of Vessel Propulsion/Steering	9	0.2%
Discharge/Release - Pollution	7	0.2%
Vessel Yawl/Pitch/Roll/Heel	3	0.1%
Flooding - Progressive	2	0.1%
Wave(s) Strikes/Impacts	1	0.0%
Cargo/Fuel Transfer/Shift	1	0.0%
Damage to Cargo	1	0.0%
TOTAL:	3,638	100.0%

[4] 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 2019, there were 97 incidents onboard towing vessels or barges that resulted in 99 injuries to crewmembers. Two incidents resulted in injuries to multiple crewmembers. Table 7 provides a breakdown of the injuries by severity category, and Table 8 provides the number of critical, severe, and serious injuries by accident type for 2019. For reference, a description of the USCG Injury Severity Scale is on the following page.

Table 7 - Number of Injuries by Severity Category for 2015 to 2019

Injury Severity	2015	2016	2017	2018	2019	Total (%)
Critical	4	0	0	1	0	0.9%
Severe	2	5	2	5	5	4.6%
Serious	23	20	15	22	21	20.5%
Moderate	46	39	35	50	40	42.6%
Minor	34	36	37	42	33	31.4%
Total:	**109**	**100**	**89**	**120**	**99**	**100%**

Table 8 - Critical, Severe, Serious Injuries by Accident Type for 2019

	Injury Severity		
Accident Type	**Serious**	**Severe**	**Total**
Contact Injury- Fall onto surface	9	1	**10**
Contact Injury- Crushed between objects	4	1	**5**
Contact Injury- Struck by Moving Object	4	1	**5**
Contact Injury- Line handling/caught in lines	1	2	**3**
Overexertion Injury- Strain or sprain	2		**2**
Contact Injury- Other	1		**1**
Total:	**21**	**5**	**26**

There were no "critical" injuries in 2019. The following is a description of the five "severe" injuries from 2019:

- A crewmember was injured when a line snapped and hit him in the face. As a result, he was knocked unconscious and suffered serious facial injuries.
- A crewmember lost a foot when he got caught in a line that was being put under tension.
- A crewmember suffered partial amputation of his lower leg when he was struck by a piece of debris from a spud.
- A crewmember had his hand crushed when it was caught between the tow knee and a barge.
- A crewmember suffered a head injury and brain swelling when he fell through a hole in the deck.

USCG Injury Severity Scale