



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

September 26, 2022

## Established Safety Metrics

For over 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 2021.

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 2021.

## Crew Fatalities

There were 12 deaths reported to the Coast Guard in 2021 involving freight carrying towing vessels. A review of these casualties revealed that two of the 12 reported deaths were directly related to towing vessel operations and involved crewmembers. The following is a summary of these incidents:

- One crewmember was crushed while conducting repairs on a front-end loader that was onboard the barge.
- One crewmember was reported missing and subsequently retrieved from the water. This investigation is pending; cause of the death and entry into the water is unknown.

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

- One death was ruled a suicide.
- Four deaths were attributed to drug overdoses.
- Five deaths were attributed to natural cause or pre-existing medical conditions.
- In one of the deaths attributed to natural cause, the pilot of a towing vessel had an aneurysm while on watch. As a result, the vessel ran up onto the bank and was damaged.

The following incident was not documented as a reportable marine casualty since it occurred in a foreign port and involved stevedores; however, it did involve a U.S. flag barge. This incident is provided for situational awareness. Three stevedores died when they entered a watertight void that was not properly prepared for human entry. After the first stevedore entered the space and was rendered unconscious, two other stevedores entered the space to assist and they were also rendered unconscious.

Chart 1 shows the annual crew fatality count and the 5-year moving average for calendar years 1994 through 2021.

**Chart 1 - Crewmember Fatalities per Calendar Year**

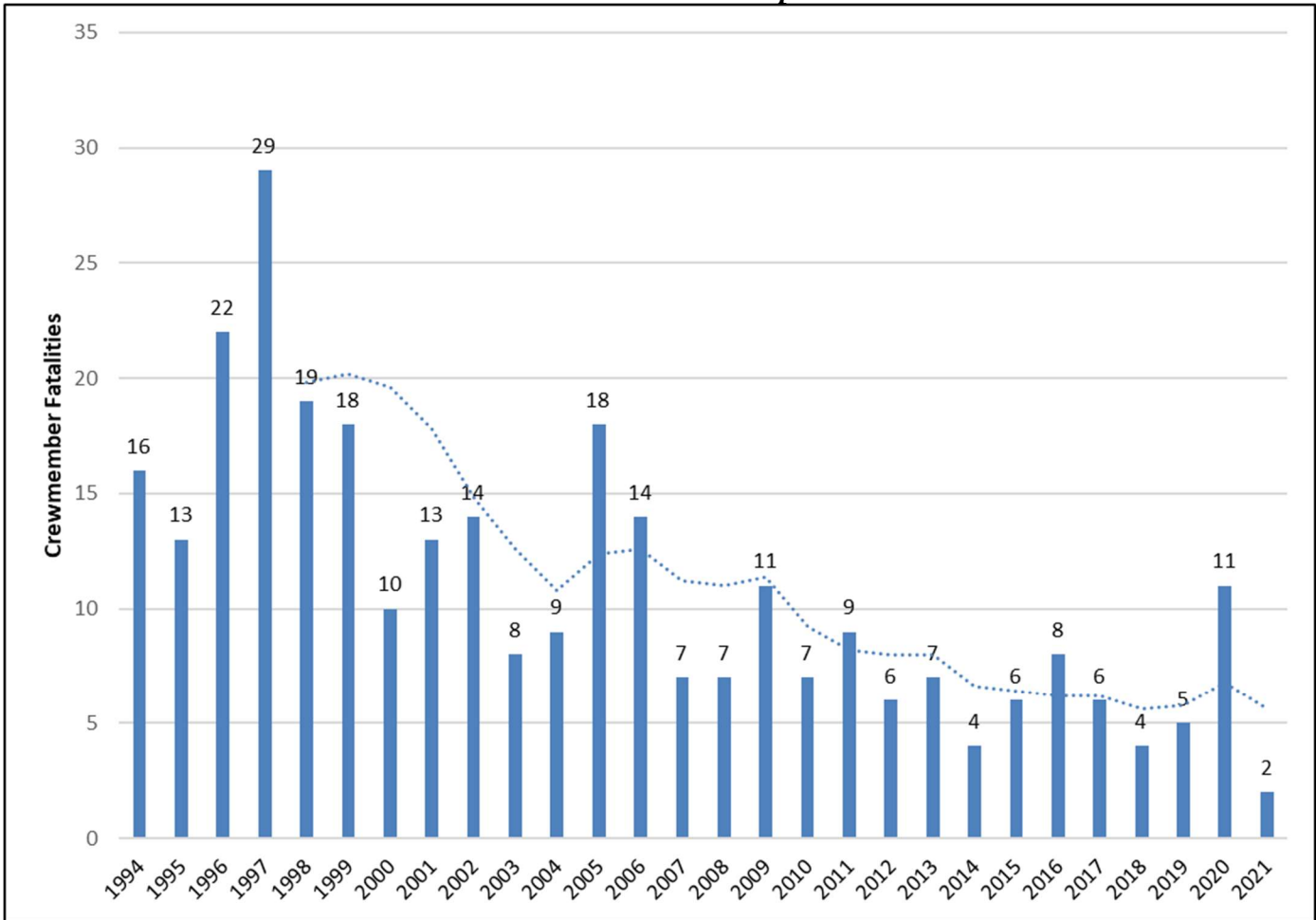
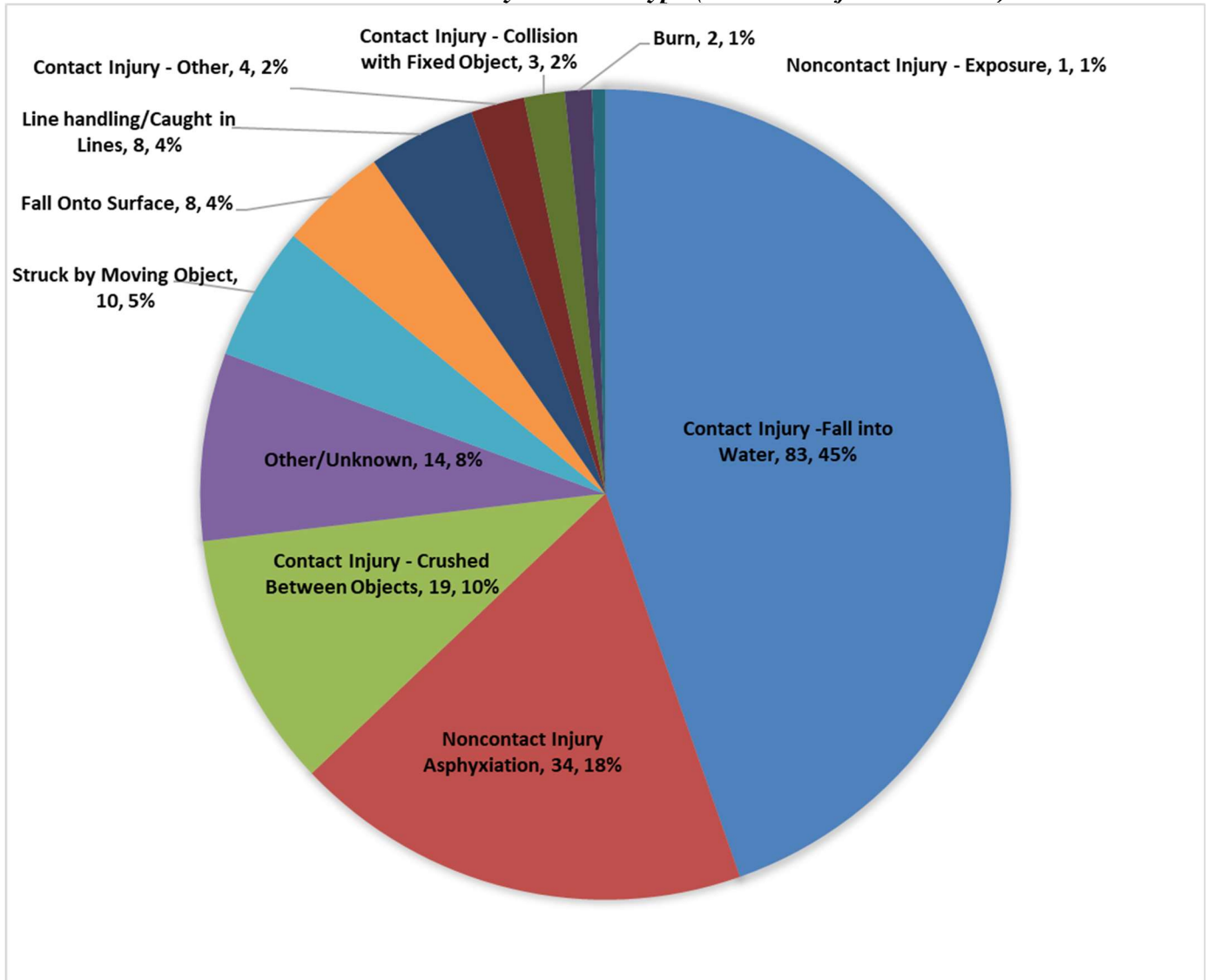


Chart 2 shows the distribution of crew fatalities by accident type for calendar years 2000 through 2021. The largest number of crew fatalities is attributed to contact injuries sustained in falls overboard (83 of 186, 44%). The next largest group of fatalities is attributed to asphyxiation<sup>1</sup> (34 of 186, 18%).

**Chart 2 - Crew Fatalities by Accident Type (cumulative for 2000-2021)**



<sup>1</sup> Fatalities where “Asphyxiation” is listed as the accident type are normally associated with drowning incidents.

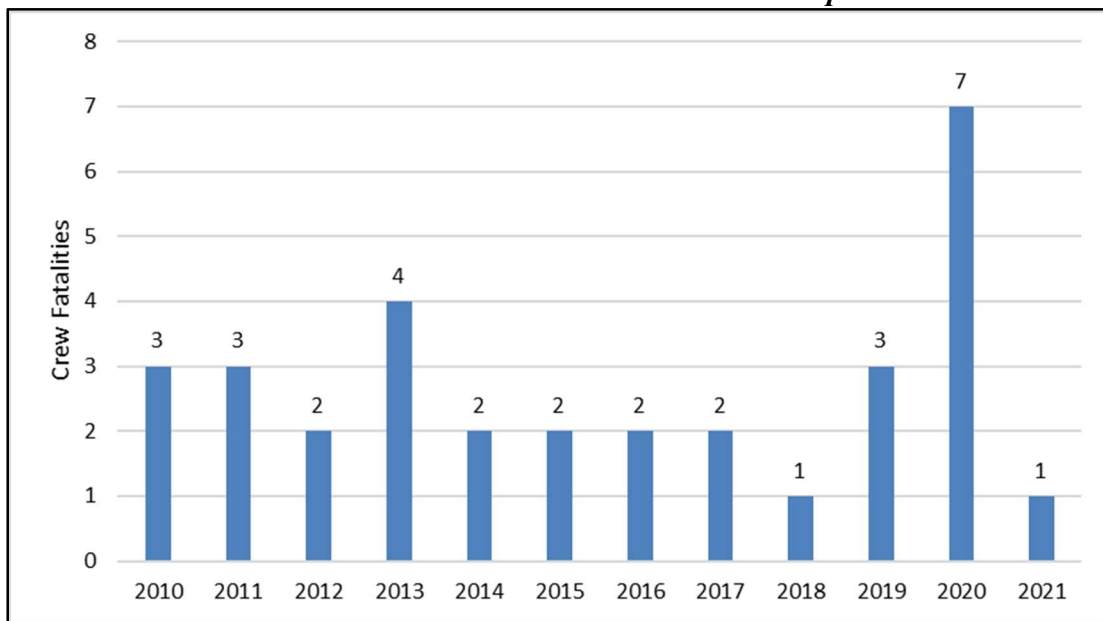
Table 1 provides a comparison of crew fatalities by accident type for years 2017 through 2021 versus the cumulative total for years 2000 through 2021. This table allows for comparison of more recent fatality data against the cumulative fatality data.

**Table 1 - Crew Fatalities by Accident Type 2017-2021 versus Cumulative Totals 2000-2021**

Accident Type	2017	2018	2019	2020	2021	Cumulative 2000-2021	Accident Type %
Contact Injury- Fall into water	1	0	1	3	0	83	44.6%
Noncontact Injury - Asphyxiation	3	2	1	4	0	34	18.3%
Contact Injury- Crushed between objects	0	1	2	0	1	19	10.2%
Other/Unknown	0	0	1	3	1	14	7.5%
Struck by Moving Object	0	0	0	1	0	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	1	0	0	0	3	1.6%
Burn	2	0	0	0	0	2	1.1%
Noncontact Injury - Exposure	0	0	0	0	0	1	0.5%
<b>TOTAL</b>	<b>6</b>	<b>4</b>	<b>5</b>	<b>11</b>	<b>2</b>	<b>186</b>	<b>100.0%</b>

Chart 3 shows the number of crew fatalities resulting from falls overboard for calendar years 2010 to 2021. 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.

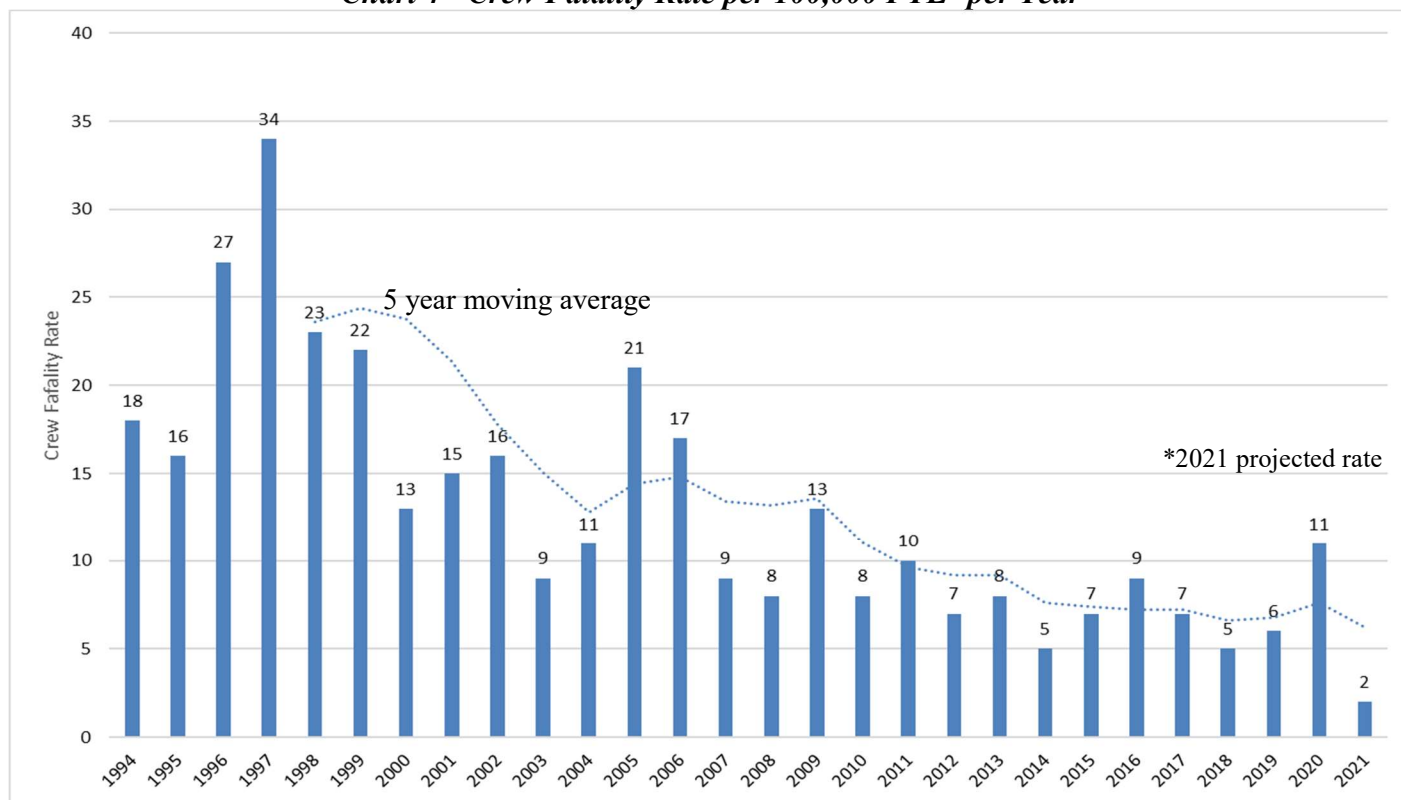
**Chart 3 - Crew Fatalities due to Falls Overboard per Year**



## 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 Army Corps of Engineers (ACE)<sup>2</sup>. 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 2020 was 10.6, and the projected crew fatality rate for 2021 is 1.9. The 2021 rate is a projection based on the 2020 ACE data, which is the latest available data. Chart 4 shows the crew fatality rate from 1994 to 2021 with rates rounded up to the nearest whole number.

**Chart 4 - Crew Fatality Rate per 100,000 FTE<sup>3</sup> per Year**



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

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

For comparison, Table 2 shows the worker fatality rates for as calculated by the Bureau of Labor Statistics (BLS) for all workers from 2016 to 2020<sup>4</sup> along with the Towing Industry Fatality Rate.

**Table 2 - Comparison of Worker Fatality Rates per Year**

<b>Data Source</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>
Bureau of Labor Statistics (BLS), All Fatal Work Injuries	3.6	3.5	3.5	3.5	3.4
BLS, Transportation Sector Fatal Work Injuries	15.4	15.1	14.0	13.9	13.4
Towing Industry, Crewmember Operational Fatal Work Injuries	8.6	6.2	4.1	5.2	10.6

Table 3 shows the BLS worker fatality counts and rates for all industry sectors for 2020.

**Table 3 – Number and Rate of Fatal Work Injuries for 2020 by Industry Sector  
(Organized by Fatal work injury rate, descending)**

<b>Industry Sector</b>	<b>Number of fatal work injuries</b>	<b>Fatal work injury rate (per 100,000 FTE workers)</b>
<b>Agriculture, forestry, fishing, and hunting</b>	511	21.5
<b>Transportation and warehousing</b>	805	13.4
<b>Construction</b>	1,008	10.2
<b>Wholesale trade</b>	155	4.6
<b>Other services (exc. Public admin.)</b>	188	3.3
<b>Leisure and hospitality</b>	219	2.5
<b>Manufacturing</b>	340	2.3
<b>Retail trade</b>	275	2
<b>Government</b>	415	1.8
<b>Educational and health services</b>	145	0.7

Other key findings from the BLS Census of Fatal Occupational Injuries Summary, 2020:

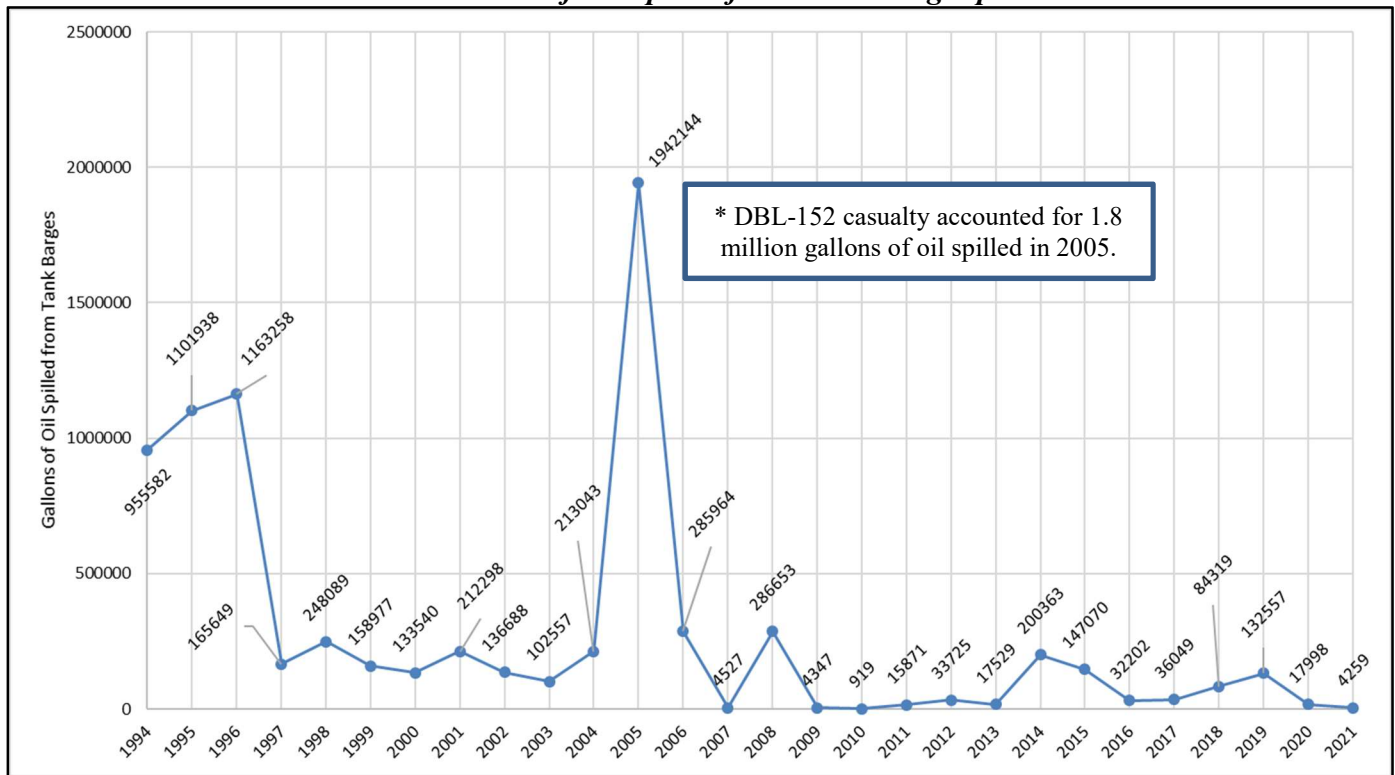
- The 4,764 fatal occupational injuries in 2020 represents the lowest annual number since 2013.
- Fatal transportation incidents fell 16.2 percent to 1,778 in 2020 from 2,122 in 2019.
- Workers in transportation and material moving occupations and construction and extraction occupations accounted for nearly half of all fatal occupational injuries (47.4 percent), representing 1,282 and 976 workplace deaths, respectively.

<sup>4</sup> Census of Fatal Occupational Injuries – Current, <https://www.bls.gov/iif/oshcfoi1.htm>

## Oil Spill Volumes

Approximately 4,259 gallons of oil was spilled into U.S. navigable waterways as a result of 70 operational tank barge pollution incidents in 2021. Chart 5 shows the total gallon quantity of oil spilled from tank barges for calendar years 1994 to 2021.

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





The largest tank barge oil spill in 2021 occurred when a towing vessel pushing two barges was approaching the mooring and struck another barge that was moored at the dock. The collision breached a cargo tank on the barge at the dock resulting in the discharge of approximately 2,800 gallons of gasoline into the waterway. This spill accounted for 65.7% of the total volume of oil spilled from tank barges in 2021.

Table 4 shows the number of tank barge oil spills by spill size category, as well as the amounts (in gallons) of the four largest oil spills. The quantity of oil spilled from the four largest tank barge oil spills are noted in Table 4. These four oil spills account for 84.9% of the total volume of oil spilled from tank barges in 2021.

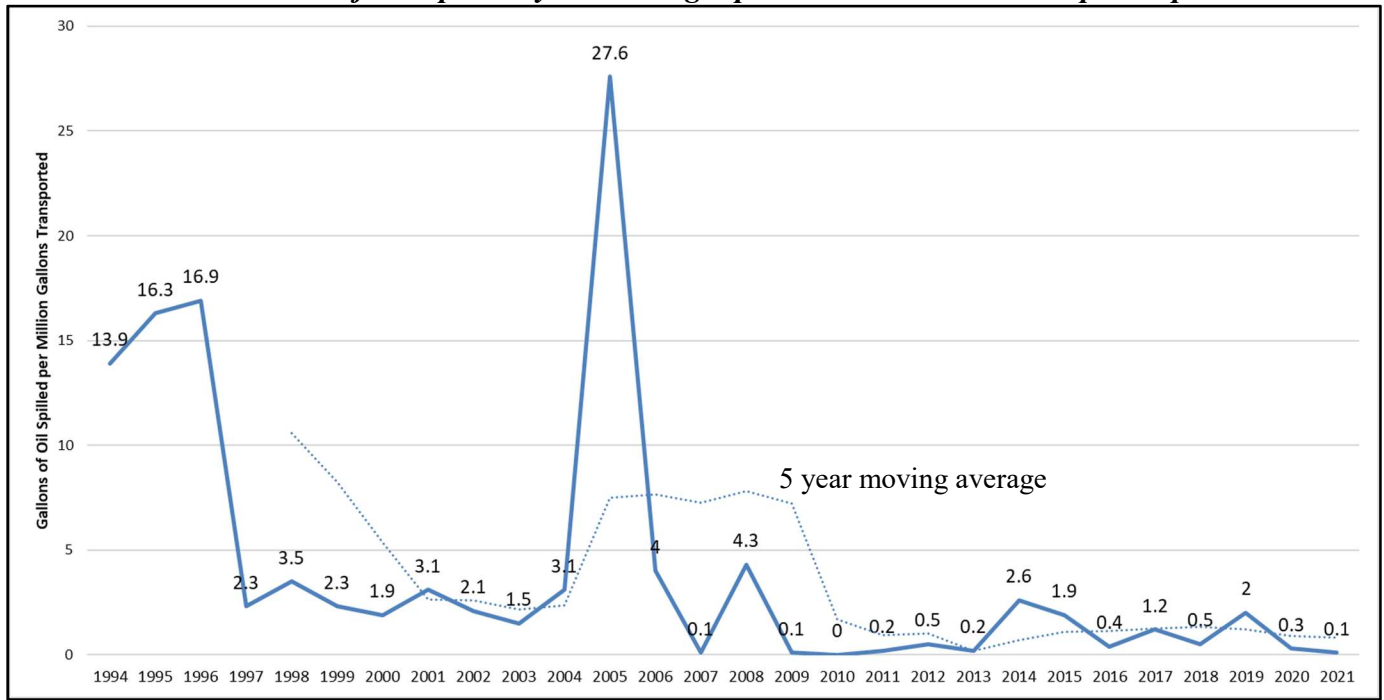
**Table 4 - Tank Barge Oil Spills by Spill Size Category for 2021**

<b>Discharge Category</b>	<b>Number of Tank Barge Spills</b>	<b>Amount of oil discharged into water (in gallons) For oil spills &gt; 100 gallons</b>
zero	1	---
less than 1	5	---
1 to 10	48	---
10 to 100	12	---
100 to 1000	3	250, 250, 314
1000 to 10000	1	2800
more than 10k	0	---
Total	70	

## Oil Spill Rate

The tank barge oil spill rate is calculated using data from both the Coast Guard and the Army Corps of Engineers. Based on the latest available data, the oil spill rate for 2020 is 0.3 gallons of oil spilled for every million gallons of oil transported. Based on the 2020 commodity data from the Army Corps of Engineers, the projected oil spill rate for 2021 is 0.1 gallons of oil spilled for every million gallons of oil transported. Chart 6 shows the oil spill rates from 1994 to 2021.

**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 Army Corps of Engineers from 2014 to 2020.

*Table 5 - Petroleum Transported by Tank Barges per Year*

<b>Calendar Year</b>	<b>Petroleum Transported by Tank Barge (in short-tons)</b>	<b>% change (year to year)</b>
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	+0.06%
2020	214,134,000	-12.9%

## Severity of Vessel Incidents

There were 1,236 incidents in 2021 involving towing vessels or barges that were investigated by the Coast Guard. All incidents for 2021 were scored using the AWO Severity Scale (shown below) that was developed by the AWO National Quality Steering Committee. There were 163 (13.1% of total) High Severity incidents, 109 (8.8%) Medium Severity incidents, and 964 (78.0%) 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 5 shows the number of towing vessel incidents reported and classified by the AWO Severity Scale from 2017 to 2021.

**Table 6 – Incident Severity per Year**

AWO Severity Scale	2017	2018	2019	2020	2021	Total
Low	767	912	1,024	975	964	<b>4642</b>
Medium	92	139	130	130	109	<b>600</b>
High	75	73	124	157	163	<b>592</b>
<b>Total:</b>	<b>934</b>	<b>1,124</b>	<b>1,278</b>	<b>1,262</b>	<b>1,236</b>	<b>5,834</b>

The Initiating Event is the first unwanted event in a casualty sequence. Identifying the Initiating Event facilitates analysis of the causal factors leading to the first event in the casualty sequence.

The following are the top 3 Initiating Events associated with high severity incidents for 2021:

- In 101 of the 163 (62.0%) high severity incidents, the injury or death of a crewmember was listed as the Initiating Event.
- In 19 (11.7%) of the high severity incidents, a material failure or malfunction was listed as the Initiating Event.
- In 17 (10.4%) of the high severity incidents, an allision was listed as the Initiating Event.

### USCG-AWO Severity Classes for Towing Vessel Casualties

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

## Crewmember Injuries

There were 114 incidents involving towing vessels or barges in 2021 that resulted in 121 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 2017 to 2021**

Injury Severity	2017	2018	2019	2020	2021	Total (%)
Critical	0	1		1		0.4%
Severe	2	5	5	3	2	3.1%
Serious	15	22	22	21	24	18.9%
Moderate	35	50	45	53	56	43.5%
Minor	37	42	38	31	39	34.1%
<b>Total:</b>	<b>89</b>	<b>120</b>	<b>110</b>	<b>109</b>	<b>121</b>	<b>100%</b>

Table 8 provides a breakdown of the critical, severe, and serious injuries by accident type for 2021.

**Table 8 - Critical, Severe, Serious Injuries by Accident Type for 2021**

Accident Type	Critical	Severe	Serious	Total
Contact Injury- Crushed between objects			3	3
Contact Injury- Fall onto surface			7	7
Contact Injury- Line handling/caught in lines		2	5	7
Contact Injury- Other			1	1
Contact Injury- Struck by Moving Object			4	4
Existing Medical Condition Event			1	1
Noncontact Injury- Other			1	1
Other Injury Type			1	1
Overexertion Injury- Strain or sprain			1	1
<b>Total</b>	<b>0</b>	<b>2</b>	<b>24</b>	<b>26</b>

The following is a summary of the two severe injuries from 2021:

- During preparations to get underway, a crewmember's hand was crushed between two links in the tow chain when another crewmember activated the winch to take up slack.
- During line handling operations, a crewmember's leg was pinched between the towline and the anchor windlass.

20 out of 24 (83%) of the Serious injuries were the result of "contact" injuries.

## USCG Injury Severity Scale

**Injury Severity Scale Description and Examples** [X]

**Minor** The injury is minor or superficial. No professional medical treatment was required.  
Examples: Minor/superficial scrapes (abrasions); minor bruises; minor cuts; digit sprain; first degree burn; minor head trauma with headache or dizziness; minor sprain/strain

**Moderate** The injury exceeds the minor level, but did not result in broken bones (other than fingers, toes or nose), loss of limbs, severe hemorrhaging, muscle, nerve, tendon or internal organ damage. Professional medical treatment may have been required. If so, the person was not hospitalized for more than 48 hours within 5 days of the injury.  
Examples: Broken fingers, toes or nose; amputated fingers or toes; degloving of fingers or toes; dislocated joint; severe sprain/strain; second/third degree burns covering 10% or less of body (if face included, move up one category); herniated disc

**Serious** The injury exceeds the moderate level and requires significant medical/surgical management. The person was not hospitalized for more than 48 hours within 5 days of the injury.  
Examples: Broken bones (other than fingers, toes, or nose); partial loss of limb (amputation below elbow/knee); degloving of entire hand/arm or foot/leg; second/third degree burns covering 20-30% of body (if face included, move up one category); bruised organs

**Severe** The injury exceeds the moderate level and requires significant medical/surgical management. The person was hospitalized for more than 48 hours within 5 days of the injury and, if in intensive care, was in for less than 48 hours.  
Examples: Internal hemorrhage; punctured organs; severed blood vessels; second/third degree burns covering 30-40% of body (if face included, move up one category); loss of entire limb (amputation of whole arm/leg)

**Critical** The injury exceeds the moderate level and requires significant medical/surgical management. The person was hospitalized and in intensive care for more than 48 hours within 5 days of the injury.  
Examples: Spinal cord injury; extensive second- or third-degree burns; concussion with severe neurological signs; severe crushing injury; internal hemorrhage; second/third degree burns covering 40% or more of body; severe/multiple organ damage

Close