

## Contact of *Kitty* Tow with Algiers Lock Gate

On July 4, 2023, about 1808 local time, the towing vessel *Kitty* was pushing two loaded tank barges through the Algiers Lock near mile 88.4 on the Lower Mississippi River in New Orleans, Louisiana, when the lead barge, *EMS 317*, struck one of the lock gates (see figure 1 and figure 2).<sup>1</sup> There were no injuries, and no pollution was reported. Damage to the barge was negligible, while damage to the lock gate was about \$2 million.



**Figure 1.** The *Kitty* after the casualty.

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<sup>1</sup> (a) In this report, all times are central daylight time, and all miles are statute miles. Unless otherwise stated, speeds are referenced in miles per hour (mph) ground speed. (b) Visit [ntsb.gov](https://www.ntsb.gov) to find additional information in the [public docket](#) for this NTSB investigation (case no. DCA23FM038). Use the [CAROL Query](#) to search investigations.

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**Casualty Summary**


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<b>Casualty type</b>	Contact
<b>Location</b>	Algiers Lock, near mile 88.4 Lower Mississippi River, New Orleans, Louisiana 29°54.86' N, 089°58.38' W
<b>Date</b>	July 4, 2023
<b>Time</b>	1808 central daylight time (coordinated universal time -5 hrs)
<b>Persons on board</b>	6
<b>Injuries</b>	0
<b>Property damage</b>	\$2,082,677
<b>Environmental damage</b>	None
<b>Weather</b>	Visibility 10 mi, scattered clouds, winds southwest at 9 mph, air temperature 90°F, water temperature 89°F, sunset 2005
<b>Waterway information</b>	Lock (length 797 ft, width 75 ft, depth 13 ft, current 0 mph, Mississippi River gage at Algiers Lock 1.7 ft)

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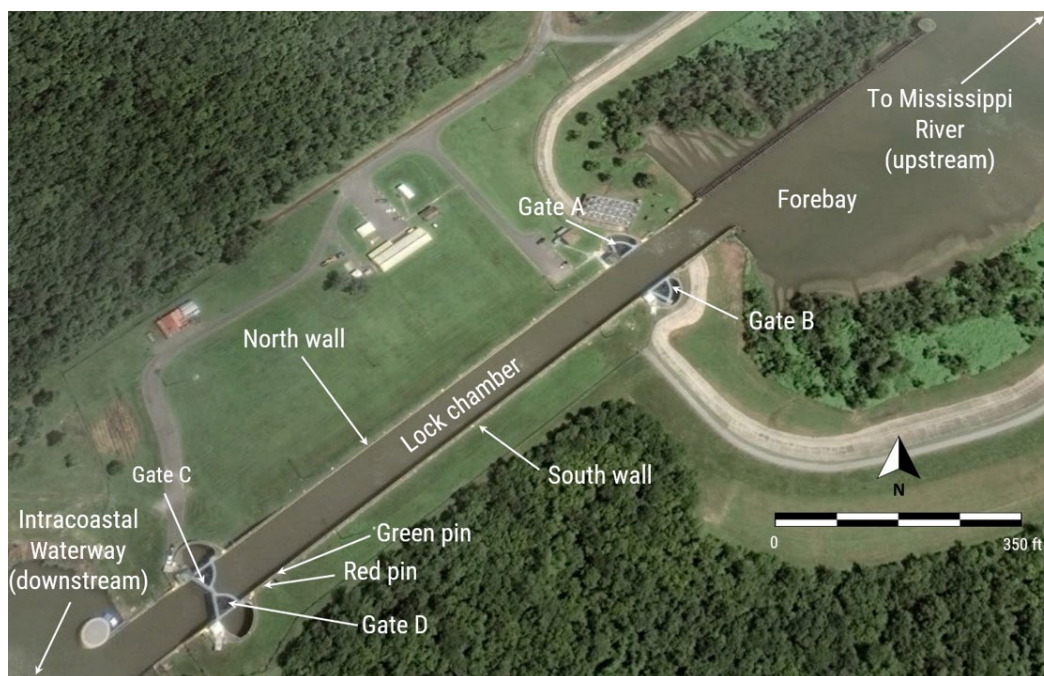
**Figure 2.** Area where the *Kitty* tow contacted Algiers Lock Gate D as indicated by a circled X. (Background source: Google Maps)

# 1 Factual Information

## 1.1 Background

The *Kitty*, a 68-foot-long towing vessel constructed of welded steel, was built in 2000, and owned and operated by Enterprise Marine Services, LLC. The *Kitty* had a draft of about 9.5 feet. The propulsion system was pneumatically controlled from the wheelhouse, and the vessel had three fixed pitch propellers (each driven by a diesel engine rated at 530 hp each), three rudders, and four flanking rudders.

The US Army Corps of Engineers operated the Algiers Lock, which connected the Mississippi River to a network of inland waterways west of New Orleans, including the Gulf Intracoastal Waterway (see figure 3). The lock was 797 feet long (760 feet useable), 75 feet wide, 13 feet over the sills, and could handle lifts to 18 feet.<sup>2</sup> The lock's upstream gates were located about 2,000 feet from the right descending bank of the Lower Mississippi River, near mile 88.4. Between the lock chamber and the Mississippi River was an area of water called the forebay.<sup>3</sup>



**Figure 3.** Algiers Lock with the lock gates in the position they were in at the time of the casualty. (Background source: Google Earth)

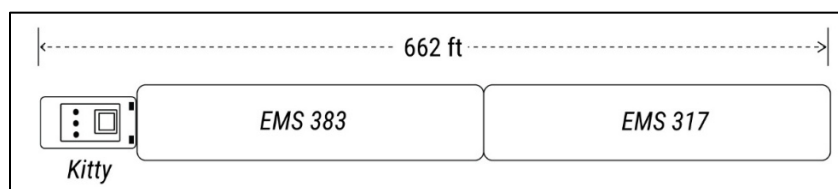
<sup>2</sup> At zero gauge (in the river), 13 feet is the depth of the lock itself.

<sup>3</sup> The inland towing industry refers to the shorelines of western rivers as the left and right banks when traveling (facing) downriver. The left bank is called the *left descending bank* and the right bank is called the *right descending bank*.

## 1.2 Event Sequence

On July 4, about noon, the *Kitty*, with six crew on board, departed a refinery at mile 88.7 on the Lower Mississippi River, pushing two loaded tank barges (*EMS 317* and *EMS 383*), en route to a terminal in Beaumont, Texas. For the voyage, the *Kitty* was to briefly transit the Mississippi River, pass through the Algiers Lock, and then proceed west through the Gulf Intracoastal Waterway. The captain worked from 0600 to 1200 and 1800 to 2400, and the relief captain worked from 1200 to 1800 and 2400 to 0600. Also on board were: two tankermen, a deckhand, and a steersman (in training for his license/credential).

The two tank barges, owned and operated by Enterprise Marine Services, LLC, were strung out with the *EMS 317* (built 2004) at the head of the tow and the *Kitty* faced up to the *EMS 383* (built 2013) at the rear of the tow (see figure 4). Each barge was 297 feet long by 54 feet wide and loaded with about 24,000 barrels of light cycle oil. The deepest draft of the tow was the loaded barges (10 feet). The overall length of the tow was 662 feet, and the width was 54 feet.



**Figure 4.** *Kitty* tow configuration.

At 1245, the *Kitty* tow pushed into the right descending bank about a half mile below the Algiers Lock forebay for midstream refueling of the towing vessel. Refueling was completed about 1630, and the vessel remained pushed into the bank to await clearance from the lock operator to enter the lock.

About 1720, in advance of the tow entering the lock, the captain of the *Kitty* assumed the watch (from the relief captain). At this point, the river stage at the Algiers Lock was 1.7 feet, which the captain of the *Kitty* said was “extremely low.” On June 22, 2023, the US Coast Guard had issued a Marine Safety Information Bulletin (MSIB), which stated “low water conditions have significantly reduced water depths in areas of the river outside the sailing line where mariners in the past had sufficient water depth to navigate,” and “pilots should maintain safe speeds when transiting in the vicinity of docks, fleeting areas, and other transiting vessels to minimize adverse impacts of the ship’s wake.”<sup>4</sup> This MSIB was still active on the date of the casualty.

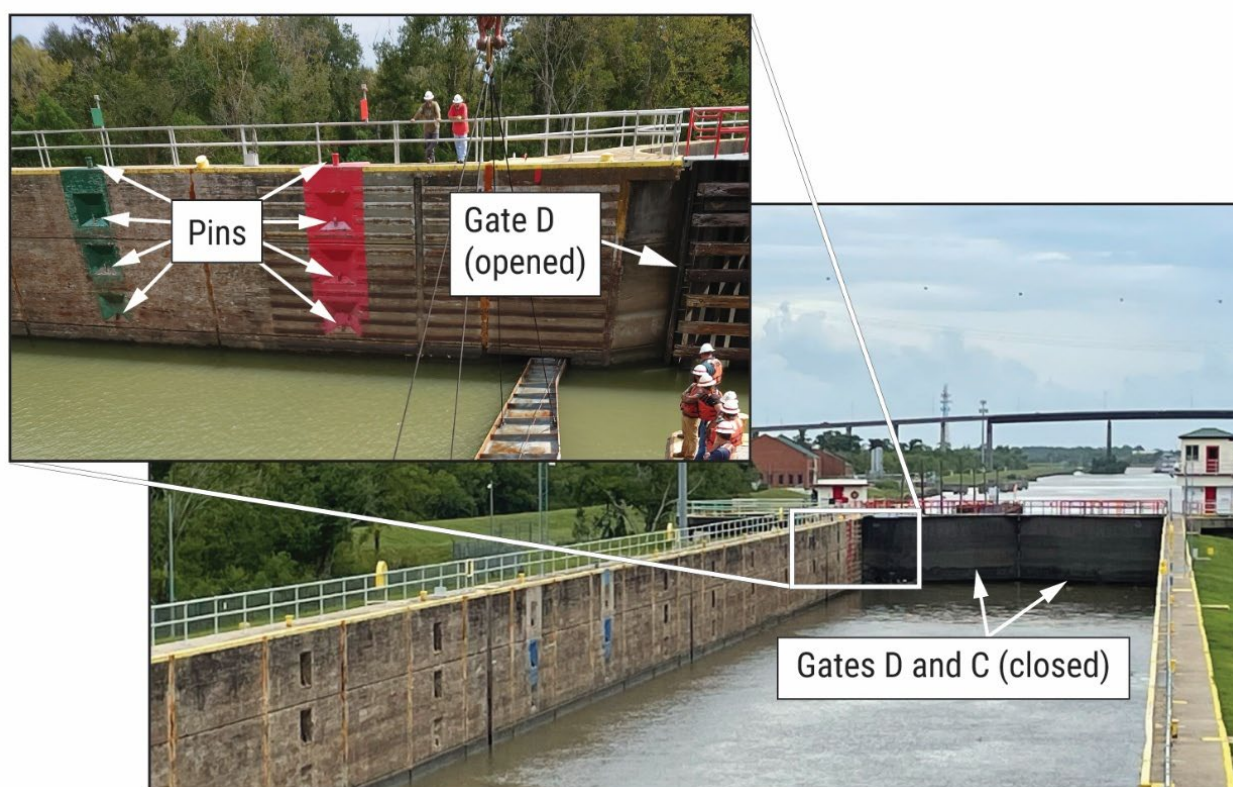
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<sup>4</sup> Coast Guard Sector New Orleans, “Low Water Safety Advisory: mm [mile marker] 00 to mm 303 AHP [above head of passes] LMR [Lower Mississippi River],” MSIB XXXIII, no. 41 (June 22, 2023).



At 1722, after receiving clearance from the lock operator, the captain backed the *Kitty* tow off the bank and steered the tow into the forebay and toward the lock. The captain told investigators that he had planned to have the steersman maneuver the tow into the lock. However, because “at this kind of river stage, it [the water] surges a lot,” he opted to do it himself, explaining what to expect and look out for when entering the lock at that river stage, with the steersman observing.<sup>5</sup>

The lock operator requested the *Kitty* have two crewmembers at the head of the tow and its bumpers (fenders) ready as the tow entered the lock. The lock operator also instructed the captain to proceed down and tie up the head of the tow at one of the green pins (about 66 feet from the closed lock gates) on whichever side of the lock he preferred (see figure 5).<sup>6</sup>



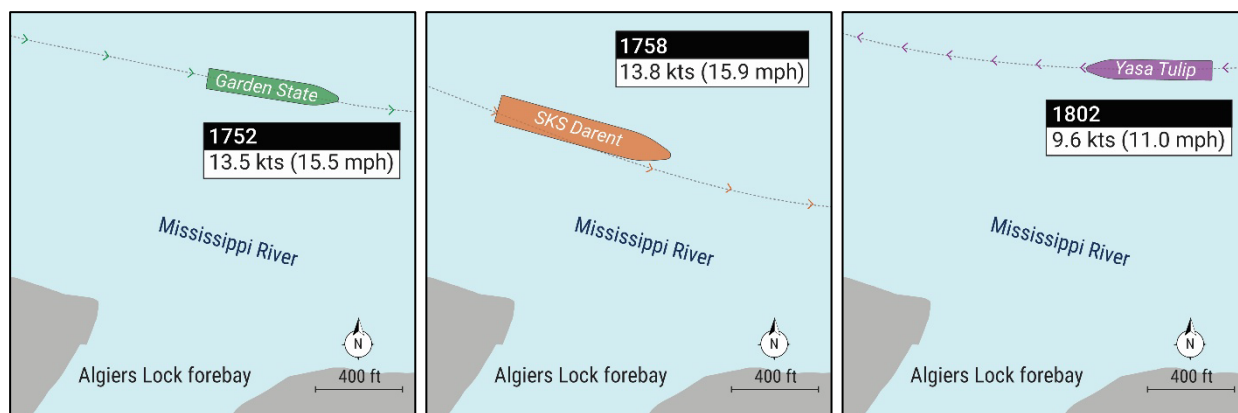
**Figure 5.** View downstream (looking southwest from chamber) of the Algiers Lock, showing the area where the red and green pins are located and closed Gates C and D. Inset shows the red and green pins' proximity to Gate D.

<sup>5</sup> *Surge* is the sudden movement of water within a lock, or the sudden forward, aft, up, or downward movement of a vessel when wave wash or swirling fill rapidly enters a lock chamber.

<sup>6</sup> A *pin* is a bollard or mooring post in a lock that a vessel can place its own lines on to secure itself/its tow within the lock.

About 1741, the *Kitty* tow entered the forebay at about 4 mph. A deckhand and tankerman prepared lines and bumpers for entering the lock and then moved to the head of the tow. As the head of the tow neared the lock entrance, the captain reduced the speed of the tow, and, about 1749, the head of the tow began to enter through the open lock gates (A and B) at 2 mph.

The captain looked at the automatic identification system information displayed on the vessel's electronic chart system and saw ships—the 587-foot-long tanker *Garden State* and, about 1.5 miles astern, the 820-foot-long tanker *SKS Darent*—transiting southbound on the Mississippi River toward the Algiers Lock forebay entrance (see figure 6). About 1752, the *Garden State* began to pass the mouth of the forebay at 13.5 knots (15.5 mph); the vessel was about 1,065 yards away from the open lock gates.



**Figure 6.** Left to right: Positions, tracks, times, and speeds of the *Garden State*, *SKS Darent*, and *Yasa Tulip* (approximate scale) while transiting the Mississippi River, near the Algiers Lock forebay, in the minutes leading up to the casualty (based on automatic identification system data).

Once the head of the *Kitty* tow was past the open lock gates, the tankerman positioned himself aft on barge *EMS 383*, on the port side, to tie up from there. The captain instructed the deckhand on the port bow of the *EMS 317* to catch a line on a green pin on the south lock wall once the pin was within reach, to help hold the tow in position. A short time later, the day lock operator told the captain to proceed to a red pin (about 38 feet from the closed lock gates) since the 65-foot towing vessel *Pamela Ann* (transiting lightboat) was also to enter the lock aft of the *Kitty*.

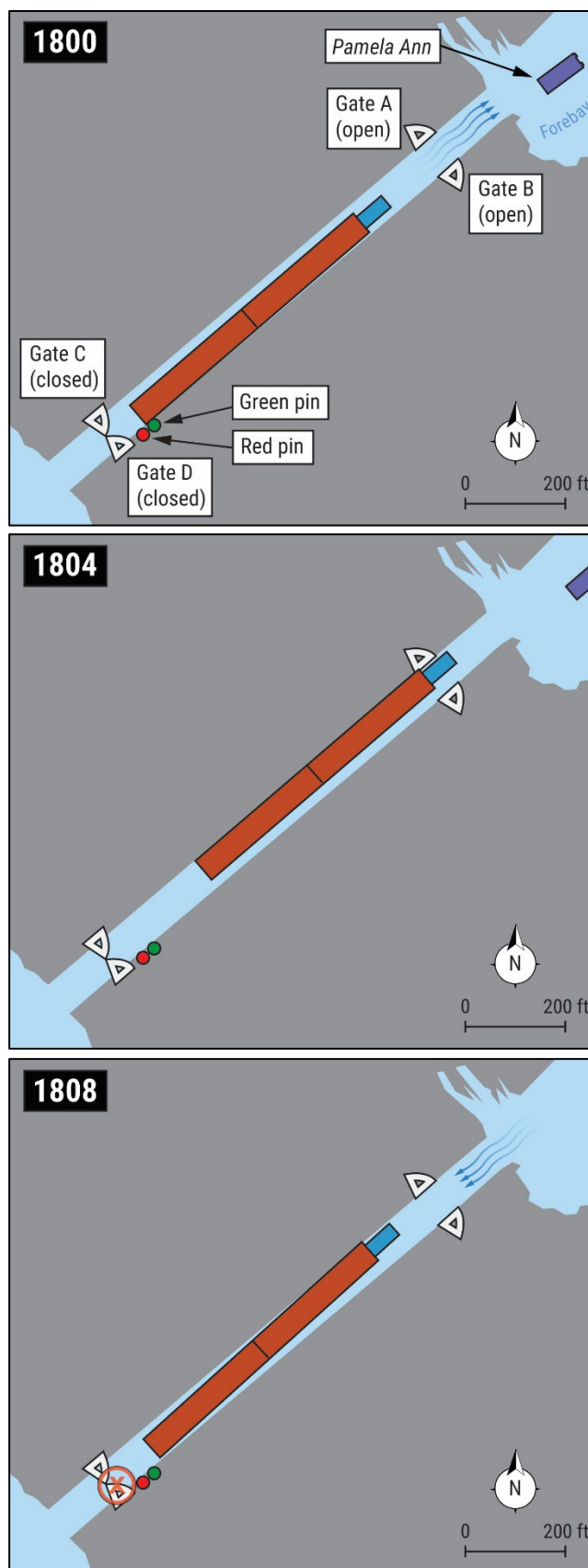
About 1757, the stern of the *Kitty* was past the open lock gates in the chamber, making a speed of about 0.7 mph as the captain maneuvered the tow closer to the south wall. The captain backed down on the engines to further slow the tow's advance.

About 1758, the second southbound tanker, the *SKS Darent*, passed the Algiers Lock forebay at 13.8 knots (15.9 mph); the vessel was about 950 yards away from the open lock gates. At 1759, the *Kitty* tow, fully within the lock chamber, had stopped moving. The deckhand was calling the distance to come ahead to the red pin via radio. The captain tried to ease the tow further ahead, but the *Kitty* tow began to move aft. The captain saw water “coming out” of the lock and that the water was “pulling” the *Kitty* tow aft out of the lock chamber (toward the Mississippi River).

At 1800, the *Kitty* tow was moving 0.6 mph astern, and the captain came ahead slow on all engines to counteract the tow’s movement (see figure 7). He stated over the Algiers Lock radio frequency that the passing ships were “sucking the water out at Algiers.”

At 1801, the *Kitty* tow was still moving astern, now at 2 mph, despite engines being at slow ahead. About 1802, the northbound 580-foot-long loaded bulk carrier *Yasa Tulip* passed the forebay at 9.6 knots (11.0 mph); the vessel was about 1,115 yards from the open lock gates.

**Figure 7.** Top to bottom: The positions of the *Kitty* tow and the *Pamela Ann* at 1800, 1804, and 1808. Direction of water movement in and out of the lock is indicated by wavy arrows, and the contact area is indicated by a red X.



About 1804, the *Kitty* stopped moving astern and the vessel was outside of the open gates, with the stern of *EMS 383* (the aft barge) abeam of the open lock gates. The captain put the engines in reverse in anticipation of water surging back into the lock; he estimated the water level in the lock had dropped about 3 to 4 feet. Less than a minute later, the *Kitty* tow started to advance ahead even though the engines were in reverse.

By 1806, the *Kitty* tow was advancing ahead at 0.7 mph and increasing in speed. The captain moved propulsion astern on all engines to arrest the increase in speed. Seeing that the tow was still advancing ahead, the captain moved all main engine propulsion levers to full astern, but there was no effect on the tow's advance. He instructed the steersman to look at the wheel (propeller) wash, and the steersman confirmed that the engines were in reverse. At the head of the tow, the deckhand placed a line on a red pin once it was within reach and tied it off, but the line broke as the tow continued moving ahead. The deckhand placed another line on the pin, and that line broke as well.

The deckhand told the captain via radio that the *Kitty* was "coming in hot." According to the captain, when the *Kitty* tow was about 100 feet from the closed lock gates, the vessel was moving about 2 mph ahead. Over the radio, the lock hand announced that the tow was approaching too fast and told the captain to slow down. The captain replied, "Algiers, I'm backing on everything. The [expletive] waters' coming back in from the [expletive] ships. I can't get it to stop. I got everything hooked up."

At the bow of the lead barge, the deckhand saw that the tow was going to hit the closed lock gate and walked aft on the barge to safety. At 1808, at 1.4 mph, the port bow of barge *EMS 317* struck Gate D, the closed gate on the south side of the lock. The *Pamela Ann*, which was aft of the *Kitty* and waiting in the forebay, also surged forward. In response to the *Pamela Ann* moving forward at a fast rate, its captain backed down hard to slow the vessel's forward motion.

After *EMS 317* struck Gate D, the captain of the *Kitty* backed the tow out into the forebay and tied up outside of the gates.

### 1.3 Additional Information

Both the day and night lock operators were in the control house on the north side of the lock (near Gates A and B) for their 1830 shift change when *EMS 317* struck Gate D. The day lock operator told investigators that the *Kitty* tow was entering the lock "normally" and that "he wasn't coming in fast at all." He recalled even commenting to the night lock operator how slowly the *Kitty* tow was coming in when it initially entered the lock.



The tankerman, located on the aft barge during the contact, said the water in the lock chamber dropped about 5 to 6 feet based on the water marks on the lock wall. He said that when he had seen surge in the lock before, the water would normally drop about a foot and then go back up, and that he had never seen the water surge as severely as it did while the *Kitty* tow was in the lock. Likewise, the deckhand, who had been on the lead barge since the tow entered the lock, estimated that the water in the lock chamber dropped at least 6 feet during this period.

### 1.3.1 Damage

The *EMS 317* sustained minor damage, consisting of an approximately 4-square-foot and 3-inch-deep dent on the port headlog (the heavy plating and framing across the head of the barge). Damage to the barge was considered negligible, and the company reported that permanent repairs would be carried out during the barge's next scheduled maintenance.

Algiers Lock Gate D sustained an approximately 16-20-foot gash and a large inset in the steel plating (see figure 8). The steel support members were also damaged, and the gate walkway was bent. The Corps of Engineers reported the cost of repairs was \$2,082,677. The Algiers Lock was reopened approximately 3.5 hours after the strike and remained functional.



**Figure 8.** Damage to Gate D as viewed from the north wall of the lock chamber.

### 1.3.2 Postcasualty Study

The NTSB conducted a video study to estimate the water-level variations in the Algiers Lock based on onboard image recorder system video footage from the *Kitty*. The study examined water-level variations (the minimum change in the lock water

level) during the casualty based on the spacing between ladder rungs (spaced 12 inches apart) on the south lock wall and the water levels against it. The study found a lower limit water-level variation of about 3.4 feet, noting that since only four water level estimations were possible during the analyzed 187.2 seconds, the 3.4-foot variation should be considered the lower limit on the actual water-level variations.

### **1.3.3 Past Events**

The Corps of Engineers had no previous records related to vessels or barges striking the gates in Algiers Lock. Lock staff interviewed said they had never witnessed or heard of a similar occurrence.

The night lock operator, who had worked at the locks for 13 years, said he had seen vessels be displaced by interrupted water flow from the river side. However, he had never seen an incident as severe as the *Kitty* tow hitting the lock gate, nor had he ever seen the river at such a low level as it was during the casualty.

The day lock operator said he did not know of any past surging events and that surging was hard to notice from his vantage point at the open gates. Although he had not witnessed past surge events, he said that other boat captains had told him by radio that their vessels would surge when ships passed the lock.

### **1.3.4 Kitty Crew**

The captain of the *Kitty* held a master of towing credential since 2007 and worked in the towing industry since 1998. He estimated that he had operated through the Algiers Lock well over a hundred times without issues. The captain and on-watch crew of the *Kitty* were tested for alcohol and other drugs, and the results were negative.

### **1.3.5 Waterway Information and Environmental Conditions**

There were no speed restrictions for deep-draft vessels transiting the Mississippi River near Algiers Lock and the forebay. The pilot of the southbound *Garden State* told investigators that the tanker was in the middle of the river at a full ahead bell as it passed the lock, and that vessels commonly transit at full ahead (13-16 mph southbound and 9-15 mph northbound) in that area.

There were no special procedures or considerations for low water conditions in the Algiers Lock. The lock operators present at the time of the casualty told investigators that there were no deficiencies with any of the lock gate control systems and that all lock systems were functioning normally. The Corps of Engineers did not have precasualty studies, assessments, or simulations specific to hydrodynamic effects on the Algiers Lock during such low water conditions.

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## 2 Analysis

While the *Kitty* tow was maneuvering into the Algiers Lock towards the Gulf Intracoastal Waterway during low water conditions on the Mississippi River, surging waters within the lock chamber affected the tow, and, at 1808, the lead barge, *EMS 317*, struck Algiers Lock Gate D.

The captain of the *Kitty* told investigators there were no problems with the vessel's propulsion and steering control, navigation, or communication systems. Based on onboard image recorder system video footage of the vessel's propeller wash, investigators found no evidence of an erroneous or inadvertent movement of a steering or propulsion control lever.

Mississippi River water gauge heights were reported to be "extremely low" at the time of the casualty near the lock entrance from the river (the gage at Algiers Lock was at 1.7 feet at the time of the strike). The Coast Guard had issued a safety advisory of the low water conditions and the need for river pilots to maintain safe speeds when transiting in the vicinity of docks, fleeting areas, and other vessels to minimize wake. Wakes from ships can travel for miles and their waves can be hazardous to other vessels and infrastructure along shorelines. There were no speed restrictions for vessels transiting the Mississippi River near the Algiers Lock at the time of the casualty. The pilot of the southbound loaded tanker *Garden State* told investigators that vessels commonly transit that area at full ahead.

The size of a wake caused by a vessel and the volume of water displaced is proportional to the vessel's speed, displacement, draft, trim, beam, and hull form, as well as the water's depth and the width of area the vessel is moving through. Prior to the casualty, three loaded ships (587 feet long and 820 feet long, moving southbound at about 13-14 knots; and 580 feet long, moving northbound at about 10 knots) had transited near the lock within about 10 minutes' time. The size, speed, and frequency (each within about 5 minutes of each other) of the three loaded ships transiting near the lock would have produced wakes that affected the forebay and lock chamber.

The effects of water displacement from a deep-draft vessel's wake can increase when that water pushes into and recedes from narrow and/or smaller water bodies, such as shallow areas and lock chambers. With the river, and therefore forebay water level, at a much lower level than normal, the size (volume of water) and surface area in the forebay would have been reduced. The forebay narrowed to the lock chamber, and surges in the lock had been witnessed before (although only about a foot).

The crew of the *Kitty* described the variance of water in the lock chamber during the casualty as 3-6 feet, and the video study found the lower limit of the actual water level variations (minimum change in the lock chamber water level) to be 3.4 feet. The captain of the *Kitty* described that the tow was pulled out of the lock,

which is consistent with the movement of receding water. Following that, the tow was pushed back into the lock chamber, consistent with rising water. Neither of these conditions occurred when there were no ships transiting in the river nearby. Thus, it is likely that wake effects from deep-draft ships, transiting the Mississippi River adjacent to the Algiers Lock forebay during extremely low water conditions, moved water in and out of the forebay and lock chamber, causing the vessels in them areas to surge.



## 3 Conclusions

### 3.1 Probable Cause

The National Transportation Safety Board determines that the probable cause of the contact of the barge *EMS 317* with Algiers Lock Gate D was surging water within the lock chamber, which was likely caused by the wakes from three deep-draft ships passing the lock forebay in quick succession during extreme low water conditions on the Mississippi River.

## Vessel Particulars

Vessel	<i>Kitty</i>	<i>EMS 317</i>
Type	Towing/barge (Towing vessel)	Towing vessel/barge (Barge)
Owner/Operator	Enterprise Marine Services, LLC (Commercial)	Enterprise Marine Services, LLC (Commercial)
Flag	United States	United States
Port of registry	Houma, Louisiana	Houma, Louisiana
Year built	2000	2004
Official number	1095430 (US)	1164698 (US)
IMO number	N/A	N/A
Classification society	ABS	N/A
Length (overall)	67.7 ft (20.6 m)	297.5 ft (90.7 m)
Breadth (max.)	28.0 ft (8.5 m)	54.0 ft (16.5 m)
Draft (casualty)	9.5 ft (2.9 m)	10.5 ft (3.2 m)
Tonnage	95 GRT	1,619 GRT
Engine power; manufacturer	3 × 530 hp (395 kW) Cummins KTA19-M530 diesel engines	N/A

NTSB investigators worked closely with our counterparts from **Coast Guard Sector New Orleans** throughout this investigation.

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For more detailed background information on this report, visit the NTSB investigations website and search for NTSB accident ID DCA23FM038. Recent publications are available in their entirety on the NTSB website. Other information about available publications also may be obtained from the website or by contacting—

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