April 4, 2025 MIR-25-14

Contact of *Amber Brittany* Tow with Vane Dike

On March 8, 2024, about 1550 local time, the towing vessel *Amber Brittany* was transiting upbound on the Ohio River, pushing a 15-barge tow, when the tow struck the vane dike at the upstream end of the McAlpine Locks and Dam in Louisville, Kentucky, and broke apart (see figure 1 and figure 2).[1] There were no injuries, and no pollution was reported. Total damages to the barges, cargo, and dam gates were estimated at $1.3 million.[2]

Figure 1. The *Amber Brittany* on July 28, 2022, before the contact. (Source: Matt Burks)

[1] In this report, all times are eastern standard times, and all miles are statute miles.

[2] Visit ntsb.gov to find additional information in the public docket for this NTSB investigation (case no. DCA24FM025). Use the CAROL Query to search investigations.

Casualty Summary

Casualty type	Contact
Location	Ohio River, mile 604.3, Louisville, Kentucky 38°15.69′ N, 085°45.82′ W
Date	March 8, 2024
Time	1550 eastern standard time (coordinated universal time –5 hrs)
Persons on board	6
Injuries	None
Property damage	$1.3 million est.
Environmental damage	None
Weather	Visibility 4 mi, overcast, winds east-southeast 6 kts, air temperature 57°F, water temperature 55°F
Waterway information	River; width 4,050 ft, depth 18 ft, current 2 mph (est.)

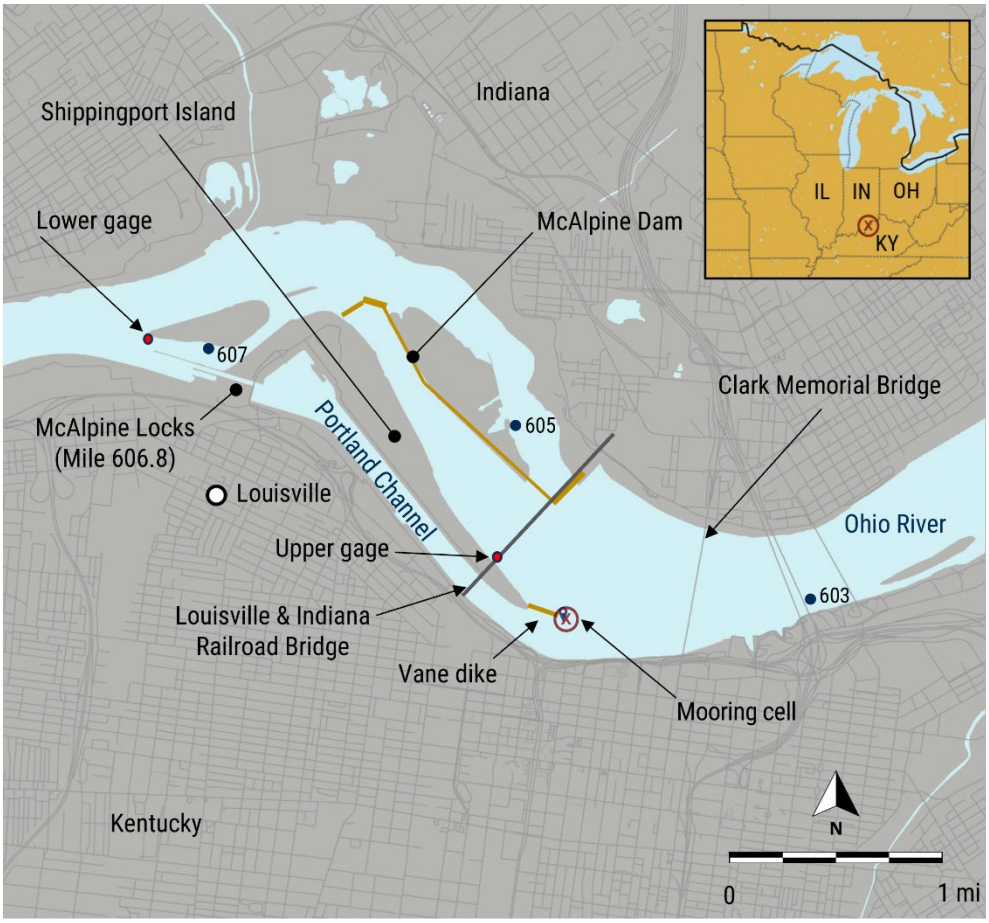

Figure 2. Area where the *Amber Brittany* contact occurred, as indicated by a red *X*. (Background source: Google Maps)

1 Factual Information

1.1 Background

Owned by Knight Manufacturing Corp and operated by Imperial River Transport, LLC, the *Amber Brittany*, built in 1982, was a 138-foot-long, steel-hulled towing vessel. The vessel had twin propellers, flanking rudders, and two 4,600-hp diesel engines. *The Amber Brittany* operated under the company's towing safety management system and had a valid US Coast Guard-issued certificate of inspection documenting compliance with Title 46 *Code of Federal Regulations* Subchapter M.

The McAlpine Locks and Dam, operated by the US Army Corps of Engineers, were built so vessels could safely navigate the section of the Ohio River near Louisville, Kentucky, that drops 26 feet in elevation in less than 2 miles. Each of the dam's five upper gates were 22.7 feet high and 100 feet wide, and each of the dam's four lower gates were 22 feet high and 100 feet wide. The McAlpine Locks were twin locks, each 110 feet wide and 1,200 feet long, located on the Kentucky (left descending bank) side of the Ohio River.[3]

A vane dike was located just off the eastern end of the entrance to the Portland Channel, which led to the McAlpine Locks.[4] Consisting of rocks and vegetation growth, the vane dike measured 600 feet long, 12 feet wide at the top, about 80 feet wide at the bottom, and extended eastward from the end of Shippingport Island, the northern land boundary of the Portland Channel (see figure 2). A mooring cell was located at the upstream end of the vane dike.

[3] 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*.

[4] A *dike* is a structure, typically constructed of stone, placed in a river to redirect the river's energy to provide a desired effect, such as managing sediment, diverting flow, or stabilizing eroding banks. A *vane dike* is positioned in a river to reduce side-to-side or transverse flows.

1.2 Event Sequence

On March 5, 2024, at 1544, the *Amber Brittany* departed from the Sitran Coal Terminal at mile 818 on the Ohio River. The towing vessel was pushing 15 loaded coal barges and was transiting upbound for the Kentucky Utilities Ghent Generating Station near mile 535. Each barge measured 195 feet long by 36 feet wide, and the tow was arranged into three strings of five barges (see figure 3). The 4,600-hp tow had an overall length of 1,113 feet and an overall width of 108 feet.

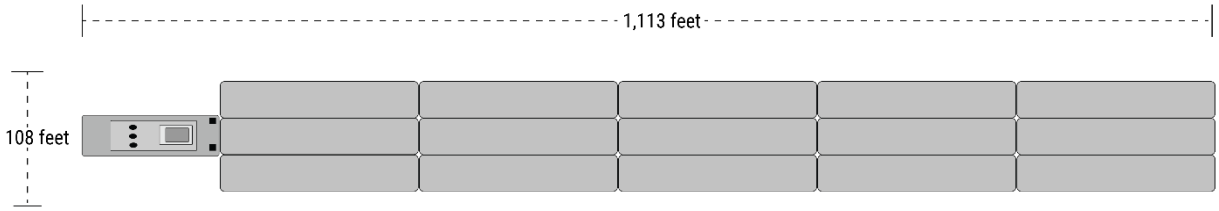

Figure 3. *Amber Brittany* tow arrangement.

The crew consisted of six personnel: a captain, pilot, an engineer, and three deckhands. The captain of the *Amber Brittany* stood watch from 0600-1200, and 1800-0000, with the pilot standing the opposite watches.[5]

On March 8, about 1125, the *Amber Brittany* approached the downriver (west) side of the McAlpine Locks and Dam, located near mile 607 in Louisville. While awaiting their turn to enter the McAlpine Locks, the pilot relieved the captain of the watch at 1200. During watch turnover, the captain and pilot discussed the upcoming locking procedures and transit strategy. The captain recommended favoring the left descending bank (Kentucky side) of the sailing line to avoid the effects of outdraft when exiting the Portland Channel.[6] He also warned of shoaling on the left descending bank and suggested using a red marker as a visual reference to safely navigate past the vane dike.

At 1446, the *Amber Brittany* tow entered the northern McAlpine Lock chamber. At 1459, the *Amber Brittany* tow exited the lock and proceeded upriver in the Portland Channel, passing a downbound towing vessel, the *Lester Parker*. The towing

[5] *Pilot* is a term used aboard towing vessels on inland waterways for a person, other than the captain, who navigates the vessel.

[6] (a) The *sailing line* on inland navigational charts is the preferred or recommended route within the reaches of a navigable channel. A vessel's orientation to a sailing line (above or below) depends on the direction of its movement, upriver or downriver, and the direction of the outdraft. (b) *Outdraft currents* are currents moving across a lock entrance toward a dam (in this case, toward the right descending bank at the upstream end of the Portland Channel).

vessel *Stacy McCune*, bound upriver, entered the northern McAlpine Lock chamber at 1526, and the lock chamber began to fill at 1540. At 1543, the *Amber Brittany* tow passed through the Louisville and Indiana (L&I) Railroad Bridge.

At 1547, automatic identification system (AIS) data showed that the heading of the *Amber Brittany* tow altered appreciably to port as the tow exited the upstream end of the canal. At 1548, the tow's course over ground also altered significantly to port as it began to be set off the sailing line and toward the vane dike. According to the pilot's statement, an outdraft current set the tow toward the vane dike. He attempted to counter the set but was unsuccessful. Realizing that the tow was going to contact the vane dike, he then attempted to land the tow as softly as possible, "in the hopes of minimizing any damage."

At 1550, the second barge in the port string of the *Amber Brittany* tow contacted the vane dike mooring cell (see figure 4). The tow broke apart immediately after contacting the mooring cell. The pilot sounded the general alarm, and the captain came to the wheelhouse shortly after the contact and assisted the pilot with communications, such as reporting the incident and coordinating with assist vessels.

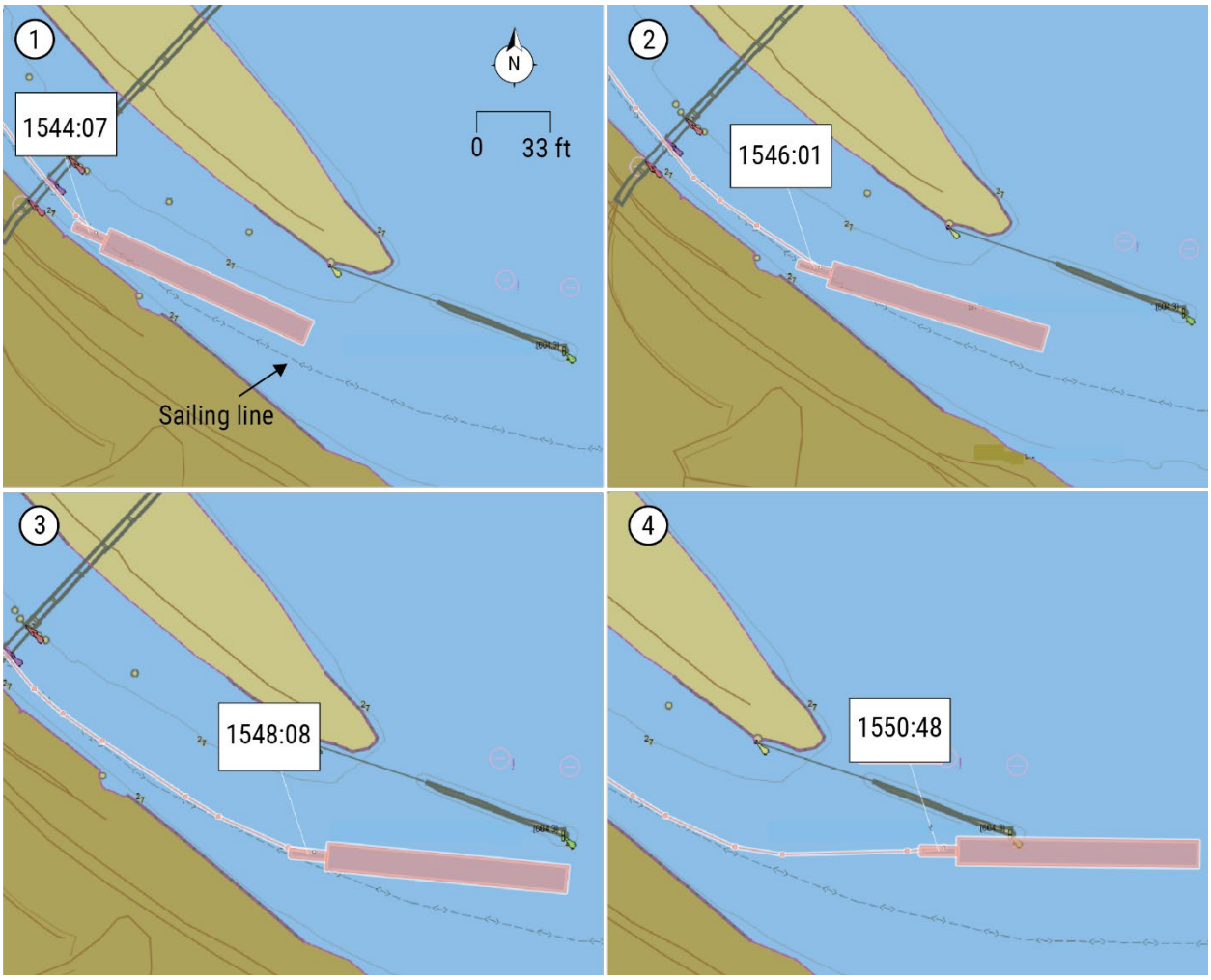

Figure 4. The *Amber Brittany* tow as it came through the Louisville and Indiana Railroad Bridge, its heading altered to port, it was set off the sailing line, and it contacted the vane dike mooring cell.

Ten of the 15 barges broke free from the tow and floated downstream on the north side of the vane dike. Eight of the barges that broke free struck and lodged alongside L&I Railroad Bridge pilings. The remaining two barges drifted downriver, eventually lodging in the McAlpine Lower Dam gates 2 and 3 (see figure 5).

Figure 5. Barges from the *Amber Brittany* tow lodged in the Lower McAlpine Dam Gate after the tow broke apart.

In the hours following the contact, vessels in the area attempted to recover the barges (see figure 6). During the recovery efforts, one barge sank near the bridge. Another barge began to take on water and was pushed to the bank of Shippingport Island.

Figure 6. The *Amber Brittany* with three barges, and tug *Kelle B* assisting, after the tow broke apart. Eight barges that broke free from the tow are lodged alongside the L&I Railroad Bridge pilings. (Background source: Rich Ammon)

The next day, on March 9, about 0810, the *Amber Brittany* departed the entrance to the Portland Channel and towed 10 of the 15 barges to a fleeting area on the Indiana shore, 0.5 miles north of Six Mile Island, about 6 miles upriver. The towing vessel and barges moored about 1015.

1.3 Additional Information

1.3.1 Damage

The *Amber Brittany* was not damaged from the contact. Five of the fifteen barges in the tow sustained damage. The two barges that became temporarily lodged in the lower dam gates were eventually forced through due to rising river conditions March 22 and April 4, respectively. One barge sank beneath the lower dam gates, and the other was recovered and pushed ashore. One barge was damaged but was repaired and placed back into service on March 12. Another barge partially sank along the bank near Shippingport Island but was repaired and refloated on March 14. One barge sank near an L&I Railroad Bridge pile but was repaired and refloated on March 22. Total damages to the barges, cargo, and dam gates were estimated at $1.3 million.

1.3.2 Personnel Information

The pilot was working on his first hitch aboard the *Amber Brittany*, which he began on February 22, thirteen days before the contact. He had previous experience operating towing vessels on inland waters and Western Rivers. This was the pilot's first time transiting the McAlpine Locks while at the helm of the *Amber Brittany*. Though the *Amber Brittany* had transited through the McAlpine Locks twice previously during the pilot's hitch, the captain had been on watch during both transits. According to the company, the pilot told them he had previous experience operating towing vessels on the Ohio River. However, following the casualty, the pilot told Coast Guard and NTSB investigators that he did not have previous experience operating towing vessels on the Ohio River.

The captain had over 40 years of experience in different roles on various vessels on inland waters and Western Rivers. He held a valid merchant mariner credential as master of towing vessels on inland waters and Western Rivers. He had worked on the *Amber Brittany* for almost a year at the time of the casualty.

After the contact, the pilot was tested for alcohol and other drugs. All results were negative. Crew rest reports showed that the pilot had 10 hours of sleep on each of the 3 days leading up to the casualty.

1.3.3 River Conditions When the Contact Occurred

At the time of the contact, the upper gage of the McAlpine Locks and Dam measured 12.5 feet. Water flow was 1.8 mph at the Water Tower station, located 3.6 miles upstream from the vane dike on the Ohio River. One of the four lower dam gates was fully closed (it was damaged from a previous barge breakaway in January 2023). The other three were open to 12 feet. The five upper dam gates were set to 13 feet, which allowed the 12.5 feet of river water to flow freely beneath them. Based on the water flow beneath the dam gates and the trend that the water was rising and projected to continue rising rapidly, the McAlpine Locks and Dam were in "high water/high flow conditions," as defined by the McAlpine Locks and Dam section of the Mississippi and Ohio Valey and Tributaries Waterway Action Plan (WAP).[7]

[7] The Mississippi and Ohio Valley and Tributaries WAP contained information about high-water operations on the Ohio River. The Coast Guard maintained the WAP, which provided maritime industry, government agencies, and State and local governments "with a plan to facilitate safe and orderly movement of traffic during evolving conditions on the inland rivers." According to the WAP executive summary, "The overall goal of this plan is to ensure safety of life and navigation, protection of infrastructure and property, and to prevent marine casualties."

These conditions activated the "watch phase" of the WAP, meaning the Coast Guard Sector Ohio Valley Command Center issued a special marine information broadcast.

1.3.4 Factors Affecting Water Conditions near the Vane Dike

1.3.4.1 Fixed Navigational Considerations

The Ohio River at the McAlpine Locks and Dam contains many features, both naturally occurring and manmade, that impact navigation through the area. The sailing line is intended to guide vessels through this area.

At the L&I Railroad Bridge near the upstream end of Shippingport Island, the navigable width of the Portland Channel reduces from about 555 feet to 240 feet beneath the bridge span. Transiting upriver, a bend in the river occurs just after the bridge and continues for about 2,000 feet. For the length of the bend, a concrete riverbank and naturally occurring shoaling extend along the Kentucky (left descending) bank. The vane dike is on the opposite side of the channel at the same location along the sailing line.

Upstream of the vane dike mooring cell, 0.6 miles along the sailing line, is another bridge, the George Rogers Clark Memorial Bridge, with a navigable span of 720 feet located along the Kentucky bank. This bridge is the first of four bridges within 0.7 miles along the sailing line. The most upstream of these bridges, the Big Four Pedestrian Bridge, has a navigable span of 530 feet (see figure 7).

Figure 7. Navigational considerations for a vessel transiting upriver on the portion of the Ohio River between the Louisville and Indiana Railroad Bridge and the Big Four Pedestrian Bridge. (Background source: Google Earth)

1.3.4.2 Variable Navigational Considerations

Variations in water flow velocities and directions near the entrance of the Portland Channel can occur due to changing river levels, dam gate openings, and locking operations. Outdraft currents can occur at the upstream end of lock canal entrances along the Ohio River. The WAP for the Mississippi and Ohio Valley and Tributaries included this cautionary note:

> The vane dike at the entrance to the Louisville and Portland Canal [Portland Channel] at OHR MM [Ohio River mile] 604.3 experiences strong outdrafts on the upstream end during high flows.

In addition to outdraft currents near the upstream end of the vane dike, a small 260-foot opening located between the vane dike and Shippingport Island also experiences changing velocities and directions of water flow between the main river body and the Portland Channel.

Locking operations can also potentially influence water-surface conditions and impact vessel traffic near the upstream entrance of the Portland Channel. A 1998 Corps of Engineers study demonstrated through hydrographic models that surges created by filling one of the 1,200-foot locks had the potential to cause adverse navigation conditions in the Portland Channel. According to the study, filling two

locks from the channel could create a more serious problem.[8] To minimize this effect noted in the study, an automatic interlocking mechanism was used at the McAlpine Locks to prevent the compounding effects of increased surface water velocity from filling the locks.

Dam gate openings also influence the hydrodynamic forces near the upstream entrance of the Portland Channel. As the velocity of the main river body increases, the outdraft forces near the vane dike also increase. River water velocities are at their highest when the nine McAlpine Dam gates are open and river levels are rising.

There have been nine reported incidents in the area of the McAlpine Locks and Dam involving towing vessels since January 2020, totaling over $2.7 million in property damage. The incidents involved both upbound and downbound vessels transiting in varying river conditions and included contacts with the L&I Railroad Bridge, concrete shoreline, and vane dike.

1.3.5 Cell Phone Usage

Cell phone records indicated that the pilot was messaging on his personal phone just before the contact. He sent a series of 16 messages on March 8 between 1547 and 1607 and made two outgoing calls to the same contact at 1619 and 1622. The messages that began at 1547 coincided with the *Amber Brittany*'s departure from the sailing line. Between 1547 and 1550, the time of the contact, the pilot sent three outgoing messages and received three incoming messages.

1.3.6 Real Time Data Available to Mariners

The United States Geological Survey publishes real time river data available to mariners, including river gage, precipitation, and mean water velocity (see figure 8). Mariners use this information to plan for water conditions while transiting the Ohio River. A river gage sensor was located near the L&I Railroad Bridge on the northeast side of Shippingport Island. There was no water velocity sensor in the immediate vicinity of the vane dike or Portland Channel entrance. There was a sensor beneath the locks and dam that measured water discharge in cubic feet per second. The Coast Guard is currently reviewing a May 2022 proposal to install a high-frequency radar system near the approach to the McAlpine Locks and Dam to monitor water-surface velocities in real time.

[8]US Army Corps of Engineers, "Navigation Conditions at McAlpine Locks and Dam, Ohio River," Technical Report CHL-98-4, January 1998, 42.

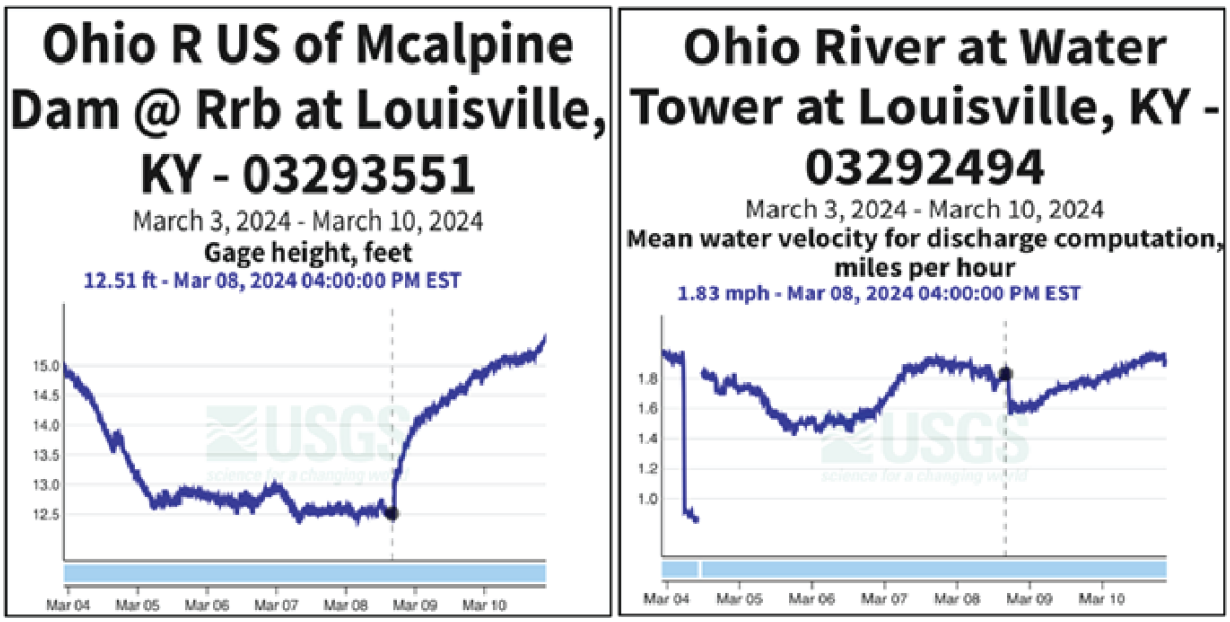

Figure 8. *Left to right*: Gage height measured near Shippingport Island and water velocity at the Water Tower station, 3.6 miles upstream from the vane dike. (Source: United States Geological Survey)

2 Analysis

On March 8, 2024, the towing vessel *Amber Brittany* was transiting upbound on the Ohio River pushing 15 loaded coal barges, when the 1,113-foot-long, 4,600-hp tow was set off course and struck the vane dike mooring cell while exiting the Portland Channel at the McAlpine Locks and Dam. The tow broke apart, sending 10 barges floating down the river, eventually lodging alongside pilings of the L&I Railroad Bridge and in two of the lower McAlpine Dam gates.

The upstream section of the McAlpine Locks and Dam is uniquely difficult to navigate, even under ideal circumstances. The geography of this stretch of the river (multiple bridges, bend in river, concrete riverbank, shoaling), combined with changing water currents near fixed hazards to navigation, creates an environment that is challenging. Prevalent outdraft currents near the vane dike and the location of the narrow span of the L&I Railroad Bridge are particular concerns when transiting the McAlpine Locks. There have been nine reported incidents in this area involving towing vessels since January 2020, totaling over $2.7 million in property damage. Of note, the NTSB investigated the contact of the *Queen City* tow with the vane dike in March 2023 and determined that the probable cause was the pilot not effectively compensating for the strong outdraft while navigating toward the lock channel entrance during a period of high-flow conditions.[9]

As the *Amber Brittany* made its port turn while passing under the L&I Railroad Bridge, the head of the tow entered the area of the canal where the effect of an outdraft current, if present, would be expected. The dam gates were almost fully open, and river levels were rising, resulting in a strong outdraft, which pulled the head of the tow to port. The head of the tow continued to be drawn to port as the tow proceeded upriver. The pilot's attempt to counteract the force of the outdraft was ineffective, and the tow was set upon the vane dike mooring cell. In addition to the outdraft, there could have been a water surge in the Portland Channel—resulting from a lock filling that took place 8 minutes before the contact—that also impacted the *Amber Brittany* tow.

Changing river levels, sediment deposits, lock fillings, and dam gate openings all influence the hydrodynamic forces in the area of the Portland Channel. The speed, direction, and force of the water currents at the channel entrance are difficult to anticipate. The nearest water velocity meter is located more than 3 miles upriver from the McAlpine Locks and Dam and does not provide detailed information that would

[9] NTSB, *Contact of Queen City Tow with Vane Dike*, MIR-24-12, May 7, 2024, https://www.ntsb.gov/investigations/AccidentReports/Reports/MIR2412.pdf.

aid operators in safely navigating the area. The WAP warns waterway operators about the known outdraft in the area during periods of high flow. In addition, the Coast Guard is reviewing a proposal for a real-time surface water velocity sensor near the vane dike. Such a sensor would give towing vessel operators and waterway managers a better understanding of the real-time hydrodynamic forces they may encounter when transiting the Portland Channel.

While the pilot was qualified to operate towing vessels of this size along inland waters and Western Rivers, this was his first time transiting the McAlpine Locks at the helm of the *Amber Brittany*. Although company personnel were under the impression that the pilot had previous experience operating tows on the Ohio River, the pilot told Coast Guard and NTSB investigators that he had not previously operated on the Ohio River. The pilot had never been observed by the captain or anyone at the operating company transiting this portion of the Ohio River. Although the captain conducted a thorough turnover before the transit with instructions for the pilot to wake him with any concerns, he did not remain alongside the pilot while he transited this difficult area for the first time. The pilot's inexperience transiting the Portland Channel at the helm of the *Amber Brittany* and accompanying tow likely contributed to his ineffective attempt to counteract the force of the outdraft.

The inherent challenges with navigating this waterway combined with the pilot's inexperience in the area placed increased attention demands on the pilot to monitor the vessel's position and compensate for the expected outdraft. Investigators sought to determine if the pilot's cell phone use may have distracted him while transiting the lock. Cell phone records indicated that the pilot was using his personal cell phone just before the contact and that the first in a series of outgoing and incoming text messages began about 1547, which coincided with the *Amber Brittany's* departure from the sailing line. Cell phone use, especially text messaging, can be visually, manually, and cognitively distracting. Therefore, any distraction from the primary navigation task due to cell phone use would have reduced the pilot's performance as he navigated the channel.

3 Conclusions

3.1 Probable Cause

The National Transportation Safety Board determines that the probable cause of the contact of the *Amber Brittany* tow with the vane dike was the pilot not effectively compensating for the outdraft current while navigating out of the lock channel entrance, likely due to the pilot's inexperience in transiting the Portland Channel on the *Amber Brittany* and his distraction due to cell phone use.

3.2 Lessons Learned

Preparing for Dam Outdrafts

Lock canal entrances near dams present unique hazards for vessels transiting inland rivers. Fast moving river water near low-flow canal waters can produce outdraft currents. Mariners should thoroughly assess the potential impact of outdraft currents when entering or exiting locking channels. Vessel horsepower and vessel handling should be carefully considered.

Maintaining Awareness in Areas of Restricted Navigation

Lock canal entrances require heightened situational awareness from vessel operators. Using cell phones and other wireless electronic devices has been demonstrated to be visually, manually, and cognitively distracting. Talking on cell phones can have serious consequences in safety-critical situations, and sending or reading text messages is potentially even more distracting than talking because texting requires visual attention to the display screen of the device. Mariners should avoid using mobile devices, especially while maneuvering in unfamiliar areas of restricted navigation.

Vessel Particulars

Vessel	*Amber Brittany*
Type	Towing/Barge (Towing vessel)
Owner/Operator	Knight Manufacturing Corp/Imperial River Transport LLC (Commercial)
Flag	United States
Port of registry	Cave-In-Rock, Illinois
Year built	1982
Official number (US)	646546
IMO number	N/A
Classification society	N/A
Length (overall)	138.4 ft (42.2 m)
Breadth (max.)	39.3 ft (12.0 m)
Draft (casualty)	10.4 ft (3.2 m)
Tonnage	564 GRT
Engine power; manufacturer	2 x 2,300 hp (3,430 kW); EMD 645 diesel engines

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