



# National Transportation Safety Board

## Marine Accident Brief

### Barge Breakaway and Contact with the Emsworth Locks and Dams

<b>Accident type</b>	Contact	No. DCA18PM011
<b>Vessel names</b>	<i>Dashields, Emsworth, and 27 barges</i>	
<b>Location</b>	Ohio River, mile 6.2, <sup>1</sup> Emsworth, Pennsylvania 40° 30.18' N, 080° 5.35' W	
<b>Date</b>	January 13, 2018	
<b>Time</b>	0630 eastern standard time (coordinated universal time – 5 hours)	
<b>Injuries</b>	None	
<b>Property damage</b>	\$12.5 million, including salvage, repairs, and lost vessels	
<b>Environmental damage</b>	Unknown amount of coal and cement released into the Ohio River	
<b>Weather</b>	Overcast with light snow, visibility 2 miles, winds 14 mph from the north, air temperature 15°F, water temperature 32°F	
<b>Waterway information</b>	The Ohio River extends 980 miles from the confluence of the Monongahela and Allegheny rivers at Pittsburgh, Pennsylvania, to Cairo, Illinois, where it flows into the Mississippi River. On the day of the accident, the river gage height at the Emsworth Dam Lower Pool was 27.04 feet, about 4 feet above flood watch activation. The current was estimated at 5–8 mph.	

On January 13, 2018, at 0630 local time, 27 dry cargo barges broke free from the Jacks Run barge fleeting area at mile 4 on the right descending bank of the Ohio River near Pittsburgh, Pennsylvania.<sup>2</sup> The barges drifted uncontrolled downriver and, beginning at 0712, struck the dams at the US Army Corps of Engineers Emsworth Locks and Dams complex, located at mile 6.2. Two Corps of Engineers workboats moored at the foot of the dam were also struck and driven into one of the dam's concrete piers, causing significant damage to both vessels. Nine barges and the Army workboats were declared constructive total losses in the accident. Total damage exceeded \$12.5 million.

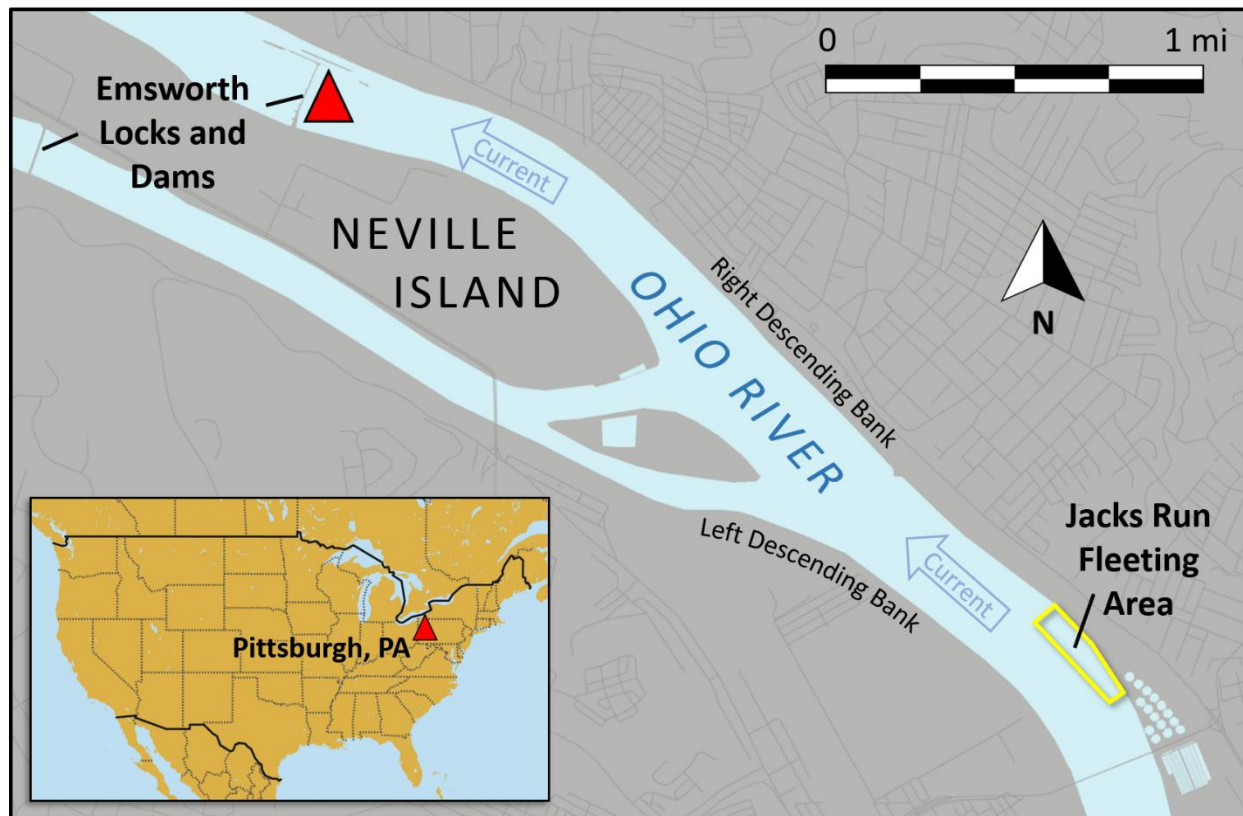
**Aerial photo of Emsworth Locks and Dam with breakaway barges (Photo by US Coast Guard)**



<sup>1</sup> All miles in this report are statute miles.

<sup>2</sup> The banks of western rivers are named left and right when traveling downstream. To avoid confusion, commercial river traffic often calls the left bank the left descending bank and the right bank the right descending bank. (Source: US Coast Guard)

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Location of the accident. (Map data by Google Maps)

### Accident Events

In November and December 2017, cold temperatures caused ice to form in the Pittsburgh area river systems. In early January 2018, temperatures rose above freezing during daylight hours causing some ice formations to thaw, break free, and float downriver before freezing again during the night.

On January 12, the Pittsburgh area experienced a record amount of rainfall at 1.99 inches. As a result, the water level in the Ohio River rose more than 12 feet between midnight on January 12 and 0615 on January 13, as measured by the US Geological Survey gage at the Emsworth Locks and Dams. The current in the river increased accordingly, as well as the amount of ice flowing down the river.

At mile 4 on the river, 27 commercial open-hopper barges, some empty and some filled with bulk cargo such as coal or cement aggregate, were moored to the riverbank at the Jacks Run fleeting area. A fleeting area is a commercial operation where maritime transportation companies stage, make up, break down, or reconfigure barge tows. The fleeting area was normally tended by the *Jack Klee*, a smaller, 800-horsepower (hp) towing vessel, but in anticipation of the highwater conditions and ice buildup on the river, the company managing Jacks Run deployed two larger towing vessels, the 1,050-hp *James Garrett* and the 1,800-hp *Cori Weiland*, to the area. In the early morning on January 13, the two towing vessels were idling their engines while made up to the sterns of the last two barges in the outermost (riverside) strings of the flotilla. According to the captains of both vessels, their crews had spent the night checking the moorings and lashings for all the barges. The captain on the *James Garrett* stated that the conditions did not allow ample time

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for the vessel's crew to adjust the mooring lines in order to accommodate the rising water, and he described the situation as "getting worse by the minute." Meanwhile, ice formations were accumulating at the head of the barge fleet.

About 0615, the captain of the *Cori Weiland*, who was in the vessel's pilothouse monitoring VHF radios, "saw sparks fly" in his peripheral vision. He later told investigators that he believed the sparks came from the mooring to the forward steel-pile mooring cell as it gave way. The captain stated that he looked at his global positioning system (GPS) indicator, realized that his vessel and the barges were now adrift, and noted that "we were picking up speed." The captain sounded the general alarm and called the captain on the *James Garrett* as the entire flotilla began moving downriver.

The two towing vessels, coordinating efforts over the VHF radio, increased engine speed to full ahead in an attempt to push the barges back toward the fleeting area, but the current overpowered them. The *Cori Weiland* captain said, "we were just picking up speed rapidly. We were doing almost 6 miles an hour in a short time, actually 5 to 8 [mph], and all that ice was jammed up behind us." The captains of both towing vessels became concerned for the safety of their vessels and crews, so they ordered the crews to let go of the barges. After unsuccessfully attempting to gather up some of the barges as the flotilla broke apart, the *Cori Weiland* and the *James Garrett* each made up to single drifting barges and began pushing them to safety. The captains then notified other towing vessels in the area and the Corps of Engineers at the Emsworth Locks and Dams of the breakaway barges.

The 25 remaining barges drifted down the Ohio River, and, at 0712, the first of the barges struck the dam located north of Neville Island. Seven barges passed through the dam's open lift gates, two barges sank above the dam, and the rest of the barges lodged in various locations along the dam structure, riverbank, and the area surrounding the dam. One barge floated down the back channel on the south side of Neville Island, hit the dam, and then sank above the dam.



Hopper barges after striking the main channel dam. (Photo by Coast Guard)

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### Damage

The accident resulted in the constructive total loss of both Corps of Engineers vessels, valued at \$690,404 combined. Seven barges were also lost, and all but one of the remaining barges required repairs. Damage to the barges, including lost cargo, totaled \$7.10 million. Salvage and other additional costs totaled \$3.99 million. According to the Corps of Engineers, the accident did not cause structural damage to the Emsworth Dams.



**Stern of barge C508 after colliding with Corps of Engineers workboats *Emsworth* (foreground) and *Dashields* (background). (Photo by Coast Guard)**

### Emsworth Locks and Dams

The Emsworth Locks and Dams consist of two separate structures located on opposite sides of Neville Island. The locks and main dam are located between the right descending bank of the Ohio River and Neville Island, 6.2 miles downstream from the city of Pittsburgh. The back-channel dam is located between Neville Island and the left descending bank of the river, 6.8 miles downstream of Pittsburgh. The Emsworth Locks and Dams are fixed, lift gated, concrete dams that were originally put into service in 1922 and had a major rehabilitation completed in the late 1980s. The main dam is 968 feet wide and has 8 vertical lift gates, each gate 100 feet wide. There are two lock chambers located north of the main dam. The main lock chamber is 110 feet wide by 600 feet long, and the auxiliary lock chamber is 56 feet wide by 360 feet long. The back-channel dam is 750 feet wide and has six vertical lift gates, each 100 feet wide.

## Barge Breakaway and Contact with the Emsworth Locks and Dams



**Emsworth Locks and Dams (not on accident date). Main channel locks and dam circled in red. Back channel dam circled in blue. The location is just west of Pittsburgh, Pennsylvania. (Satellite imagery by Google Earth Pro)**

## Jacks Run Fleeting Area

The Jacks Run fleeting area, located 4 miles west of downtown Pittsburgh on the right descending bank of the Ohio River, was owned by the Allegheny County Sanitary Authority (ALCOSAN), which operated a wastewater treatment facility on the adjacent riverside property.

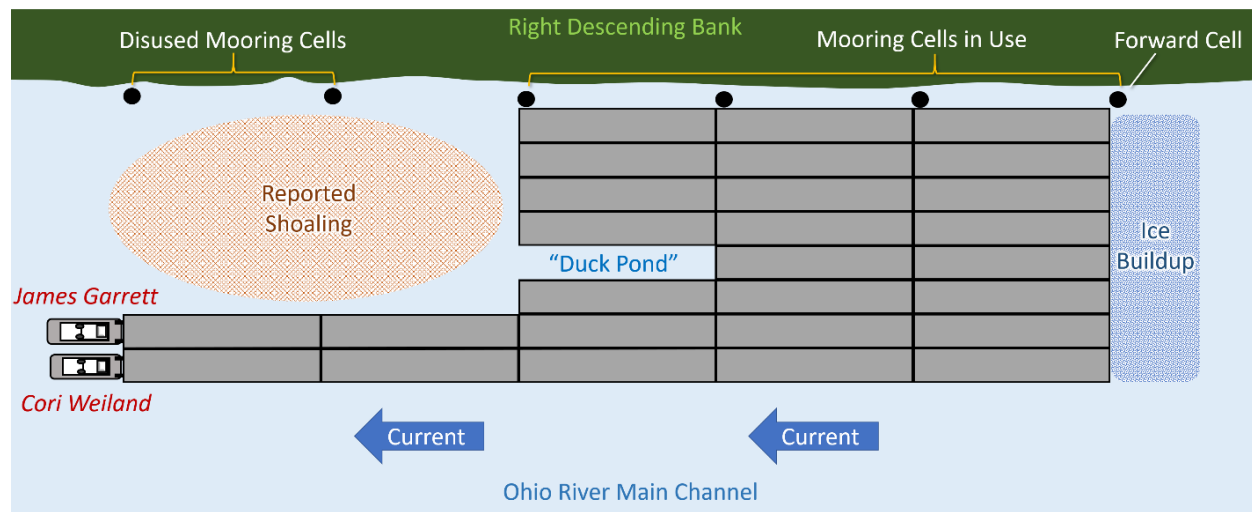


**Mooring cell at the Jacks Run fleeting area. (Photo by Coast Guard)**

The fleeting area was leased on a no-fee basis to the Industry Terminal and Salvage Company (ITS). (ITS had been the operator of the fleeting area since before ALCOSAN's purchase of the property in 1996.) Constructed in the 1930s, the area originally contained several wood-pile mooring cells that were upgraded in 1939 to steel-pile mooring cells, 16 feet in diameter, filled with dredge spoils. Each pile set had a series of large diameter steel rings connected to the cell that could be used for attaching mooring lines. In June 1951, the facility was expanded downriver with additional steel-pile cells, 13 foot 7 inches in diameter, with similar mooring arrangements. According to statements made by operators using the fleeting area, two of the mooring cells were considered unusable, though not condemned by the owner or operator of the facility. There was also reported shoaling toward the downstream portion of the fleeting area caused by the discharge of Jack's Run Creek into the Ohio River.

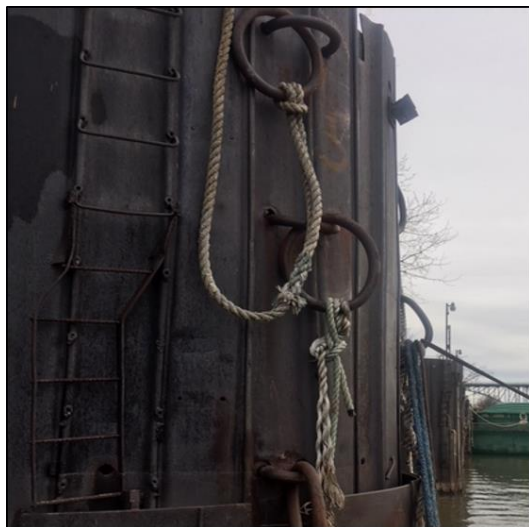
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The barges moored at the Jacks Run fleeting area on the day of the accident were aligned in five rows, with the first two rows consisting of eight barges moored together side-by-side. The third row contained seven barges, with four barges on the shore side and three barges on the river side, with a gap, sometimes called a “duck pond,” in between the two groups of barges. The last two rows each had two barges moored behind the two riverside barges of the preceding row. The flotilla of barges was moored along the riverbank to four of the steel-pile mooring cells. The remaining mooring cells were unused due to the poor condition of the cells and because of the shoaling in the vicinity of the cells.



**Barge mooring arrangement at Jacks Run fleeting area prior to the breakaway. (Barges, towing vessels, and mooring cells drawn approximately to scale; other elements not to scale)**

During a postaccident examination of the fleeting area, investigators found that a steel ring on the upstream mooring piling that had held the headlines for the barge flotilla had broken away from the piling at its anchor point. A steel mooring ring on the third piling downstream from the head piling had deformed into an oblong shape. Lengths of parted and frayed steel cables and lines were still attached to several of the mooring points.



**At left, a piling with mooring rings as designed. At right, the forward piling with a broken mooring ring anchor point and missing ring.**

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**At left, a deformed anchor ring on third piling back from the forward piling. At right, parted and frayed mooring wires from the lead shore-side barge during the accident.**

The Corps of Engineers does not have a written policy that specifically addresses barge fleeing areas, but during the permitting process for a new fleeing area, the Corps reviews the proposal from the perspective of the area's proximity to, and the potential impact upon, the navigational channel. Where impacts to the navigational channel are a concern, the Corps of Engineers will often issue permits with special conditions such as restrictions on the maximum width that vessels can be moored out into the waterway or the maximum length those moored vessels may run along the bank. The Jacks Run fleeing area permit contained no such restrictions on fleet width or length along the waterway and no special conditions requiring a "waterfront facility operations guide."

A waterfront facility operations guide contains practical guidance to operators concerning "the minimum standard of care for moored vessels and the facility waterfront under all conditions." This guide, according to the Corps of Engineers, is intended to provide procedures and clear courses of action, including emergency response plans, for all river stages and conditions. It also establishes restrictions for each mooring location, when applicable. The guide is expected to be kept current by operators and permit holders. It may be required by permit for some fleeing areas, but it is recommended by the Corps for all fleeing areas, regardless of permit requirement. Although not required at Jacks Run, a *Fleeting Procedures Guide* was developed by ITS that covered the criteria expected to exist in the waterfront facility operations guide.

The undated *Fleeting Procedures Guide* addressed a variety of subjects, including safe mooring procedures under routine, highwater, and falling river conditions; procedures for emergency situations such as icing; and contact information for responsible persons. The fleeing guide did not specify a maximum number of barges that could be moored at a facility or the maximum number of barges that were permitted to extend from the bank toward the channel (maximum fleet width). The guide's highwater procedures directed operators to narrow the fleet and "wire up all the barges solid and square without any notches or duck ponds." (Highwater conditions were not atypical for this region; in fact, there were six additional breakaway incidents in the Pittsburgh area in the first 5 months of 2018.)

The captains of the *Cori Weiland* and the *James Garrett* told investigators that they had tried to close the duck pond in the third row of the flotilla but were prevented from doing so by ice

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that had built up between the barges and in the duck pond area. Furthermore, they could not narrow the fleet due to the shoaling from Jack's Run Creek. The captains stated that they were familiar with the fleeing guide; however, the guide included only general procedures for highwater conditions.

## Fleeting Area Ownership and Operations

When the Corps of Engineers issues a permit for a fleeing area, the permittee is expected to keep the facility maintained and in good order. Permittees can repair, maintain, and make minor modifications without notifying the Corps of Engineers. The Jacks Run permit (#96005) stated that the permittee "must maintain the activity authorized by this permit in good condition and in conformance with the terms and conditions of this permit." When the permit was transferred to ALCOSAN by the Corps of Engineers in 1996 (from the previous owner, the Consolidated Rail Corporation), the transfer documentation stated that ALCOSAN was not relieved of the maintenance requirement, but it could make a good faith transfer of responsibility to a third party if it sold the property associated with the permit.

When ALCOSAN leased the fleeing area to ITS, the permit was not transferred to ITS. However, ALCOSAN representatives stated that they had nothing to do with the fleeing area and relied solely on their contractual agreement with ITS for permit compliance. An agency representative stated in an interview that ALCOSAN did not want to "be in a position to operate a commercial fleeing area . . . we wanted somebody who would occupy the entire site, secure the entire site, maintain the entire site. That's not our business. Our business is sewage." The terms of the ALCOSAN-ITS contract stated that the "tenant will . . . keep the cells and all lighting on and other safety features of the cells in good order, condition and repair." When interviewed, ALCOSAN representatives were unaware of who at ITS was responsible for day-to-day operations and maintenance of the mooring facility.

The lease agreement between ALCOSAN and ITS prohibited further assignment of the lease or subletting the fleeing area to another company. However, in August 2015, ITS entered into an agreement with McKees Rocks Harbor Services, LLC, (MRHS) with the intent "that MRHS manage the Mooring Area." Another company, Borghese Lane, LLC, was also included in the agreement. Borghese Lane operated the towing vessel *Jack Klee*, which normally tended the fleeing area and was owned by MRHS. (Borghese Lane, which also operated the *James Garrett* and the *Cori Weiland*, hired vessel crews from another company, Inland Towing and Fleeting.) The agreement required MRHS to shift barges to and from the fleeing area and to "ensure that the barges are properly moored at all times and the Mooring Area is maintained in a safe condition." There were no specific requirements relating to the maintenance of the mooring cells, and there were no limitations regarding the number or arrangement of barges moored at the facility. Although the lease between ALCOSAN and ITS was in effect until 2020, the agreement between MRHS, Borghese Lane, and ITS had expired at the time of the breakaway.

According to interviews with both ALCOSAN and ITS, the mooring piles at the Jacks Run fleeing area were not being maintained by any of the parties using the fleeing area. Interviews with ITS and its contractors (MRHS, Borghese Lane) indicated that no one was clear on how to request repairs or who was responsible for those repairs. When an ITS senior manager was queried about the company's role in operations and maintenance of the Jacks Run facility, he stated, "We have no operational role. It's specifically laid out in our contract between Industry Terminal and McKees Rocks Harbor Services. They manage and operate the facility. They're responsible for the



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fleeting, the shifting in and out, and the maintenance of the facility. I rarely go to the facility. I haven't been there for months.” The captains of the *James Garrett* and the *Cori Weiland* were asked if the crews had a process for inspecting the D-rings that were mounted to the mooring cells. They stated that they looked to see if there was visual damage, but no formal inspections were done by the operators. One of the captains then stated that, “there are cells down there that we don't use because of the conditions of the cell. We know to stay away from them.”

## Oversight and Regulatory Compliance

Federal and state governments have concurrent jurisdiction on navigable inland waters and the riverbed beneath. Before a barge fleeting area such as Jacks Run can be established, the project must be permitted by the Corps of Engineers, which focuses on maintaining the integrity of the navigational channel.<sup>3</sup> Section 10 of the Rivers and Harbors Act of 1899 establishes the authority of the Corps of Engineers to regulate activities affecting navigation in United States waters and states the following:

It shall not be lawful to build or commence the building of any wharf, pier, dolphin, boom, weir, breakwater, bulkhead, jetty, or other structures in any port, roadstead, haven, harbor, canal, navigable river, or other water of the United States . . . except on plans recommended by the Chief of Engineers and authorized by the Secretary of War.

The Corps of Engineers is not responsible for, nor does it require that, companies obtaining permits submit plans to a structural or civil engineer to ensure the integrity and viability of mooring piers, pilings, and associated equipment for a fleeting area. According to the Corps of Engineers, engineering certifications are recommended, but the integrity of all structures remains the responsibility of the permittee.

Although a waterfront facility operations guide may be required by permit, a representative from the Corps of Engineers Pittsburgh District stated that they have no regulatory authority to mandate operational controls over a vessel in a Corps of Engineers permitted fleeting area and have challenges in enforcing any standards for the structural integrity of mooring systems. Further, the representative stated that the Corps would not know of shoaling conditions at a fleeting area unless it impacted the navigational channel, or the owner or operator informed the Corps of Engineers that they intended to conduct dredging in the area.

The Coast Guard also has regulatory authority over some fleeting areas. However, this authority is limited to fleeting areas that receive barges carrying regulated dangerous cargos and addresses only the security of the facilities.<sup>4</sup> There are no Coast Guard regulations relating to the safety of fleeting areas, except for when those areas are located in a regulated navigational area (RNA). When established, RNAs may designate areas of interest in a region and may prescribe minimum mooring requirements for any vessel, regardless of cargo, during conditions such as high water. (RNAs are discussed in further detail on page 14 of this report.) There were no RNAs in the Pittsburgh region at the time of the accident, and thus Coast Guard regulatory authority for safety

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<sup>3</sup> See Title 33 *United States Code (USC)* Section 403 and Title 33 *Code of Federal Regulations (CFR)* Parts 209.200 and 322.

<sup>4</sup> See Title 33 *USC* Section 1226 and supporting regulations in Title 33 *CFR* Part 105.

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oversight did not extend to the Jacks Run fleeting area. (The Jacks Run fleeting area could receive barges with dangerous cargos and was therefore subject to Coast Guard security oversight.)

Breakaways are not unusual in the Ohio Valley River region. In fact, in a separate incident on the same day as this accident, 27 barges broke loose from another mooring facility on the Ohio River resulting in the sinking of 10 barges. In 1985, multiple breakaways occurred on the three regional rivers, the Monongahela, Ohio, and Allegheny. These breakaways resulted in river closures impacting not only traffic on the waterways but also the local economy and spurred a cooperative effort between the Corps of Engineers, the Coast Guard, and industry to require that facilities handling barges develop the waterfront facility operations guides. (Industry in the area is represented by the Waterways Association of Pittsburgh, a coalition of marine industry and related companies operating on and along the region's three rivers.)

In response to a breakaway incident that occurred in 1996, Coast Guard Marine Safety Unit (MSU) Pittsburgh, in cooperation with the Corps of Engineers Pittsburgh District, developed the "Fleet Sweep Program." Under the program, MSU Pittsburgh personnel periodically visited barge fleeting areas in their area of responsibility and conducted an examination. The examination was guided by a form that included questions such as:

Is the company familiar with the requirements of the Fleeting Permit?

Is all mooring equipment in good condition? (i.e. mooring cells, lines, dead men)<sup>5</sup>

Are all barges properly and securely moored?

The final page of the form contained signature lines for both the examiner and a representative for the fleeting area owner. According to MSU Pittsburgh officials who were interviewed during the accident investigation, examination forms were forwarded to the Corps of Engineers Pittsburgh District waterways inspector when discrepancies were found in a fleeting area. However, the waterways inspector, whose contact information was provided on the examination forms, told investigators that "I really very rarely see any of them."

For the fleeting area examinations, Coast Guard Sector Ohio Valley's Prevention Department had a standard operating procedure (SOP) for barge breakaways that was put into place in July 2007. The SOP included "Prevention of Barge Breakaways" and "Response to Barge Breakaways" sections. The prevention section listed four areas that were to be addressed by MSU commanding officers: 1) barge breakaway seminars; 2) outreach to river industry/community; 3) joint random fleeting area inspections; and 4) lessons learned. According to the SOP regarding joint random fleeting area inspections:

Unit commanders will set the amount and frequency of random fleeting area safety inspections to be conducted based upon [the operations tempo] and mission priorities. Inspection teams should incorporate a member from the Corps of Engineers and check for the condition of the materials used to secure the barges, overall safety hazards for workers, training of employees, and compliance with the Corps of Engineers fleeting permit.

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<sup>5</sup> *Dead men* are concrete or steel anchors, normally embedded in the ground on shore or on the river bottom, used for mooring vessels.

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The Corps of Engineers inspector stated in his interview that he had never participated in joint inspections with the Coast Guard and, in fact, that the Corps of Engineers did not have a standard by which they completed inspections.

In the case of Jacks Run, the Coast Guard conducted a visual examination of the fleeting area using the Fleet Sweep Program form about 9 months before the accident. The form was dated April 6, 2017. The question regarding company familiarity with fleeting permit requirements was left unanswered, and the question regarding whether all mooring equipment was in good condition was checked “Yes.” The examiner answered “N/A” to the question regarding the proper and secure mooring of barges. According to Coast Guard officials, no barges were moored at the fleeting area during the examination. On the form reviewed by investigators, no contact information was provided for the facility owner, and the signature page was missing.

Coast Guard representatives told investigators that examiners do not have copies of permits for many of the fleeting areas, the fleeting areas are commonly not staffed, and barges are often not moored in the area when the examiners arrive for an inspection. Without having the Corps of Engineers permit, the fleeting area owner’s waterfront facility operations guide, or a company representative staffing the fleeting area, the Coast Guard examination cannot be fully completed in accordance with the examination form. Furthermore, Coast Guard representatives stated that they had no training, regulations, or standards to attest to the structural integrity of the fleeting area. Thus, any recommendations coming from fleeting area examinations were based on the inspector’s experience and known industry best practices. (Following the accident, the Coast Guard evaluated the Fleet Sweep Program and, after determining that it was ineffective, canceled the program pending further cooperative efforts with the Corps of Engineers.)

The Coast Guard and Corps of Engineers, in partnership with industry groups, have preventive programs in place to address the risk presented by the annual highwater and ice conditions. Each year, the Waterways Association of Pittsburgh hosts a barge breakaway seminar, and the Coast Guard and Corps of Engineers, along with other stakeholders, are invited to make presentations. The seminars stress the importance of preparing for inclement weather and river conditions, the need for adequately securing barges, and the importance of coordination amongst the various tow vessel operators in assisting with corralling breakaway barges, should the need arise. Investigators found no evidence that the originally permitted owner of the Jacks Run fleeting area, ALCOSAN, or any of the organizations involved in the leasing or subleasing of this location had previously attended this seminar.

## Personnel

The captain of the *Cori Weiland* during the breakaway incident stated that he had been with Inland Towing and Fleeting for 16 months. He had 26 years of mariner experience on the rivers, 21 years of which he was a master. Although he did not know who maintained the Jacks Run fleeting area, he was familiar with the fleeting area, as well as many other fleeting areas on the inland river system. When asked by investigators if he had seen the Corps of Engineers permit for the fleeting area, the captain said that he had never seen a permit for it or any of the other fleeting areas in which he operated. He also stated that he had never attended the annual barge breakaway seminars held by the Waterways Association of Pittsburgh.

The captain on the *James Garrett* could answer general questions asked by the investigators regarding the Jacks Run waterfront facility operations guide. However, he could not answer more

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detailed questions regarding specific requirements contained in that manual regarding highwater and ice procedures. He had not attended any of the breakaway seminars.

## Previous NTSB Investigations Involving Barge Breakaways

The NTSB investigated the December 14, 1982, breakaway of 38 barges on the Arkansas River. Ten barges, moored in an unauthorized fleeting area, came adrift during a period of high river flows and drifted into an authorized fleeting area, causing 25 barges to break away from their moorings. The barges drifted downstream and collided with a state highway bridge and a grain dock, where 3 more barges were set adrift. No one was injured, but the resultant property damage was estimated at over \$12 million. The investigation found instances of noncompliance with the Corps of Engineers fleeting permit that were indicative of the fleet operator's "lax attitude" concerning permit requirements and the safety of barges left in the company's care. Investigators also determined that the Corps of Engineers needed to develop a means to protect the Arkansas River dams from the hazard presented by breakaway barges during periods of high water.

In response to that accident, the NTSB issued two recommendations to the Corps of Engineers. Safety Recommendation M-83-58 urged the Corps of Engineers to "institute a monitoring program for the District Engineers to verify that the terms and conditions of construction permits issued for barge fleeting areas by the Corps of Engineers are met." On September 22, 1987, this recommendation was classified "Closed—Acceptable Action" after the Corps of Engineers began an ongoing surveillance program of its permitted activities and performed a complete inspection of all permitted facilities involving barge tie-ups in the area. Safety Recommendation M-83-59 recommended that the Corps of Engineers "develop a means to protect dams of the McClellan-Kerr Arkansas River Navigation System from the danger presented during periods of high water by breakaway barges." In response, the Corps of Engineers conducted a model study on the Arkansas River, which was described in an August 1993 Technical Report HL-93-7, *Scour Project for Dam No. 2, Arkansas River*. The study determined appropriate modifications to the stilling basin at dam number 2 to prevent recurrence of the December 14, 1982, accident. The report recommended sinking old barges lengthwise in the channel bottom approximately 12 feet downstream from the dam stilling basin, and then filling the barges and the area between the stilling basin and barges with concrete. These modifications were completed in November 1992 across the entire width of the stilling basin. On July 19, 1994, Safety Recommendation M-83-59 was classified "Closed—Acceptable Action."

## Analysis

Just prior to the breakaway of the barges, the Ohio River was swelled by heavy rain causing the current to increase significantly over a short period of time. The rising water and increasing current, along with floating ice that had been building up at the head of the barge flotilla, significantly strained the barge moorings. When the barges broke free, the captain of the towing vessel *Cori Weiland* reported seeing sparks in the vicinity of the forward mooring cell. After the accident, investigators found that the mooring ring on the cell was missing, and the mooring ring anchor point was broken. A mooring ring on another cell was significantly misshapen. Broken mooring lines and cables were also found attached to the mooring cells. The NTSB concludes that the breakaway of the barges at Jacks Run fleeting area occurred when the force of the river current acting on the extensive ice buildup at the front of the barge flotilla exceeded the capacity of the fleeting area's mooring cell fittings and the barge mooring wires.

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The *Fleeting Procedures Guide*, produced by the fleeting area operator ITS, instructed crews tending Jacks Run and other fleeting areas managed by the company to narrow the width of barge flotillas and remove gaps between barges (“duck ponds”) during highwater conditions. At the Jacks Run facility, however, shoaling prevented the crews of the assigned towing vessels from narrowing the flotilla, and ice prevented them from closing a duck pond in the middle of the flotilla. Thus, a majority of the barges were moored toward the front of the flotilla, where ice was building up, and toward the river side, where the current was strongest. Also, due to the shoaling and poor condition of the two downstream mooring cells (which rendered them unusable), only the first three rows of barges were moored to shore. The NTSB concludes that poor maintenance of the mooring cells and shoaling in the fleeting area prevented the towing vessel crews from establishing a suitable mooring arrangement for the barge fleet, which resulted in a failure of the moorings during highwater and ice conditions.

Waterfront facility operations guides were developed in partnership between the Corps of Engineers and the Waterfront Association of Pittsburgh and are an industry best practice for managing fleeting areas. These guides were designed to provide facility operation personnel with a clear course of action to follow at all river stages and conditions. Although ITS had produced a guide—the *Fleeting Procedures Guide*—towing vessel crews tending the barges at the Jacks Run fleeting area could not follow procedures in the guide to narrow the fleet and close gaps between barges during highwater conditions. As described above, the lack of procedural compliance was not crew negligence, but rather a consequence of the failure of the owner and operator to properly maintain the facility. Had ITS strictly enforced the policies laid out in its waterfront facility operations guide, it is likely that the poor maintenance conditions at the Jacks Run fleeting area would have been addressed prior to the accident and the towing vessel crews could have followed highwater procedures.

The company holding a fleeting area permit is responsible for ensuring that the area is meeting the requirements set forth therein by the Corps of Engineers. The permit held by ALCOSAN was not transferred to ITS as part of the lease agreement, and therefore ALCOSAN was ultimately responsible for ensuring that the permit was in good standing and that the fleeting area was being properly maintained. ALCOSAN representatives believed, however, that in accordance with the lease agreement, ITS was responsible for complying with requirements in the permit and ensuring that any issues related to the safety and maintenance of the fleeting area were addressed. An ITS representative stated that sublessees of the area were responsible for maintenance, but this responsibility was not clear in the contracts, which were expired at the time of the accident. Regardless, investigators found no records or other evidence indicating that ALCOSAN, ITS, or any of ITS’s sublessees were conducting regular maintenance for the Jacks Run fleeting area. As previously noted, some mooring cells were in disrepair and shoaling had been allowed to occur, significantly impacting operations in the fleeting area. The NTSB concludes that neither the owner, ALCOSAN, nor the operator, ITS, of the Jacks Run fleeting area was adequately maintaining the facility and its moorings.

Permittees are expected but not required to provide a waterfront facility operations guide to the Corps of Engineers when a permit application is submitted. However, the Corps of Engineers does not review the guides before the permits are approved. As the guides are only recommended best practices and not required by regulation, neither the Corps of Engineers nor the Coast Guard can enforce operator compliance with the company policies contained therein. Without enforcement authority, not all operators are following the guides and some of these shortfalls are

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contributing to breakaways. If operators followed company policies outlined in their waterfront facility operations guides, then the increased safety procedures could help prevent hazardous conditions that contribute to barge breakaways. Developing a regulation that provides the Corps of Engineers or the Coast Guard with the authority to review, provide feedback on, and enforce compliance with waterfront facility operations guides would ensure that companies are putting sound procedures in place and that their operators are complying with the procedures. Therefore, the NTSB recommends that the Corps of Engineers require fleeting area permittees to submit waterfront facility operations guides when applying for permits and review those guides to ensure that they are adequately addressing the maintenance of fleeting areas and procedures for operating in highwater and ice conditions. Furthermore, the NTSB recommends that the Coast Guard and Corps of Engineers work together to develop a policy to ensure fleeting areas are maintained in compliance with permit requirements.

Title 33 *Code of Federal Regulations (CFR)* Part 165 authorizes Coast Guard District Commanders to establish regulated navigation areas (RNAs) to “control vessel traffic in an area which is determined to have hazardous conditions.” On the Mississippi River, an RNA has been established between miles 88 and 240 that, among other regulations, requires additional measures to be taken at fleeting areas during highwater conditions to prevent breakaways.<sup>6</sup> Similarly, in the Gulf Intracoastal Waterway, an RNA has been established that provides detailed requirements for barge mooring in extreme weather conditions. Furthermore, the RNA requires regular mooring facility inspections and specifies that facility inspection records include the following:

- The time of commencement and termination of each inspection.
- The name of each person who makes the inspection.
- The identification of each barge entering or departing the fleeting facility.

Additionally, facilities in the RNA must obtain a “certification by a professional engineer that the mooring arrangements are able to withstand winds of up to 140 mph, a surge water level of eleven feet, a current of four mph and a wave height of three feet within the canal basin in the area.”<sup>7</sup>

The Pittsburgh region has a long history of barge breakaways caused by high water and other environmental conditions such as ice buildup. In the 328 miles of river in MSU Pittsburgh’s area of responsibility, these breakaways have the potential to inflict catastrophic damage to the area’s 23 locks and dams and 108 bridges. In the first 5 months of 2018 alone, six barge breakaway incidents created significant economic and waterway disruption. The region has over 350 known fleeting areas, but no safety regulations exist for barge fleeting areas holding unregulated cargo. Currently, the region has no RNAs. The NTSB concludes that had the Pittsburgh area had an RNA with condition-based mooring requirements similar to the Mississippi River and Gulf Intracoastal Waterway RNAs, it is likely that the poor condition of the Jacks Run mooring cells would have been discovered and addressed.

Having certification that the structural integrity of the fleeting facility is sufficient may address some of the breakaway issues, particularly if those areas continue to be maintained. Both

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<sup>6</sup> See Title 33 *CFR* Part 165.803.

<sup>7</sup> See Title 33 *CFR* Part 165.838(e)(1)(vii).

## Barge Breakaway and Contact with the Emsworth Locks and Dams

the Coast Guard and Corps of Engineers stated that they do not have the resources or authority to inspect structural integrity, though they believe it could eliminate some of the breakaway issues. However, as demonstrated in the Gulf Intracoastal Waterway, an RNA can be established to require engineering certification of mooring arrangements. Therefore, in order to reduce the risk of barge breakaways at Jacks Run and other fleeting areas in the region, the NTSB recommends that the Coast Guard develop an RNA for the Pittsburgh region that would ensure the integrity of fleeting areas and include detailed requirements for barge moorings during highwater and ice conditions.

## Findings

1. The breakaway of the barges at Jacks Run fleeting area occurred when the force of the river current acting on the extensive ice buildup at the front of the barge flotilla exceeded the capacity of the fleeting area's mooring cell fittings and the barge mooring wires.
2. Poor maintenance of the mooring cells and shoaling in the fleeting area prevented the towing vessel crews from establishing a suitable mooring arrangement for the barge fleet, which resulted in a failure of the moorings during highwater and ice conditions.
3. Neither the owner, the Allegheny County Sanitary Authority, nor the operator, Industry Terminal and Salvage Company, of the Jacks Run fleeting area was adequately maintaining the facility and its moorings.
4. Had the Pittsburgh area had a regulated navigation area with condition-based mooring requirements similar to the Mississippi River and Gulf Intracoastal Waterway regulated navigation areas, it is likely that the poor condition of the Jacks Run mooring cells would have been discovered and addressed.

## Probable Cause

The National Transportation Safety Board determines that the probable cause of the barge breakaway at the Jacks Run fleeting area and the barges' contact with the Emsworth Locks and Dams was the failure of the fleeting area owner, Allegheny County Sanitary Authority, and the operator, Industry Terminal and Salvage Company, to maintain the area's mooring cells and prevent shoaling, which resulted in inadequate mooring arrangements during highwater and ice conditions. Contributing to the accident was the Army Corps of Engineers and Coast Guard's lack of resources and authority to effectively inspect fleeting areas and ensure that they are maintained.

## **Barge Breakaway and Contact with the Emsworth Locks and Dams**

### **Recommendations**

As a result of its investigation, the National Transportation Safety Board makes the following safety recommendations:

#### **To US Army Corps of Engineers:**

Require fleeting area permittees to submit waterfront facility operations guides when applying for permits and review those guides to ensure that they are adequately addressing the maintenance of fleeting areas and procedures for operating in highwater and ice conditions. (M-19-4)

In collaboration with the Coast Guard, develop a policy to ensure fleeting areas are maintained in compliance with permit requirements. (M-19-5)

#### **To the US Coast Guard:**

In collaboration with the Corps of Engineers, develop a policy to ensure fleeting areas are maintained in compliance with permit requirements. (M-19-6)

Develop a regulated navigation area for the Pittsburgh region that would ensure the integrity of fleeting areas and include detailed requirements for barge moorings during highwater and ice conditions. (M-19-7)

### **BY THE NATIONAL TRANSPORTATION SAFETY BOARD**

**ROBERT L. SUMWALT, III**  
Chairman

**EARL F. WEENER**  
Member

**BRUCE LANDSBERG**  
Vice Chairman

**JENNIFER HOMENDY**  
Member

**Adopted: May 17, 2019**



## Barge Breakaway and Contact with the Emsworth Locks and Dams

### Vessel Particulars

<b>Vessels</b>	<b>Emsworth</b>	<b>Dashields</b>	<b>Barges</b>
<b>Owner/operator</b>	US Army Corps of Engineers	US Army Corps of Engineers	American River Transportation Company (1); Crouse Corporation (10); Heartland Barge Management (1); Ingram Marine Group (13); other (2)
<b>Homeport/port of registry</b>	Pittsburgh	Pittsburgh	Various US cities
<b>Flag</b>	United States	United States	United States
<b>Type</b>	Workboat	Workboat	Hopper barges
<b>Year built</b>	2000	2010	Various
<b>Hull ID Number/ Official number (US)</b>	SAMA1137G0000	SAMA1979E010	Various
<b>Construction</b>	Aluminum	Aluminum	Steel
<b>Classification society</b>	N/A	N/A	N/A
<b>Length</b>	39 ft (11.9m)	53 ft (10.7 m)	195–200 ft (59.4–61 m)
<b>Draft</b>	5 ft (1.5m)	5 ft (1.5 m)	9 ft (2.7 m)
<b>Beam/width</b>	14 ft (4.3 m)	15 ft (4.6 m)	35 ft (10.7 m)
<b>Displacement/Gross Tonnage</b>	30,860 lbs (displacement)	27,040 lbs (displacement)	630–802 GRT
<b>Engine power; manufacturer</b>	Twin, 8 cylinder, (210 hp each)	Twin, 6 cylinder (500 hp each)	N/A
<b>Persons on board</b>	0	0	0

**NTSB investigators worked closely with our counterparts from Coast Guard Marine Safety Unit Pittsburgh throughout this investigation.**

For more details about this accident, visit [www.nts.gov](http://www.nts.gov) and search for NTSB accident ID DCA18PM011.

The NTSB has authority to investigate and establish the probable cause of any major marine casualty or any marine casualty involving both public and nonpublic vessels under Title 49 *United States Code*, Section 1131. This report is based on factual information either gathered by NTSB investigators or provided by the Coast Guard from its informal investigation of the accident.

The NTSB does not assign fault or blame for a marine casualty; rather, as specified by NTSB regulation, “[NTSB] investigations are fact-finding proceedings with no formal issues and no adverse parties . . . and are not conducted for the purpose of determining the rights or liabilities of any person.” Title 49 *Code of Federal Regulations*, Part 831.4.

Assignment of fault or legal liability is not relevant to the NTSB’s statutory mission to improve transportation safety by conducting investigations and issuing safety recommendations. In addition, statutory language prohibits the admission into evidence or use of any part of an NTSB report related to an accident in a civil action for damages resulting from a matter mentioned in the report. Title 49 *United States Code*, Section 1154(b).