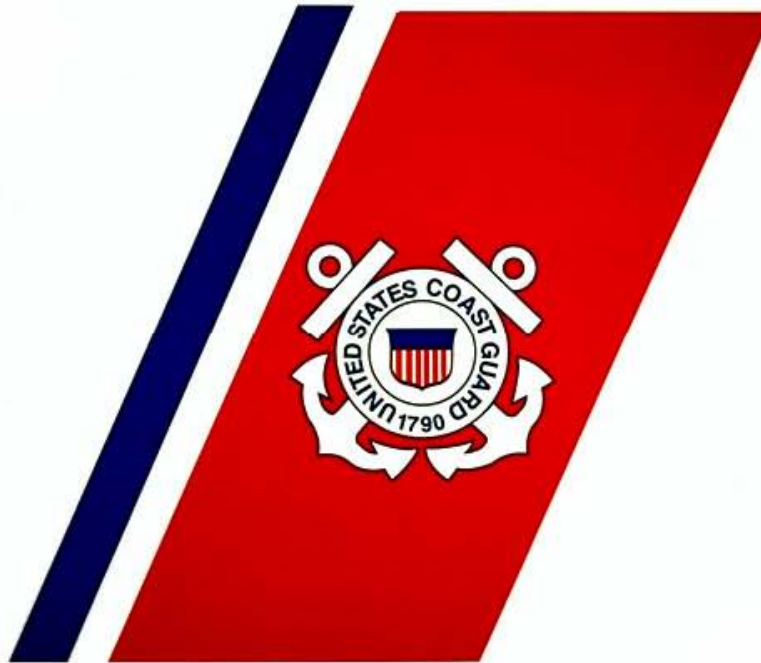


# Report of Investigation

Sinking of the M/V ELIZABTH M (Official Number # 262962) and Six  
Barges with Four Fatalities on January 09, 2005 at the Montgomery  
Locks and Dam on the Ohio River at Mile Marker 31.7



USCG MISLE Incident Investigation Activity Number 2271812

## **Table of Contents**

List of Tables and Figures	2
Executive Summary	4
U. S. Coast Guard District Formal Hearing	6
Vessel and Cargo Data	7
Record of Deceased and Injured	9
Montgomery Locks and Dam Particulars	10
Findings of Fact	11
Conclusions	50
Recommendations	55
List of Enclosures	58

## List of Tables and Figures

### List of Tables:

Table 1: Towing Vessel Data .....	7
Table 2: Barge Data.....	7
Table 3: Rescue/Recovery Vessel Data.....	7
Table 4: Record of Deceased.....	9
Table 5: Record of Injured.....	9
Table 6: Montgomery Locks and Dam Data.....	10
Table 7: Weather and River Conditions at Montgomery Locks and Dam on 08JAN05.....	17
Table 8: RICHARD C Particulars.....	19
Table 9: Weather and River Conditions at Montgomery Locks and Dam on 09JAN05.....	22

### List of Figures:

Figure 1: Overview of casualty scene.....	5
Figure 2: Pre-casualty photographs of the ELIZABETH M taken October 2004.....	8
Figure 3: Diagram of Montgomery Locks and Dam.....	10
Figure 4: Post-casualty photographs of ballast installed in the engineroom on the ELIZABETH M in April 1997.....	12
Figure 5: Post-casualty photographs of ELIZABETH M rub rail damage sustained on 31DEC05.....	15
Figure 6: The handwritten orders, as issued on 08JAN05, by Campbell Transportation Company.....	18
Figure 7: Configuration of ELIZABETH M and tow while in the lock chamber.....	23
Figure 8: Description of Lockage Types from U.S. Army Corps of Engineers website.....	24
Figure 9: Approximate location of Montgomery Locks and Dam outdraft and eddy currents.....	24
Figure 10: Approximate boundaries of the restricted areas of Montgomery Locks and Dam.....	25
Figure 11: Approximate location and configuration of the ELIZABETH M and tow just prior to maneuvering to face up to the stern of the tow.....	26
Figure 12: Approximate location and configuration of the ELIZABETH M after facing up to the tow.....	27
Figure 13: Approximate location and configuration of the ELIZABETH M and tow after the allision with the bull nose of the center lock wall.....	28
Figure 14: Approximate location and configuration of the ELIZABETH M and tow after the allision with the river side lock wall.....	29
Figure 15: Approximate location and configuration of the ELIZABETH M and tow after the allision with landside lock wall.....	30

Figure 16: Approximate location and configuration of the ELIZABETH M and tow after being pushed up to the 800 foot mark on the landside lock wall.....	31
Figure 17: Approximate location and configuration of the ELIZABETH M and tow after placing a line onto a timberhead on the starboard bow of the center barge in the starboard string.....	32
Figure 18: Approximate location of the ELIZABETH M and barges after striking the dam.....	34
Figure 19: Post-casualty photograph of the ladder on the ELIZABETH M leading to the top of the pilothouse used by [REDACTED] to secure himself and [REDACTED] until they were rescued.....	35
Figure 20: Post-casualty photograph of the top of the pilothouse.....	36
Figure 21: Pre-casualty and post-casualty photographs of the pilothouse console...	37
Figure 22: Post-casualty photographs of air filter housing on Texas deck and collapsed flexible PVC duct hoses in MDE air intake system.....	38
Figure 23: Post-casualty photograph of pinholes and fractures in the ELIZABETH M forepeak.....	43
Figure 24: Post-casualty photograph of ELIZABETH M raised poop deck.....	44
Figure 25: Example of unserviceable hatch dogs found on ELIZABETH M .....	44
Figure 26: Post-casualty photographs of cutouts in ELIZABETH M main deck ...	45
Figure 27: Post-casualty photographs of the ELIZABETH M taken during salvage operations and vessel survey.....	46



## **Executive Summary**

1. On January 9, 2005, at approximately 0200, the M/V ELIZABETH M and her six barge tow successfully locked up-bound through the Montgomery Locks and Dam located in Beaver County, PA at mile marker 31.7 on the Ohio River. The tow included a total of six (6) loaded open hopper coal barges. The lock approach and lockage were uneventful.

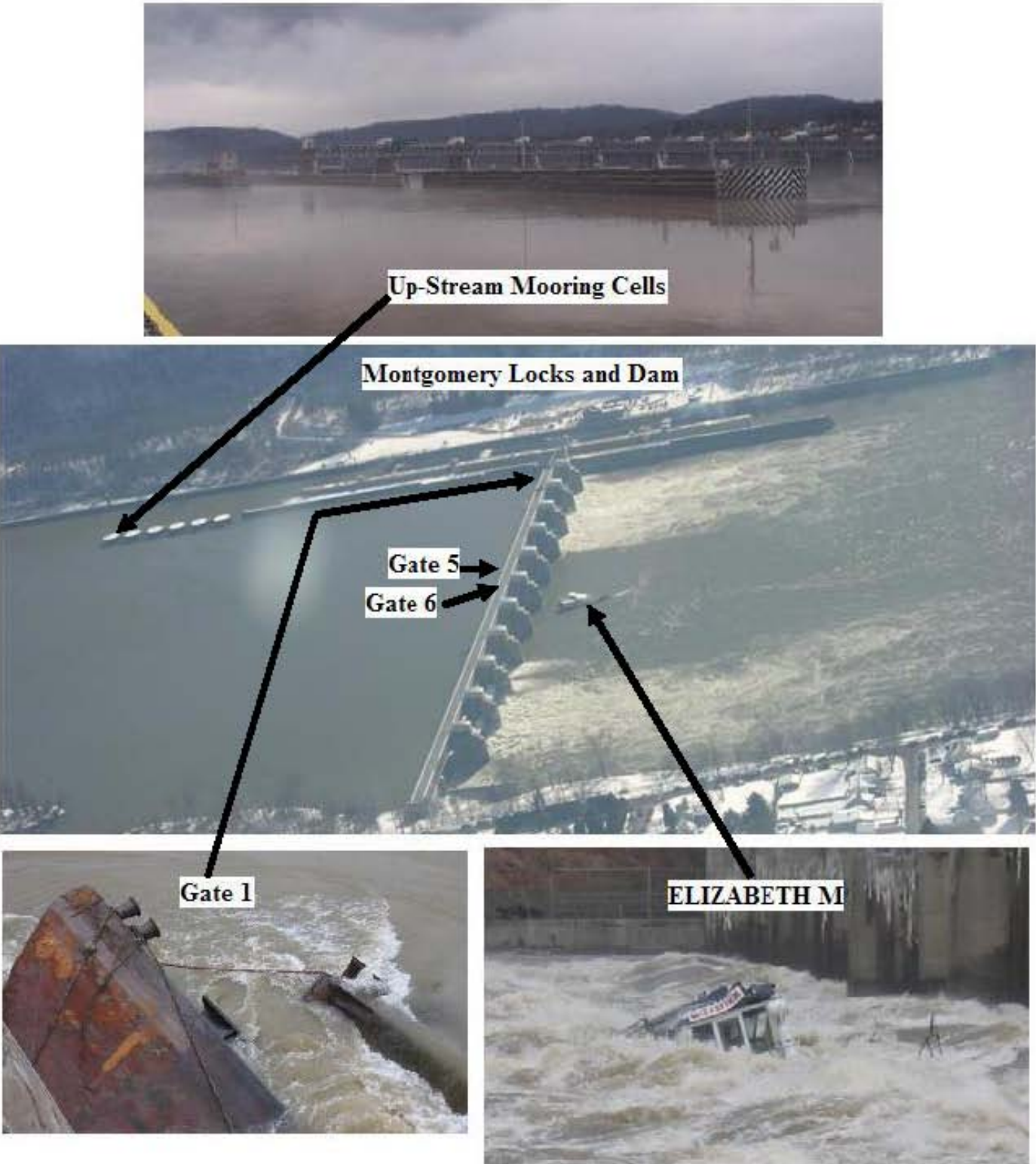
2. While the ELIZABETH M was exiting the lock chamber and facing up to the tow “on the fly,” the barges were set to port towards the center of the river. The set led to an initial allision with the middle lock wall bull nose and the two barges at the head of the tow began to breakaway. A second allision between the tow and the mooring cells at the end of the riverside lock wall caused the two lead barges to wrap around the end of the riverside lock wall. A third allision between the stern of the towboat and the landside lock wall caused most of the facing wires between the towboat and the tow to separate. Efforts to regain control of the barges proved unsuccessful and, at approximately 0220, the ELIZABETH M and two barges went over the Montgomery Dam.

3. The ELIZABETH M sank and came to rest just below the Montgomery Dam between gates 5 and 6. A portion of the pilot house remained above the waterline after the vessel sank. Two of the six barges in the vessel’s tow preceded the ELIZABETH M over the dam and continued downstream and subsequently sank. One barge sank near the lower approach cells and the other barge sank near the right descending bank on the Ohio River at mile marker 33.5. The four remaining barges sank upstream of the dam in the vicinity of gates 1, 2, 3 and 4.

4. Subsequent to the sinking of the ELIZABETH M, three crewmembers perished, one crewmember was missing and three crewmembers survived. The three surviving crewmembers suffered various degrees of injury, mostly hypothermia, contusions and lacerations. Rescue/recovery operations were carried out by three towboats that were operating in the area - the M/V ROCKET, M/V SANDY DRAKE and M/V LILLIAN G.

5. The ELIZABETH M was raised on March 4, 2005. After the vessel was raised the unaccounted for crewmember was located in the vessel’s engineroom. The vessel was transported to, and dry-docked at, C& C Marine Maintenance Co. in Georgetown, PA located at mile 39 on the Ohio River. The vessel was surveyed and the owners plan to scrap the vessel after removing serviceable equipment.

Figure 1: Overview of casualty scene.



## U. S. Coast Guard District Formal Hearing

1. On Monday, January 10, 2005, the Commander, Eighth Coast Guard District convened a District Formal Investigation to determine, to the extent possible, the cause(s) of the sinking of the ELIZABETH M. The public hearing was opened in Pittsburgh, PA on January 31, 2005 and concluded on Friday, February 4, 2005.
2. Ten Parties in Interest were designated:
  - a. Campbell Transportation Co., owner/operator of the ELIZABETH M and the six barges. Counsel: Mr. [REDACTED], Grogan and Graffam, Pittsburgh, PA.
  - b. Stelco Steel Co., cargo owners. Counsel: Mr. [REDACTED], Babst, Calland Clements & Zomnir, Pittsburgh, PA.
  - c. U.S. Army Corps of Engineers, owner and operator, Montgomery Locks and Dam. Counsel: Ms. [REDACTED], U.S. Department of Justice, Washington, DC.
  - d. Mr. [REDACTED], Master of the ELIZABETH M. Counsel: Mr. [REDACTED], Thieman and Ward, Pittsburgh, PA.
  - e. The family of Mr. Scott A. Stewart, Pilot of the ELIZABETH M. Not represented by counsel.
  - f. The family of Mr. Rick A. Conklin, Striker-Pilot of the ELIZABETH M. Counsel: Mr. [REDACTED], Joseph P. Moschetta and Associates, Washington, PA.
  - g. Mr. [REDACTED], deckhand on the ELIZABETH M. Counsel: Mr. [REDACTED], Grogan and Graffam, Pittsburgh, PA.
  - h. The family of Mr. [REDACTED], deckhand on the ELIZABETH M. Counsel: Mr. [REDACTED], Lakin Law Firm, Wood River, IL.
  - i. The family of Mr. Thomas J. Fisher, deckhand on the ELIZABETH M. Counsel: Mr. [REDACTED], O'Bryan, Baun, Cohn & Kuebler, Birmingham, MI.
  - j. Mr. [REDACTED], deckhand on the ELIZABETH M. Counsel: Mr. [REDACTED], O'Bryan, Baun, Cohn & Kuebler, Birmingham, MI.
3. The Coast Guard called fourteen witnesses to testify. No witnesses were called by the Parties in Interest. Testimony was provided by:
  - a. Mr. [REDACTED], President Campbell Transportation
  - b. Mr. [REDACTED], Master ELIZABETH M
  - c. Mr. [REDACTED], Deckhand ELIZABETH M
  - d. Mr. [REDACTED], Deckhand ELIZABETH M
  - e. Mr. [REDACTED], Master RICHARD C
  - f. Mr. [REDACTED], Pilot RICHARD C
  - g. LT [REDACTED], U.S. Coast Guard
  - h. Mr. [REDACTED], U.S. Army Corps of Engineers (Lockmaster)
  - i. Mr. [REDACTED], U.S. Army Corps of Engineers (Lock Leader)
  - j. Mr. [REDACTED], U.S. Army Corps of Engineers (Locksman)
  - k. Mr. [REDACTED], U.S. Army Corps of Engineers (Locksman)
  - l. Mr. [REDACTED], Pilot ROCKET
  - m. Mr. [REDACTED], Pilot SANDY DRAKE
  - n. Mr. [REDACTED], Pilot LILLIAN G

## Vessel and Cargo Data

**Table 1: Towing Vessel**

Name	ELIZABETH M
O.N.	262962
Service	Towing Vessel
G.T.	303
N.T.	206
Length	108 ft.
Breadth	26.5 ft.
Depth	8 ft.
Propulsion	Twin Diesel with Kort Nozzles and 6 ft diameter propellers
H.P.	2200 total
Year Built	1951
Homeport	Pittsburgh, PA
Owner/ Operator	Campbell Transportation Co.

**Table 2: Barge Data**

Name	HBL 8205	CTC 962	CBL 7712	CTC 7616	CTC 7638	CTC 8412
O.N.	646167	690686	583352	680657	680679	672417
Service	Freight Barge	Freight Barge	Freight Barge	Freight Barge	Freight Barge	Freight Barge
G.T.	544	420	483	468	468	474
N.T.	544	420	483	468	468	474
Length	195 ft.	195 ft.	195 ft.	195 ft.	195 ft.	195.1 ft.
Breadth	26 ft.	26 ft.	26 ft.	26 ft.	26 ft.	26.1 ft.
Depth	10.5 ft.	11 ft.	10.2 ft.	11 ft.	11 ft.	11.1 ft.
Year Built	1982	1982	1977	1976	1976	1984
Homeport	Pittsburgh, PA	Pittsburgh, PA	Pittsburgh, PA	Pittsburgh, PA	Pittsburgh, PA	Pittsburgh, PA
Owner/ Operator	Campbell Trans. Co.	Campbell Trans. Co.	Campbell Trans. Co.	Campbell Trans. Co.	Campbell Trans. Co.	Campbell Trans. Co.
Cargo	Coal	Coal	Coal	Coal	Coal	Coal

**Table 3: Rescue/Recovery Vessel Data**

Name	SANDY DRAKE	LILLIAN G	ROCKET
O.N.	574855	507264	275027
Service	Towing Vessel	Towing Vessel	Towing Vessel
G.T.	237	292	143
N.T.	161	198	97
Length	93.5 ft.	84.5 ft	66.7 ft
Breadth	26 ft.	30 ft	27 ft
Depth	9 ft.	8.6 ft	7.3 ft
Propulsion	Single Screw	Twin Screw	Triple Screw
H.P.	1800	3,000	950
Year Built	1976	1967	1957
Homeport	Louisville, KY	Pittsburgh, PA	St. Louis, MO
Owner/ Operator	Crounse Corp.	Mon River Towing, Inc	Campbell Transportation Co.

Figure 2: Pre-casualty photographs of the ELIZABETH M taken October 2004.



Bow



Port Profile



Starboard Profile



Stern

## Record of Deceased and Injured

Table 4: Record of Deceased

Name	Scott A. Stewart	Rick A. Conklin	Thomas J. Fisher	Edward M. Crevda
USCG License	Master of Towing Vessels Upon Western Rivers. [REDACTED]	Master of Towing Vessels Upon Western Rivers. [REDACTED]	N/A	N/A
Age	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Address	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Position	Pilot	Striker-Pilot	Deckhand	Deckhand

Table 5: Record of Injured

Name	[REDACTED]	[REDACTED]	[REDACTED]
USCG License	Master of Towing Vessels Upon Western Rivers. [REDACTED]	N/A	N/A
Age	[REDACTED]	[REDACTED]	[REDACTED]
Address	[REDACTED]	[REDACTED]	[REDACTED]
Injuries	Hypothermia, amputated right hand digitus minimus (little finger), lacerations to feet, bumps and contusions.	Hypothermia and frostbite.	Hypothermia.
Position	Master	Deckhand	Deckhand

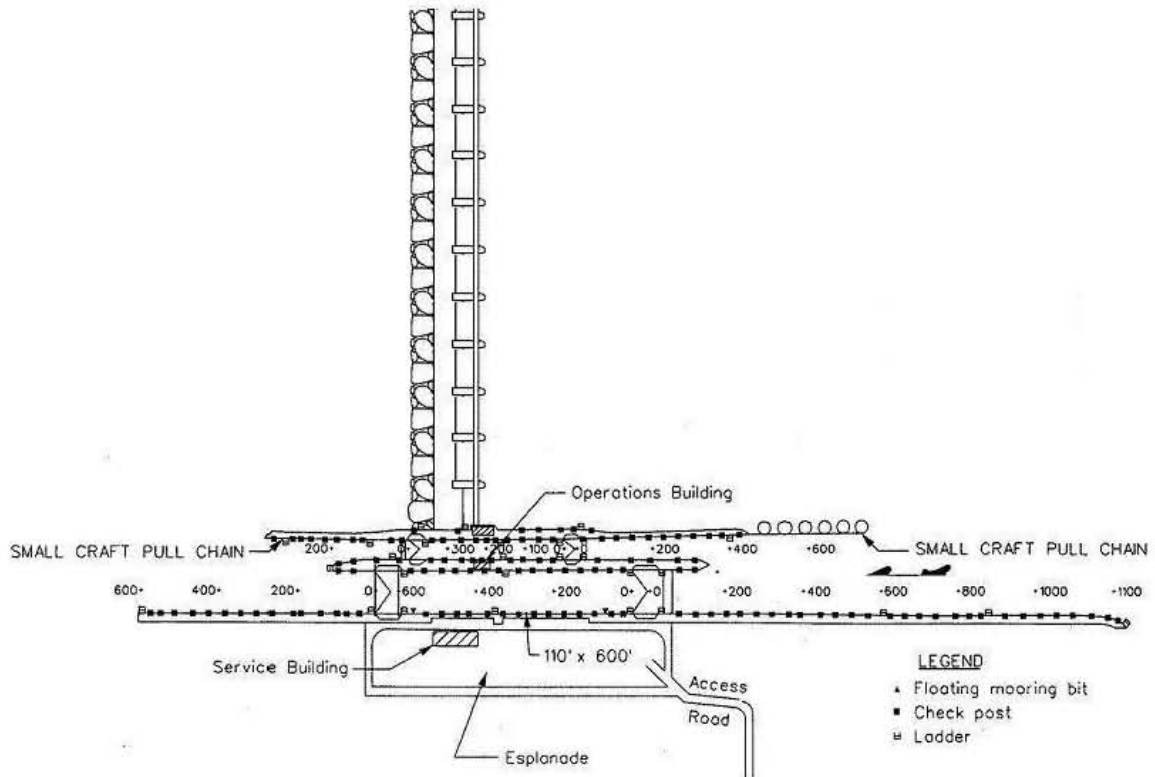


## Montgomery Locks and Dam Particulars

Table 6: Montgomery Locks and Dam Data

Name	Montgomery Locks and Dam
Location	Mile 31.7 Ohio River, Beaver County Pennsylvania
Year Built	1936
Lock Chambers	Main chamber (110 ft wide x 600 ft long) Auxiliary chamber (56 ft wide x 360 ft long)
Lift	17.5 ft
Dam Length	1,379 ft
Dam Gates	10
Gate Width	100 ft each.
Annual Traffic	Approximately 20 million tons of freight
Lockages	Commercial: Approximately 550 per month Pleasure Craft: Approximately 275 during summer months
Length of Pool	18.4 miles. Upstream of Montgomery to Dashields.
O/O	U.S. Army Corps of Engineers

Figure 3: Diagram of Montgomery Locks and Dam.



## Findings of Fact

1. The ELIZABETH M is a welded, steel hulled, twin screw commercial towboat (see Table 1: Towing Vessel for vessel particulars). Vessel subdivision consists of four (4) transverse watertight bulkheads which divide the vessel hull into five separate main compartments. There are also 36 inch wide wing voids that are subdivided by nine (9) transverse bulkheads which form fuel tanks, ballast tanks and empty voids. The superstructure has three levels: main deck, second deck and pilothouse. The main deck consists of the upper engineroom flat, crew accommodations, galley, line room and, office space. The second deck contains crew accommodations. All exterior doors on the main deck are non-watertight with 9 inch sills. (IO Exhibit 002, 132)

2. In April 1997, 35 tons of ballast (cement blocks) was installed on the ELIZABETH M in an attempt to trim the vessel to the original waterline after replacement of the vessel's main propulsion engines. The vessel was not ballasted prior to this installation. Vessel plans indicate the original waterline was 6'6". Pre-casualty photographs of the vessel (see figure 2), taken approximately three months before the casualty, show the vessel drafting approximately 7'6". The original main propulsion engines were White Superior Model 405 with Falk gears. The vessel was repowered with lighter Caterpillar 3512 engines and gears. When the ballast was installed it was divided equally, port and starboard, by placing an equal numbers of blocks on each side of the vessel in approximately the same relative position and distance outward from the centerline in the following locations: 7 tons in the forward void, 14 tons below the deck plates in the engineroom and 14 tons in the lower aft void. Although an accurate determination could not be made regarding the exact weight of the original engines and gears, post casualty analysis indicated, "It is likely that the 35 tons is significantly more ballast than the weight difference between the original and final engines & drive trains." Post casualty analysis completed by the U.S. Coast Guard Marine Safety Center (MSC) indicated the approximate 1' increase in draft over the original waterline would have negatively impacted the vessel's survivability during a sinking scenario by increasing the vessel's susceptibility to downflooding through non-watertight doors. Although the post-casualty analysis only captured the vessel's static response in calm water, environmental conditions (such as current) and the vessel's dynamic response (such as pitch, roll, free surface effects, etc.) on the night of the casualty would have further reduced the vessel's survivability as outlined in the analysis. (IO Exhibit 144, 145, 146, 147)



Figure 4: Post-casualty photographs of ballast installed in the engineroom on the ELIZABETH M in April 1997.



3. Campbell Transportation Company is the owner and operator of the ELIZABETH M (O.N. 262962) and barges HBL-8205 (O.N. 646167), CTC 962 (O.N. 690686), CBL 7712 (O.N. 583352), CTC 7616 (O.N. 680657), CTC 7638 (O.N. 680679), CBL 8412 (O.N. 672417). The ELIZABETH M had a pre-casualty value of approximately \$600,000 and each barge had a pre-casualty value of approximately \$100,000. (IO Exhibit 003, Trans Vol I pg 20 ln 7, Vol I pg 22 ln 6, Vol I pg 39 ln 13)

4. The ELIZABETH M was scheduled to have both the port and starboard main diesel engines (MDEs) replaced in the spring of 2005. This was a scheduled repower of the towboat and, prior to this investigation, there were no known problems with the installed MDEs. (IO Exhibit 005, Trans Vol I pg 29 ln 6, Vol I pg 58 ln 18, Vol II pg 31 ln 21, Vol III pg 137 ln 14, Vol III 269 ln 8)

5. On and prior to 09JAN05, the ELIZABETH M was not experiencing any personnel, material condition or mechanical problems. (Trans Vol II pg 30 ln 1, Vol III pg 136 ln 2, Vol III pg 137 ln 14, Vol III pg 269 ln 8)

6. The Master of the ELIZABETH M was [REDACTED] [REDACTED] is the holder of U. S. Coast Guard license number [REDACTED]. His license, which is on its third issue, authorizes him to serve as "Master of Towing Vessels upon Western Rivers." The license also has a valid Radar Observer (Rivers) endorsement which expires in July 2008. The license was issued by the U. S. Coast Guard Regional Examination Center in Memphis, TN, on 02JUL03, and is due to expire on 02JUL08. (IO Exhibit 038, Trans Vol II pg 12 ln 8, Vol II pg 14 ln 3)

7. The Pilot of the ELIZABETH M was Scott Allen Stewart. Stewart was the holder of U. S. Coast Guard license number [REDACTED]. His license, which was on its first issue, authorized him to serve as "Master of Towing Vessels upon Western Rivers." The license also had a valid Radar Observer (Rivers) endorsement which expires in October 2008. The license was issued by the U. S. Coast Guard Regional Examination Center in Memphis, TN, on 16DEC03, and was due to expire on 16DEC08. (IO Exhibit 087)

8. The Striker-Pilot of the ELIZABETH M was Rick Alan Conklin. Conklin was the holder of U. S. Coast Guard license number [REDACTED]. His license, which was on its first issue, authorized him to serve as "Master of Towing Vessels upon Western Rivers." The license also had a valid Radar Observer (Rivers) endorsement which expires in October 2009. The license was issued by the U. S. Coast Guard Regional Examination Center in Memphis, TN, on 21OCT04, and was due to expire on 21OCT09. Mr. Conklin was also a highly decorated veteran with thirteen years of shipboard experience in the U.S. Army. (IO Exhibit 075, 086)

9. Campbell Transportation Company has written policy titled "Pilot Trainee or Steersman Program." This written policy "...describes the qualifications, responsibilities, necessary training, skill requirements, and other criteria for a Pilot Trainee or Steersman..." Among other requirements, "the Steersman shall steer the

vessel only under the direct supervision of the Captain of the vessel assigned...” and overseeing the training is the responsibility of the vessel Captain. Rick Conklin was referred to as a “Striker-Pilot” in documentation and throughout the testimony provided during the U. S. Coast Guard hearing. Although there is no reference to a “Striker-Pilot” in this policy, Campbell Transportation Company considered this to be the guiding policy for Conklin’s training. The company expected [REDACTED] to follow this policy while Conklin was filling the Striker-Pilot position on board the ELIZABETH M. [REDACTED] testified he was not aware of this policy. (IO Exhibit 018, 037, Vol I pg 86 ln 23, Vol II pg 36 ln 17)

10. The Striker-Pilot (Conklin) on the ELIZABETH M was assigned to the after watch (also known as the Pilot’s watch) before Zappone reported aboard the ELIZABETH M. The Striker Pilot continued to serve on the Pilot’s watch after [REDACTED] reported aboard. (Trans Vol II pg 98 ln 8, Vol III pg 262 ln 18)

11. On 04SEP04, at approximately 0200, the ELIZABETH M was involved in a grounding at mile 7.6 on the Monongahela River. No damage reported. (IO Exhibit 010)

12. On 23SEP04, at approximately 1400, the ELIZABETH M was involved in a grounding at mile 6.2 on the Ohio River. No damage reported. Campbell Transportation Company provided the first written notification of this reportable marine casualty to the U. S. Coast Guard on 28JAN05. (IO Exhibit 011)

13. On 24SEP04, at approximately 1010, the ELIZABETH M suffered a power loss (both generating and main propulsion) at mile 13.5 on the Monongahela River due to contaminated fuel. A Captain of the Port Order was issued by Marine Safety Office Pittsburgh, PA to have the vessel surveyed by an accredited Marine Surveyor to determine the vessel’s material condition and seaworthiness. (IO Exhibit 002, 12)

14. On 30SEP04, Campbell Transportation Company representative completed a U.S. Coast Guard cooperative towboat examination (phase II) on the ELIZABETH M utilizing the Eighth Coast Guard District Towing Vessel Boarding form. No deficiencies were noted. (IO Exhibit 008)

15. On 01OCT04, Davis Marine Surveyors, Inc. conducted a dry-dock survey of the ELIZABETH M’s hull looking for possible damage sustained during the grounding suffered on 23SEP04 to account for the fuel contamination which caused the power loss on 24SEP04. Fractures were noted in way of the port fuel tank. A 4 foot x 4 foot x .5 inch section of hull was renewed. (IO Exhibit 002, 089)

16. On 06OCT04, Davis Marine Surveyors, Inc. completed a follow-up survey and determined “...necessary repairs found all in order effective this date, October 6, 2004, the ELIZABETH M is recommended for return to service.” The Captain of the Port Order issued on 24SEP04 was rescinded based on this survey report. (IO Exhibit 002, 089)



17. On 12OCT04, Campbell Transportation Company had the ELIZABETH M dry-docked for a survey by Mr. [REDACTED] and completed subsequent repairs. Work completed included repairing a hole in the starboard ballast tank, installation of gussets on the bottom of the tow knees, repairing cracks in the headlog, renewal of a 4 foot x 5 foot x .25 inch plate in way of the port fuel tank knuckle, replacement of port and starboard rudders and repairing fractures in the Kort Nozzles. Hull gauging noted thin spots (under .25 inches). The company decided to defer making repairs to correct thin spots in the hull to a later date – FEB05. (IO Exhibit 007, Trans Vol I pg 22 ln 8)

18. On 31DEC04, at approximately 1230, the ELIZABETH M allided with the barge CBL 7711 (O.N. 583351) while building a tow at the Colona loading facility located at approximately mile 23 on the Ohio River. The ELIZABETH M sustained damage to her starboard rub rail approximately amidships. Damage consisted of fractures covering roughly a 6 inch x 8 inch area contained totally within the rub rail. The damaged area was located approximately 1.5 to 2 feet above the waterline. The damage did not permeate into the vessel's hull. (IO Exhibit 013, 095, Trans Vol I pg 38 ln 1, Vol II pg 86 ln 5, Vol III pg 134 ln 8, Vol III pg 268 ln 1)

Figure 5: Post-casualty photographs of ELIZABETH M rub rail damage sustained on 31DEC04.



19. On 04JAN05, U.S. Coast Guard Marine Safety Office Pittsburgh began implementing the Ohio River Valley Waterways Management Plan due to weather predictions calling for heavy precipitation and a rapid rise in river levels within 24 to 48 hours. The predictions of inclement weather and rising river levels was disseminated to the local maritime industry via an established calling tree. A conference call between government agencies and industry representatives was also scheduled to discuss the developing river conditions. This was the initial high water requirement of the Ohio River Valley Waterways Management Plan. No restrictions were placed on the navigation of the upper Ohio River. (IO Exhibit 113, Trans Vol IV pg 121 ln 7)

20. On 05JAN05, the National Weather Service began issuing flood warnings and flood watches for the upper Ohio River via their website. (Trans Vol IV pg 122 ln 17)

21. On 07JAN05, the 0800 Ohio River Status Report issued by the U.S. Army Corps of Engineers indicated the Ohio River in the vicinity of Montgomery Locks and Dam had crested at 2100 on 06JAN05. The lock's gauge readings were 20.6 feet on the upper gauge and 36.9 feet on the lower gauge. At this time, the locks were out of operation due to high water conditions. (IO Exhibit 041)

22. On 07JAN05, at approximately 1145, the main lock chamber of the Montgomery Locks and Dam was placed back into operation. The auxiliary lock chamber was placed back into operation on this same date at approximately 1615. (IO Exhibit 042)

23. On 07JAN05, at approximately 1200, U.S. Coast Guard Marine Safety Office Pittsburgh hosted a conference call to discuss river conditions. In attendance were the U.S. Coast Guard, U.S. Army Corps of Engineers, National Weather Service, and maritime industry representatives. No advisories were issued and no restrictions were placed on the navigation of the Ohio River. Captain of the Port Pittsburgh requested a listing of towboats pre-positioned in the various pools that would be monitoring barge fleeing areas. The list was not provided until after 09JAN05. The conference call was the second and final high water requirement of the Ohio River Valley Waterways Management Plan. (IO Exhibit 113, Trans Vol IV pg 123 ln 9, Trans Vol IV pg 126 ln 10, Vol IV pg 127 ln 1, Vol IV pg 128 ln 17)

24. On 08JAN05 and 09JAN05, the ELIZABETH M was operating in high water conditions. Campbell Transportation Co. considered the river to be in high water conditions when the gates at the Montgomery Locks and Dam were at or above 50 feet. As per the Ohio River Valley Waterways Management Plan, the U.S. Coast Guard Marine Safety Office Pittsburgh considered the Ohio River to be at high water when the upper gauge at Dashields Lock, located at mile marker 13.3, was at or above 20 feet. The U.S. Army Corps of Engineers considered the river to be in high water conditions when the gates at the Montgomery Locks and Dam were at or above 65 feet. Montgomery Locks and Dam had a decrease in vessel lockage during this period of high water. (IO Exhibit 054, 113, Trans Vol I pg 43 ln 14, Vol I pg 44 ln 2, Vol II pg 81 ln 14, Vol III pg 138 ln 13, Vol IV pg 146 ln 4, Vol IV pg 146 ln 8, Vol IV pg 159 ln 8, Vol IV pg 163 ln 19, Vol IV pg 252 ln 9, Vol V pg 18 ln 15, Vol V pg 127 ln 19)

25. On 08JAN05, weather conditions were improving and river levels were dropping at the Montgomery Locks and Dam. (IO Exhibits 056, 062, 063)

Table 7: Weather and river conditions observed at Montgomery Locks and Dam on 08JAN05.

Time	0001	0730	1940
Upper Gauge	13.4 ft	12.1 ft	12 ft
Lower Gauge	28.5 ft	24.8 ft	23.8 ft
Temperature	35 degrees F	39 degrees F	35 degrees
Weather Conditions	Rain	Rain	Clear
Dam Gate Opening	95 ft	89 ft	83 ft
Flow Rate	161,000 CFS	148,000 CFS	135,000 CFS

26. On 08 JAN05, the crew of the ELIZABETH M consisted of seven crewmembers divided into two watch sections; a forward watch (sometimes referred to as the front or Captain's watch) and an after watch (sometimes referred to as the Pilot's or back watch). The forward watch included the Master (██████████) and two deckhands (Thomas Fisher and ██████████). The after watch included the Pilot (Scott Stewart), a Striker-Pilot (Rick Conklin) and two deckhands (██████████ and Edward Crevda). The forward watch ran from 0600 to 1200 and from 1800 to 0000. The after watch ran from 0000 to 0600 and from 1200 to 1800. (IO Exhibit 018, Trans Vol I pg 39 ln 22, Vol II pg 15 ln 8, Vol II pg 17 ln 18, Vol II pg 18 ln 3, Vol II pg 98 ln 14, Vol III pg 264 ln 1)

27. On 08JAN05, at approximately 0934, the ELIZABETH M received handwritten sailing orders from Campbell Transportation Company dispatchers via fax. Orders for the RICHARD C and the OLIVER SHEARER were contained on the same fax. These were the last orders received by the ELIZABETH M before the casualty. Prior to receipt of these orders the ELIZABETH M had been assigned fleet watching duties at the Sammis Landing (Ohio Edison Co.) located on the Ohio River near mile marker 53. (Trans Vol I pg 48 ln 18, Vol II pg 35 ln 8, Vol IV pg 47 ln 15)

28. On 08JAN05, the ELIZABETH M was ordered to deliver fifteen empty barges to DTC Environmental Services Inc. located on the Ohio River at approximate river mile 47.3. The ELIZABETH M was then to proceed light boat back to Sammis Landing to pick up four barges for delivery to the Georgetown fleet located on the Ohio River near mile marker 39. All of the above transits occurred within the pool water below the Montgomery Locks and Dam. The last order for the ELIZABETH M was to pick up six loaded coal barges in Georgetown for delivery to Tonomo located on the Monongahela River near mile marker 20 on the right descending bank. All orders prior to the transit between Georgetown and Tonomo were completed without incident. The RICHARD C's final order was to get in tow with the ELIZABETH M in Georgetown to help deliver the six loaded coal barges to Tonomo. (IO Exhibit 16, 108 Trans Vol I pg 32 ln 14)

Figure 6: The handwritten orders, as issued on 08JAN05, by Campbell Transportation Company.

Saturday 1-8-05

Elizabeth M,

Del 15 Barge Empty tow to  
Quality Feed Fleet (D.T.C.). Have  
Russ Mobley check fleet.

Lite Barge to Sammis

P/W 4 Repair Empties. 7621 8422 8206  
8405 To G-Town

P/W @ G-Town 7638 7616 8412

7712 462 8205 To Tonomo

The Rickland C will help.

OK

Richard C,

P/W @ Coni the 6 Empties

Del 5 to Colona

Del 8405 to G-Town for Repair.

At G-town Get in tow with Elizabeth M

Del 6 Loads to Tonomo.

OK

Oliver Shearer,

Take 8 loads (number given) to Pittsburg  
Area Stand-by for Richard C & Elizabeth M

OK

29. The RICHARD C is a commercial towing vessel. (IO Exhibit 139)

Table 8: RICHARD C Particulars.

O.N.	275049
Service	Towing Vessel
G.T.	294
N.T.	200
Length	113 ft.
Breadth	27 ft.
Depth	7.8 ft.
Propulsion	Twin Diesel
H.P.	1280 total
Year Built	1958
Homeport	Pittsburgh, PA
O/O	Campbell Transportation Co.

30. The Master of the RICHARD C was [REDACTED]. [REDACTED] is the holder of U. S. Coast Guard license number [REDACTED]. His license, which is on its fourth issue, authorizes him to serve as "Master of Towing Vessels upon Western Rivers." The license also has a valid Radar Observer (Rivers) endorsement which expires in July 2006. The license was issued by the U. S. Coast Guard Regional Examination Center in Memphis, TN, on 26NOV01, and is due to expire on 26NOV06. (PI Exhibit 010)

31. The Pilot of the RICHARD C was [REDACTED]. [REDACTED] is the holder of U. S. Coast Guard license number [REDACTED]. His license, which was on its first issue, authorized him to serve as "Master of Towing Vessels upon Western Rivers." The license also had a valid Radar Observer (Rivers) endorsement which expires in November 2007. The license was issued by the U. S. Coast Guard Regional Examination Center in Memphis, TN, on 22NOV02, and was due to expire on 22NOV07. (Trans Vol IV pg 230 ln 4)

32. On 08JAN05, after receipt of the vessel orders from Campbell Transportation dispatchers, the Master of the ELIZABETH M ([REDACTED]) and the Master of the RICHARD C ([REDACTED]) discussed the orders via telephone. They discussed how the tow would be configured and how the towboats would face up to the tow of six loaded coal barges. Although [REDACTED] testified he knew the RICHARD C was supposed to get in tow with the ELIZABETH M in Georgetown, [REDACTED] also testified his interpretation of the orders meant "...I was to pick them six loads up and continue on up the river." If the RICHARD C wasn't there "...he would catch up with me at some point in time; and we would go up together to get them other loads that the OLIVER SCHEARER was going to take..." [REDACTED] and [REDACTED] testified their interpretation of the orders meant "...I was supposed to meet the ELIZABETH M at Georgetown, get in tow with them to shove six loads back up river to Tonamo..." (Trans Vol II pg 45 ln 8, Vol II pg 46 ln 18, Vol II pg 90 ln 6, Vol II pg 84 ln 15, Vol II pg 108 ln 15, Vol II pg 232 ln 23, Vol II pg 104 ln 1, Vol III pg 35 ln 2, Vol III pg 70 ln 22, VOL III pg 79 ln 2, Vol III pg 359 ln 11, Vol IV pg 46 ln 11, Vol IV pg 47 ln 8)



33. On 08JAN05, at approximately 2200, the ELIZABETH M completed building her tow with the assistance of the ROCKET (O.N. 275027) and departed Georgetown with six loaded coal barges configured three barges long by two barges wide. The barges were drafting between 9 and 10 feet. The tow and towboat were making headway at approximately 3.5 miles per hour. [REDACTED] and deckhands Fisher and [REDACTED] were on watch. (IO Exhibits 070, 072, 073, 077, Trans Vol II pg 23 ln 14, Vol II pg 24 ln 5, Vol II pg 24 ln 11, Vol II pg 25 ln 9, Vol II pg 25 ln 12, Vol II pg 49 ln 4, Vol II pg 109 ln 6, Vol III pg 176 ln 9, Vol IV 256 ln 13, Vol IV pg 280 ln 23, Vol IV pg 299 ln 20, Vol V pg 22 ln 16, Vol V pg 131 ln 20, Vol V pg 131 ln 22, Vol V pg 232 ln 8, Vol V pg 234 ln 1)

34. The six barges in the tow were secured as follows: .75 to 1 inch fore and aft wires and double up wire between the stern port corner of the lead barge and the port bow corner of the center barge in the port string. .75 to 1 inch fore and aft wires and double up wire between the starboard stern corner of the lead barge and the bow starboard corner of the center barge in the port string. .75 to 1 inch fore and aft wires and double up wire between the stern port corner of the lead barge and the port bow corner of the center barge in the starboard string. .75 to 1 inch fore and aft wires and double up wire between the starboard stern corner of the lead barge and the bow starboard corner of the center barge in the starboard string. Jockey wires (2) between the starboard bow corner of the barge at the head of the port string and the port bow corner of the barge at the head of the starboard string. Fore and aft wires and double up wire between the port stern corner of the center barge and the port bow corner of the stern barge in the port string. Fore and aft wires and double up wire between the starboard stern corner of the center barge and the starboard bow corner of the stern barge in the starboard string. There were jockey wires and an additional wire wrapped around the four timberheads at the junction between the starboard stern corner of the center barge in the port string, bow starboard corner of the stern barge in the port string, stern port corner of the center barge in the starboard string and the port bow corner of the stern barge in the starboard string. (Trans Vol II pg 178 ln 18, Vol III pg 153 ln 20)

35. The tow was secured to the towboat using facing wires and wing wires. The three part facing wires on the port side ran between the towboat and the timberhead on the port stern corner of the stern barge in the port string. The three part facing wires on the starboard side ran between towboat and the timberhead on the starboard stern corner on the stern barge in the starboard string. The single part wing wire on the port side of the towboat ran to the timberhead on the port stern corner on the stern barge in the port string. The single part wing wire on the starboard side of the towboat ran to the timberhead on the starboard stern corner on the stern barge in the starboard string. (Trans Vol II pg 182 ln 18, Vol III pg 156 ln 11, Vol III pg 272 ln 23)

36. [REDACTED], a deckhand on the ELIZABETH M who helped build the tow, testified the deck crew on the ELIZABETH M and the ROCKET (the vessel that helped build the tow) had concerns about transiting upstream with the tow because river conditions might cause the barges to submerge and/or the tow to break apart. [REDACTED] testified that he relayed his concerns to Thomas Fisher, the lead deckhand on the front watch. These

concerns were not relayed to the pilothouse. [REDACTED] the lead deckhand on the after watch, testified that he was not concerned about making the transit and he was not aware of any concerns by any deckhands on the ELIZABETH M. [REDACTED] had approximately 6 months experience as a deckhand. [REDACTED] had approximately 5 years experience as a deckhand. (Trans Vol III pg 129 ln 20, Vol III pg 139 ln 4, Vol III pg 178 ln 17, Vol III pg 179 ln 11, Vol III pg 194, ln 16, Vol III pg 258 ln 20, Vol III pg 259 ln 20, Vol III pg 324 ln 8, Vol IV pg 14 ln 21)

37. On 08JAN05, at approximately 2241, the RICHARD C arrived at the Montgomery Locks and Dam for a down bound lockage. The RICHARD C had one barge in tow to be delivered to Georgetown for repairs. (IO Exhibit 016, 060)

38. On 08JAN05, at approximately 2300, [REDACTED] directed the deckhands on his watch to go out on the head of the tow to observe the freeboard as the tow approached Old Lock 7 which is located near mile marker 36.5 on the Ohio River. The deckhands observed a reduction of freeboard as the tow passed over Old Lock 7 and reported the same to the pilothouse. [REDACTED] reduced headway to approximately .9 miles per hour. Although water did wash over the main deck of the barges at the head of the tow, no water entered the cargo hoppers. Loss of freeboard as a tow passes over Old Lock 7 is a known phenomenon and deckhands are routinely sent to the head of tows to observe the freeboard. (Trans Vol II pg 111 ln 1, Vol III pg 175 ln 11, Vol III pg 202 ln 10, Vol IV pg 13 ln 15)

39. On 08JAN05, after clearing Old Lock 7, [REDACTED] increased the tow's headway to approximately 2 miles per hour. Headway was maintained between 1.9 and 2 miles per hour for the remainder of his watch. (Trans Vol II pg 111 ln 15)

40. On 08JAN05, at approximately 2307, the RICHARD C and tow began a down bound lockage through Montgomery Locks. (IO Exhibit 60)

41. On 08JAN05, at approximately 2315, Scott Stewart, the ELIZABETH M Pilot, arrived in the pilothouse to relieve [REDACTED] [REDACTED] and Stewart completed a pre-relief brief discussing known river traffic and cautions about locking through Montgomery Locks in high water conditions. At the time of the watch relief the vessel was located near mile marker 35 on the Ohio River in the vicinity of Phyllis Island. It is unknown when the Striker-Pilot ([REDACTED]) reported to the pilothouse. (Trans Vol II pg 39 ln 18, Vol II pg 49 ln 8, Vol II pg 105 ln 10, Vol II pg 112 ln 11, Vol II pg 191 ln 21)

42. On 08JAN05, at approximately 2325, [REDACTED] departed the pilothouse, got a glass of water, read a little bit, and went to sleep. (Trans, Vol II pg 49 ln 11, Vol II pg 113 ln 10,)

43. On 08JAN05, at approximately 2330, [REDACTED] (Pilot) relieved [REDACTED] (Master) as operator on the RICHARD C. At the time of the relief, the vessel and her single barge tow were in the process of locking through at the Montgomery Locks. (IO Exhibit 68)

44. On 08JAN05, at approximately 2334, the RICHARD C completed her down bound lockage at Montgomery Locks. (IO Exhibit 60, Trans Vol IV pg 233 ln 11)

45. On 09JAN05, weather condition began to deteriorate and river levels began to rise. (IO Exhibits 056, 062, 063)

Table 9: Weather and river conditions observed at Montgomery Locks and Dam on 09JAN05.

Time	0001	0130	0200	0500
Upper Gauge	13 ft	13 ft	12.9 ft	13 ft
Lower Gauge	23.8 ft	24.2 ft	24.2 ft	24.5 ft
Temperature	33 degrees F	33 degrees F	33 degrees F	33 degrees F
Weather Conditions	Cloudy	Cloudy	Cloudy	Cloudy
Dam Gate Opening	83 ft	89 ft	89 ft	95 ft
Flow Rate	135,000 CFS	148,000 CFS	135,000 CFS	161,000 CFS

46. On 09JAN05, at approximately 0001, the Pilot (Stewart) on the ELIZABETH M and the Pilot (██████) on the RICHARD C had a conversation via VHF-FM radio to establish a passing agreement. The vessels safely passed near Shippingport, PA which is at approximate mile marker 34.5 on the Ohio River. The ELIZABETH M was up bound and the RICHARD C was down bound. Although the Pilot on the RICHARD C later testified he understood his orders were to get in tow with the ELIZABETH M in Georgetown, he did not discuss the deviation from the orders with Stewart. On the morning of the casualty, when asked by a Campbell Transportation Company dispatcher why the ELIZABETH M departed Georgetown without the RICHARD C, ██████ said, "he didn't ask." Although ██████ was observing a situation that was contrary to his understanding of his vessel's orders, in addition to not inquiring with the Pilot on ELIZABETH M, he did not notify the RICHARD C's Master or a Campbell Transportation Company representative to inform them of the discrepancy. He just "...was wondering why he left." The president of Campbell Transportation Co. testified ██████ "...should have called the office..." when he knew the ELIZABETH M departed Georgetown without the RICHARD C. (IO Exhibit 067, Trans Vol I pg 44 ln 18, Vol I pg 45 ln 1, Vol I pg 100 ln 17, Vol IV pg 82 ln 9, Vol IV pg 234 ln1)

47. Without the assistance of the RICAHRD C, the President of Campbell Transportation Company and Hudson, the Master on the RICHARD C, did not consider the ELIZABETH M to be an adequate vessel to transport the six loaded coal barges from Georgetown to Tonomo. ██████ testified that he considered the ELIZABETH M to be adequately equipped and manned for pushing the six loaded coal barges, unassisted, in the river conditions he was experiencing on 08 and 09JAN05. (Trans Vol I pg 51 ln 15, Vol II pg 83 ln 23, Vol II pg 107 ln 20, Vol IV pg 77 ln 14)

48. On 09JAN05, at approximately 0020, the ELIZABETH M contacted the Montgomery Locks and Dam for an up bound lockage. (IO Exhibits 061, 074, 077, Trans Vol IV pg 159 ln 3)

49. On 09JAN05, at approximately 0021, the ELIZABETH M arrived at the Montgomery Locks and Dam. (IO Exhibits 059, 061, 074)

50. On 09JAN05, at approximately 0053, the ELIZABETH M began her approach to the Montgomery Lock. Stewart was operating the ELIZABETH M as the vessel made the approach to the lock chamber. (IO Exhibits 059, 061, 074, 128, Trans Vol III pg 271 ln 6, Vol III pg 316 ln 11)

51. On 09JAN05, at approximately 0112, the ELIZABETH M began entry into the main chamber at Montgomery Lock. (IO Exhibit 061)

52. On 09JAN05, at approximately 0132, the ELIZABETH M completed entry into the main chamber at Montgomery Lock. (IO Exhibits 061, 074)

53. On 09JAN05, the ELIZABETH M approach and lockage were completed without incident. Lock personnel described these evolutions as a "...picture perfect lock..." (Trans Vol V pg 20 ln 2, Trans Vol V pg 73 ln 10, Trans Vol V pg 179 ln 19)

54. On 09JAN05, the ELIZABETH M and her six (6) barge tow executed a "knockout" lockage. Because of the tow configuration and length, a towboat only set over was utilized during the lockage. The ELIZABETH M was moored starboard side to the stern barge in the tow's port string for the lockage. (IO Exhibits 052, 072, 077, 129, 131, Trans Vol II pg 203, ln 10, Vol IV pg 159 ln 1, Vol IV pg 256 ln 20, Vol IV pg 280 ln 1, Vol IV pg 335 ln 6, Vol V pg 23 ln 1, Vol V pg 132 ln 9, Vol V pg 147 ln 13, Vol V pg 149 ln 4)

Figure 7: Configuration of the ELIZABETH M and tow while in the lock chamber.

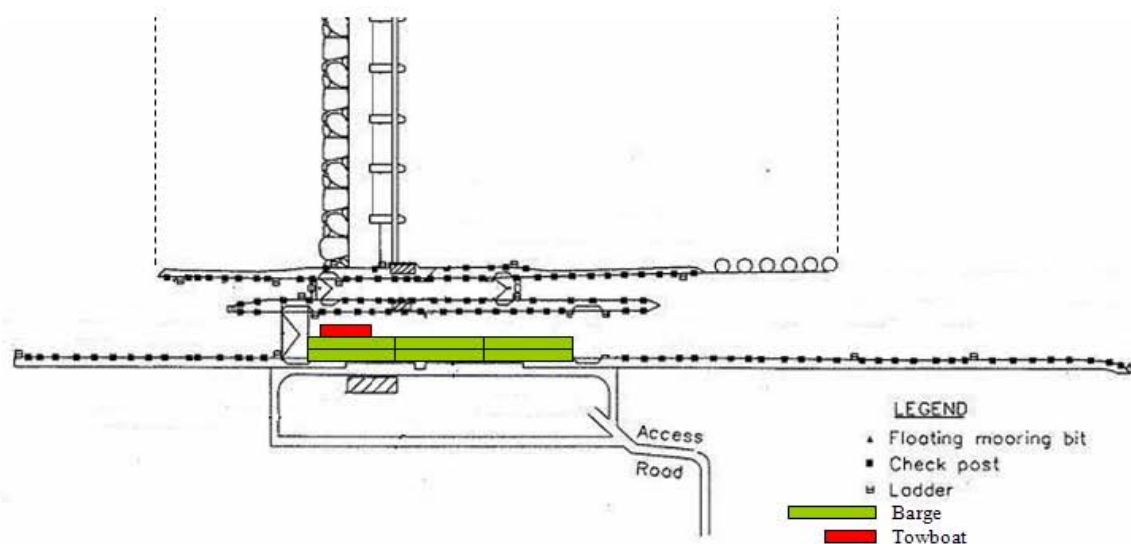




Figure 8: Descriptions of Lockage Types from the U.S. Army Corps of Engineers website. This was the only written descriptions that could be located.

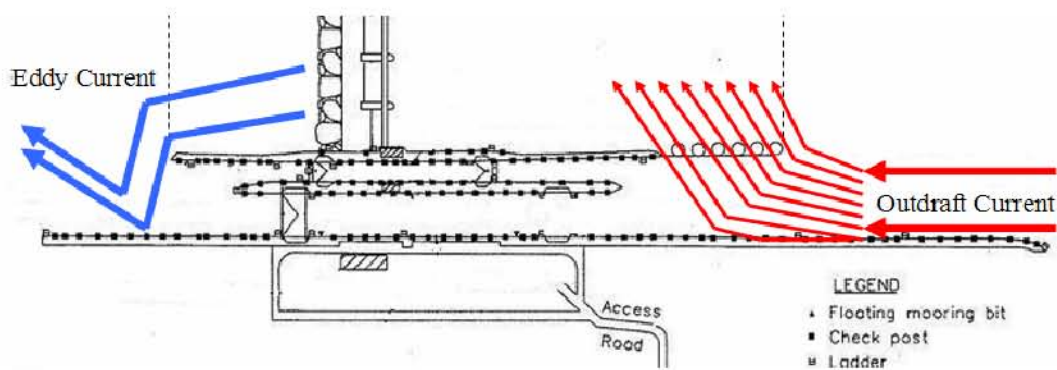
Lockage Types	
Code	Description
O	<b>O – open pass</b> – The vessel traverses the lock with no lock hardware operation/chambering. The vessel goes straight through the chamber with both sets of gates open. This may occur at tidal locks.
F	<b>F - fast double (Multi-chamber)</b> – The towboat and possibly some of its barges are separated from the remaining barges and are locked through a different chamber from the remaining barges.
J	<b>J - jack knife</b> – The tow is rearranged, usually from two barges wide to three, by breaking the face coupling on at least one barge and knockout of the tow.
K	<b>K – knockout</b> – The towboat alone is separated from its barges and moved alongside the barges for lockage..
N	<b>N - navigable pass</b> – The vessel traverses the dam instead of the lock. The vessel actually navigates outside the lock walls.
S	<b>S – straight</b> – The tow is not broken up for lockage.
T	<b>T - barge transfer</b> – Barges are placed in the lock chamber by one towboat, removed and continued on their journey with another towboat.
V	<b>V – setover</b> – The towboat and one or more of its barges are separated as a unit from the remaining barges to be “set over” for service.
Z	<b>Z - other (remarks)</b> – Any type of lockage not defined by one of the above.
	- None

[http://www.mvr.usace.army.mil/mvrirmi/omni/webprts/omni\\_vl/lockage%20Types.htm](http://www.mvr.usace.army.mil/mvrirmi/omni/webprts/omni_vl/lockage%20Types.htm) 03/25/2005

55. On 09JAN05, the U.S. Corps of Engineers had three people working at the Montgomery Locks and Dam at the time of the ELIZABETH M lockage. They were: [REDACTED] (Lead Lockman), [REDACTED] (Locksman) and [REDACTED] (Locksman). (IO Exhibits 070, 072, 073, Trans IV pg 166 ln 12, Vol IV pg 257 ln 23, Vol V pg 25 ln 3, Vol V pg 204 ln 17)

56. There are five operating conditions that are peculiar to the Montgomery Locks and Dam. First is the outdraft at the upper approach. The stronger the current flow over the dam the stronger the outdraft. Second is the eddy current at the lower approach. Third is the short lock chamber - the “600 foot” main chamber is actually 592 feet in length. Fourth is the constant wind. Fifth is tows may have problems exiting the lock after a down bound lockage when the lock’s lower gauge reaches 24 feet – it tends to push the tow back into the lock chamber. (IO Exhibit 064, Trans Vol IV pg 164 ln 3)

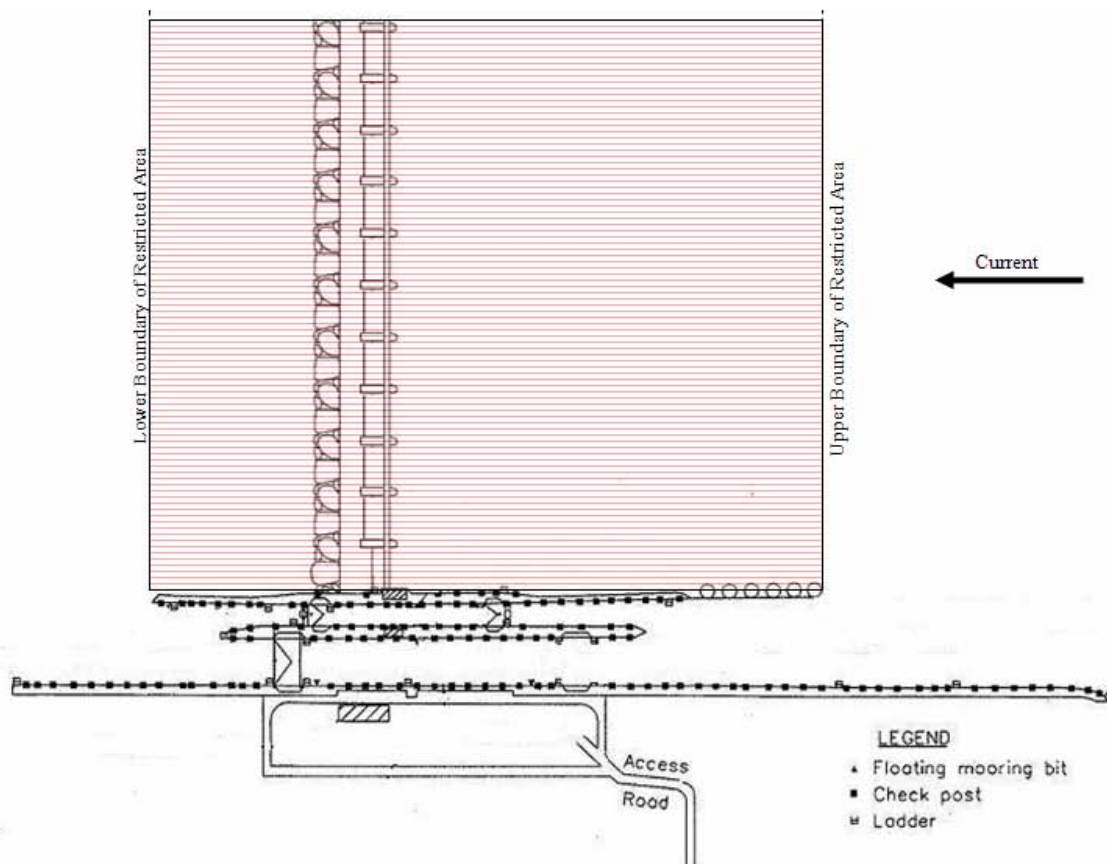
Figure 9: Approximate location of Montgomery Locks and Dam outdraft and eddy current.



57. [REDACTED] as well as all other Campbell Transportation Co. vessel operators, were aware of the outdraft conditions at the upper approach to the Montgomery Locks. (Trans Vol I pg 71 ln 8, Vol II pg 25 ln 18)

58. The Montgomery Locks and Dam has restricted areas above and below the dam. Restricted areas are areas designated by the responsible District Engineer of U.S. Army Corps of Engineers. No vessels are supposed to enter any restricted areas at any time. The restricted area at the Montgomery Locks and Dam extends the entire width of the river up to approximately 1000 feet above the dam and approximately 500 feet below the dam. (PI Exhibit 008)

Figure 10: Approximate boundaries of the restricted areas of Montgomery Locks and Dam.



59. U.S. Army Corps of Engineers Navigation Notice No. 1-2004 was in affect and applicable to the ELIZABETH M's lockage on 09JAN05. Of specific interest is paragraph 14 of the Operational Aspects section which states, "When moving or making up tows prior to leaving the lock in an up bound movement, towboat operators are required to keep all barges secured to the lock or guide wall...For a single lockage, with a towboat only set over, deviating from this procedure will be allowed if the immediate situation will permit departure under power and a lock operator walks a line out with the



tow until the towboat is again secured to the tow..." [REDACTED] and at least one of the lock personnel working at the Montgomery Locks and Dam the night of the casualty were not aware of the contents of this notice. (IO Exhibit 52, Trans Vol III pg 93 ln 3, Vol V pg 195 ln 18)

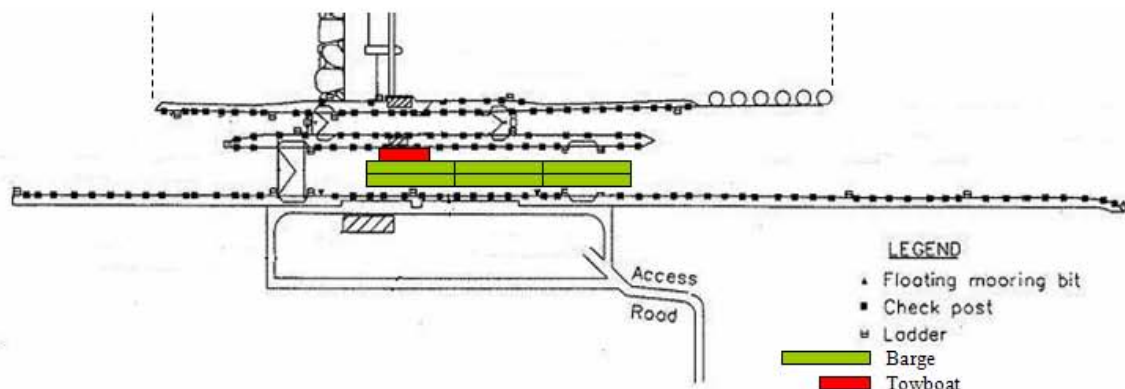
60. The U.S. Army Corps of Engineers has specific high water operating procedures for the Montgomery Locks and Dam contained within the Project Safety Plan. Due to the size and configuration of the towboat/barge and the type of lockage utilized, the plan did not contain any additional requirements applicable to the ELIZABETH M and/or her tow while locking through on 09JAN05. (IO Exhibit 54, Trans Vol IV pg 158 ln 1)

61. On 09JAN05, while the ELIZABETH M was in the lock chamber, the dam gates were raised from 83 feet to 89 feet. Raising the dam gates 6 feet would have increased the flow rate over the dam by approximately 13,000 cubic feet per second. An increase in the flow rate over the dam would have increased the outdraft current at the upper approach to the lock. (Trans Vol IV pg 165 ln 7, Vol IV pg 281 ln 19)

62. On 09JAN05, at approximately 0141, the ELIZABETH M began to exit the Montgomery Locks up bound on the Ohio River. Rick Conklin, the Striker-Pilot, was operating the ELIZABETH M as she departed the lock chamber. Once the ELIZABETH M and tow were cleared by the lock personnel to exit the lock, [REDACTED] released the line between the lock and the tow. A line was not maintained between the towboat/tow and the lock. (IO Exhibit 061, 128, Vol II pg 50 ln 3, Vol II pg 74 ln 8, Vol III pg 274 ln 4, Vol III pg 292 ln 13, Vol III pg 295 ln 11, Vol III pg 316 ln 11, Vol III pg 348 ln 12, Vol III pg 362 ln 23)

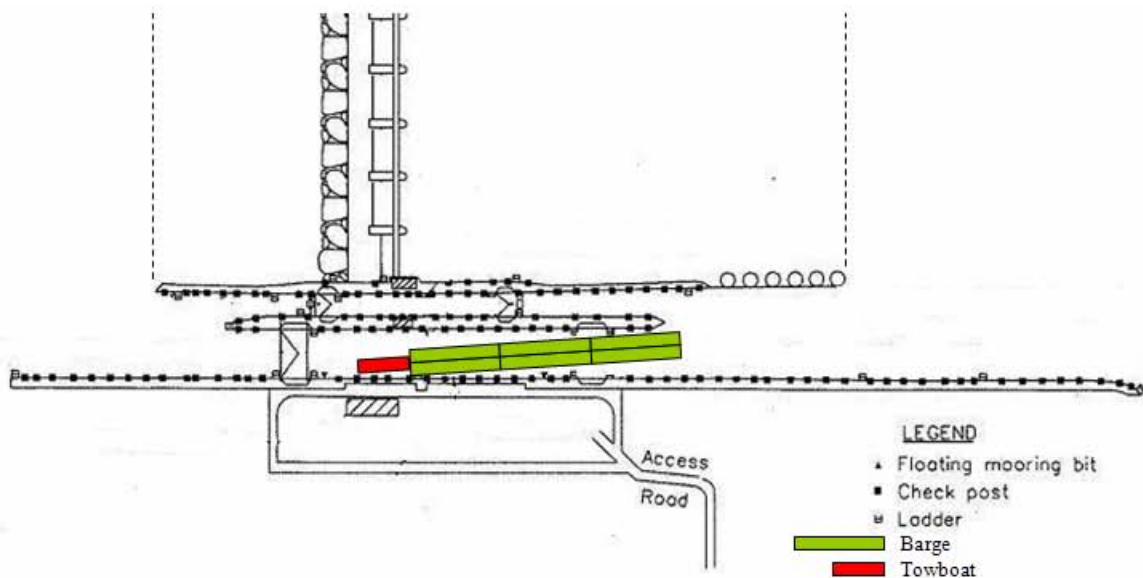
63. On 09JAN05, at approximately 0154, the ELIZABETH M began maneuvering to face up to the tow on the fly. The ELIZABETH M pushed the tow approximately 200 feet out of the lock chamber before releasing the tow and prior to maneuvering around to the stern of the tow to face up. While the towboat was maneuvering around to the stern of the tow to face up, the tow was adrift with no positive control. (IO Exhibit 138 Trans Vol III pg 293 ln 3, Vol III pg 295 ln 1, Vol III pg 349 ln 6)

Figure 11: Approximate location and configuration of the ELIZABETH M and tow just prior to maneuvering to face up to the stern of the tow.



64. On 09JAN05, at approximately 0157, the ELIZABETH M completed facing up to the tow. At this time the towboat and part of the tow were still within the main lock chamber. This is the approximate time and location where the effects of the outdraft would have been felt at the head of the tow. The tow was out of shape and being set towards the center of the river by the outdraft. Just after the tow was faced up, [REDACTED] noticed "...the head of the tow, it looked weird. It was headed out. The stern of the boat was riding against the land wall." (IO Exhibit 050, Trans Vol III pg 274 ln 16, Vol III pg 293 ln 3, Vol III pg 295 ln 1, Vol III pg 355 ln 10, Vol V pg 49 ln 1, Vol V pg 153 ln 23)

Figure 12: Approximate location and configuration of the ELIZABETH M after facing up to the tow.



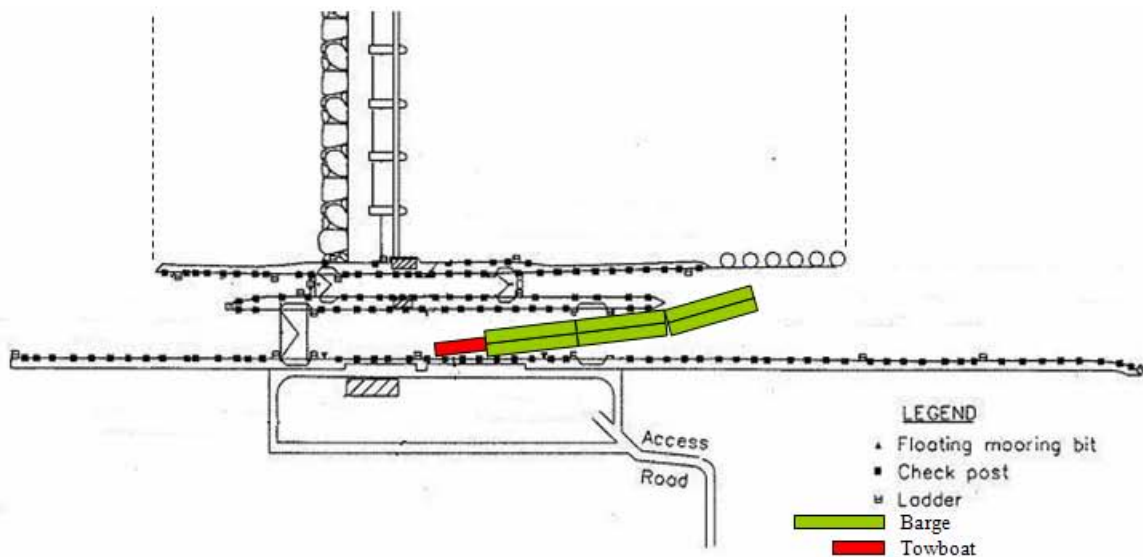
65. On 09JAN05, at approximately 0200, the ELIZABETH M completed her up bound lockage through the Montgomery Locks. (IO Exhibits 059, 061, 074)

66. On 09JAN05, at approximately 0202, the tow of the ELIZABETH M allided with the upstream bull nose at the end of the middle lock wall. The allision caused all the wires at the coupling between the lead and center barges in both the port and starboard strings to separate with the exception of the wires on the port string between the port stern of the lead barge and the port bow of the center barge. [REDACTED] placed a line between the starboard stern of the lead barge and the starboard bow of the center barge in the starboard string to keep the barges at the head of the tow from rounding to. After the allision the towboat and tow continued making headway, in an upstream direction, angling out towards the center of the river. This was the approximate time that [REDACTED] (Locksman) observed the ELIZABETH M was going "...out toward the center river a little quicker than what I seen other people do..." and "...accelerated..." [REDACTED]



reported the same to the Lock Leader ( ) via hand held radio. ( ) was located in the lock control building on the middle lock wall. (IO Exhibit 050, 117, Trans Vol III pg 275 ln 2, Vol III pg 299 ln 15, Vol III pg 300 ln 14, Vol III pg 318 ln 1, Vol IV pg 259 ln 3, Vol IV pg 263 ln 15, Vol IV pg 264 ln 5, Vol V pg 26 ln 20, Vol V pg 28 ln 7)

Figure 13: Approximate location and configuration of the ELIZABETH M and tow after the allision with the bull nose of the middle lock wall.



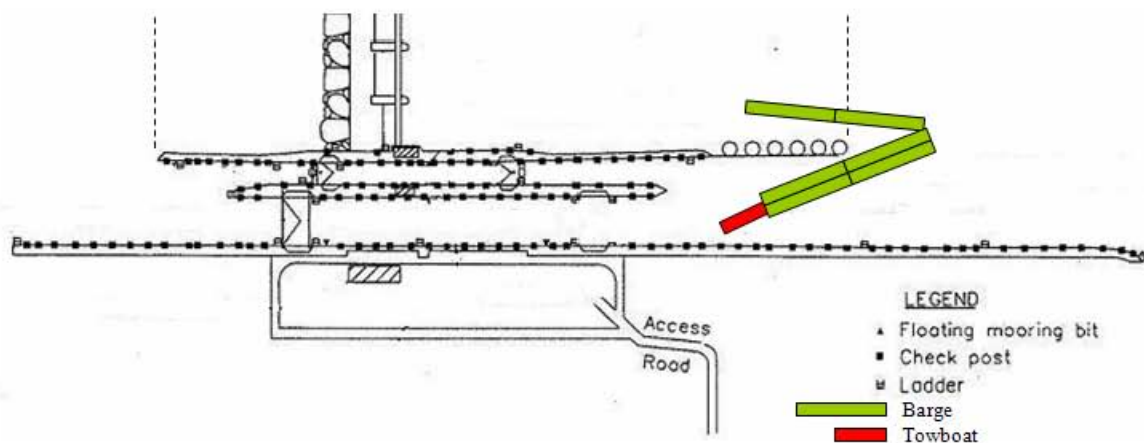
67. On 09JAN05, between 0202 and 0206, the general alarm was sounded aboard the ELIZABETH M alerting the crew of a developing emergency. ( ) testified it was the general alarm that woke him. ( ) testified he felt a "large bump" then heard the general alarm. All crewmembers responded to the general alarm. (Trans Vol II pg 49 ln 23, Vol III pg 146 ln 3)

68. Between the time of the allision at 0202 and just prior to the time the ELIZABETH M went over the dam, Conklin had departed the pilothouse and went out on deck to assist the deck crew. During this time Conklin was not wearing a lifejacket. (Trans Vol II pg 75 ln 16, Vol III pg 165 ln 11, Vol III pg 169 ln 2, Vol III pg 331 ln 11)

69. On 09JAN05, at approximately 0206, the tow of the ELIZABETH M had an allision with the river side lock wall at the end of the upstream mooring cells. The allision parted the line securing the lead barge of the starboard string in the tow. The wire between the starboard bow of the lead barge in the port string and the port bow of the lead barge in the starboard string held. The starboard string lead barge swung around in front of the port string lead barge ending up in a bow to bow configuration. The allision also allowed the two head barges to wrap around the mooring cells and end up facing downstream toward the dam. This was the approximate time that the Lock Leader ( ) arrived at the river side lock wall to observe the situation. He contacted the ELIZABETH M via VHF-

FM radio to see if they needed assistance. The vessel replied back "...I think we got it under control, I think we can handle it..." [REDACTED] also attempted, without success, to contact other vessels in the area that might have been able to provide assistance. At this time two of the lock personnel ([REDACTED] and [REDACTED]) proceeded to the dam and opened dam gates 2 and 9 in case the tow broke away from the ELIZABETH M. This was also about the time [REDACTED] arrived in the pilothouse after being awoken by the general alarm. [REDACTED] observed Stewart operating the ELIZABETH M and Conklin was located at the portside pilothouse door. Conklin told [REDACTED], "They didn't get me faced up fast enough." Two deckhands ([REDACTED] and Crevda) were on the tow attempting to regain control of the two barges at the head of the tow. Stewart directed the deckhands to run a line from the tow out to the mooring cell located at the end of the riverside lock wall. [REDACTED] was successful in securing a line between the last upstream mooring cell on the river wall and the tow in the vicinity of the coupling between the center barge and stern barge in the port string. Once the line was secured between the tow and the mooring cell, [REDACTED] departed the bridge to retrieve his glasses from his stateroom. (IO Exhibit 070, 117, Trans Vol II pg 41 ln 19, Vol II pg 42 ln 23, Vol II pg 49 ln 17, Vol II pg 49 ln 23, Vol II pg 50 ln 1, Vol II pg 50 ln 3, Vol II pg 50 ln 6, Vol II pg 50 ln 16, Vol II pg 50 ln 17, Vol II pg 74 ln 8, Vol II pg 117 ln 19, Vol II pg 119 ln 3, Vol II pg 120 ln 16, Vol II pg 194 ln 21, Vol II pg 207 ln 2, Vol III pg 275 ln 15, Vol III pg 318 ln 9, Vol IV pg 259 ln 8, Vol IV pg 264 ln 12, Vol V pg 28 ln 17, Vol V pg 30 ln 19, Vol V pg 53 ln 10, Vol V pg 56 ln 3, Vol V pg 80 ln 7, Vol V pg 135 ln 4, Vol V pg 135 ln 13, Vol V pg 156 ln 20)

Figure 14: Approximate location and configuration of the ELIZABETH M and tow after the allision with the river side lock wall.

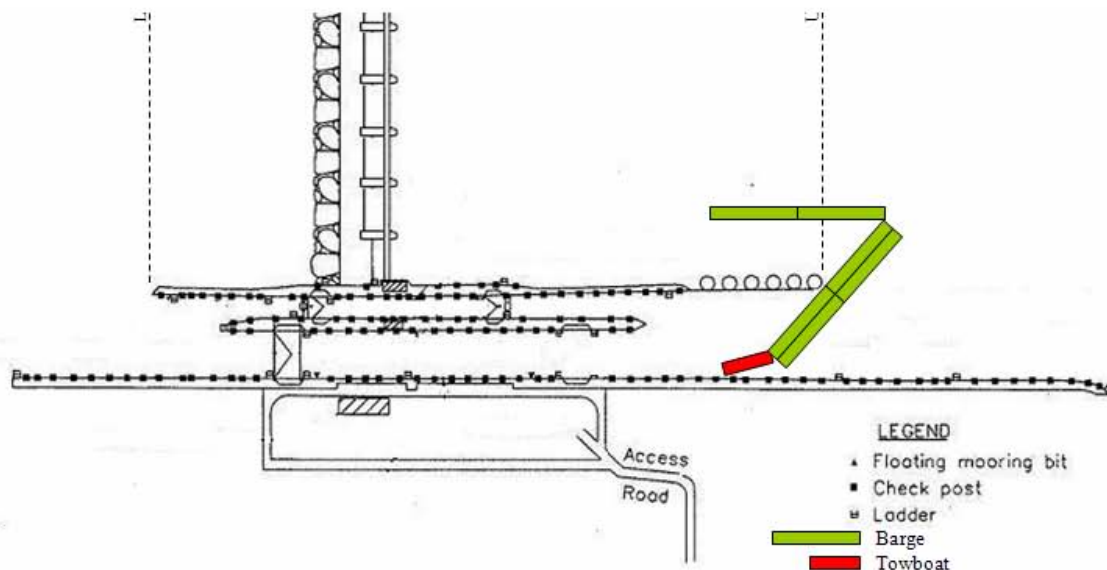


70. As [REDACTED] was retrieving his glasses he heard Stewart order the deckhands to remove the line between the tow and the mooring cells. This task was completed just after [REDACTED] arrived back in the pilothouse. [REDACTED] noticed the towboat was swinging towards the landside lock wall. [REDACTED] told Stewart to "Fan your rudders. Steer to starboard." (Trans Vol II pg 51 ln 5, Vol II pg 51 ln 9, Vol II pg 121 ln 14, Vol II pg 122 ln 2, Vol II pg 122 ln 16)



71. Shortly after telling Stewart to "Fan your rudders" the towboat's starboard quarter allided with the landside lock wall. The allision tore the starboard chock off the towboat and caused all of the facing wires between the ELIZABETH M and the tow to separate with the exception of the port facing wires. The tow continued to rotate around the end of the river side lock wall heading towards the dam. At this time [REDACTED] relieved Stewart as operator of the ELIZABETH M. After being relieved Stewart started calling for assistance over the marine radio. [REDACTED] maneuvered the ELIZABETH M to the port stern corner of the stern barge in the port string and used a line to secure the bow of the towboat to the tow to try to push the tow upstream out of the locks and towards the mooring cells located above the upper end of the landside lock wall. (Trans Vol II pg 51 ln 16, Vol II pg 51 ln 21, Vol II pg 52 ln 2, Vol II pg 58 ln 17, Vol II pg 60 ln 4, Trans Vol II pg 63 ln 10, Vol II pg 123 ln 9, Vol II pg 123 ln 15, Vol II pg 124 ln 4, Vol II pg 124 ln 11, Vol III pg 277 ln 4)

Figure 15: Approximate location and configuration of the ELIZABETH M and tow after the allision with landside lock wall.

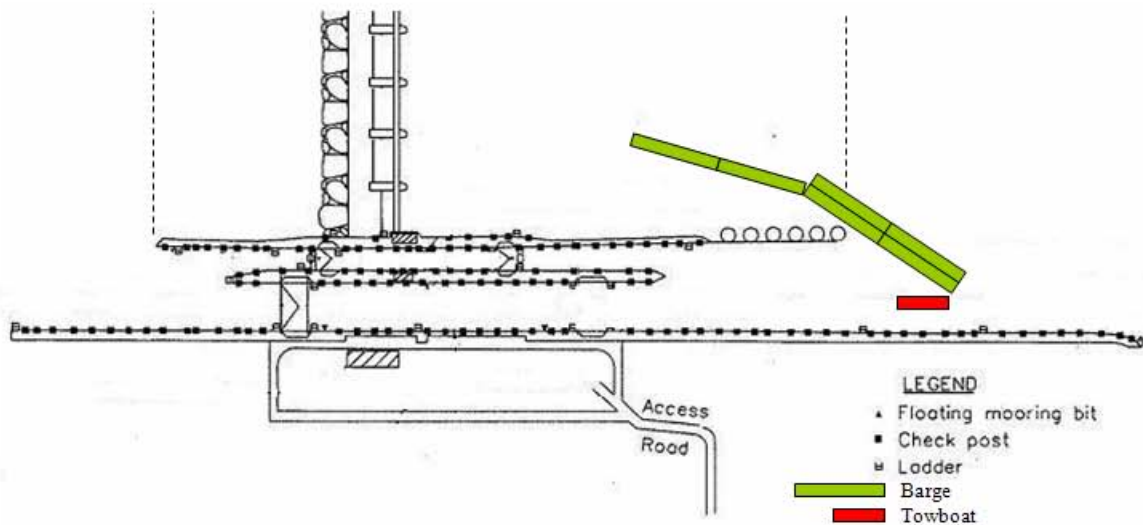


72. On 09JAN05, sometime between 0206 and 0210, the Pilot on the RICHARD C ([REDACTED]) spoke with the Pilot on the ELIZABETH M (Stewart) via telephone and told him he could not proceed up stream due to strong currents and he was moored at Old Lock #7. Stewart indicated "...he had two barges hanging over the outside wall & that he could not talk." [REDACTED] then contacted the Campbell Transportation Company dispatcher ([REDACTED]) indicating "...that he believed the ELIZABETH M was 'in trouble at the lock.'" [REDACTED] again made contact with the ELIZABETH M but Stewart said he could not talk and hung up. (IO Exhibits 067, 108, Trans Vol III pg 318 ln 9, Vol IV pg 44 ln 12)

73. On 09JAN05, at approximately 0210, Campbell Transportation Company dispatcher [REDACTED] contacted the ELIZABETH M and spoke with Stewart. Stewart indicated the ELIZABETH M was “kinda” in trouble and the M/V LILLIAN G was en route to assist. (IO Exhibit 108)

74. On 09JAN05, at approximately 0214, the ELIZABETH M succeeded in pushing the tow up to approximately the 800 foot marker on the landside lock wall. At this time [REDACTED] made a report to the pilothouse that the stern barge in the port string was sinking. Fearing the sinking barge might cause other barges in the tow and/or the towboat to sink; [REDACTED] ordered the deckhands to release the sinking barge from the tow. The wires securing the sinking barge in the tow had tightened up as the barge lost freeboard and the deckhands were not successful in releasing the barge. (IO Exhibit 050, Trans Vol II pg 52 ln 9, Vol II pg 52 ln 23, Vol II pg 53 ln 3, Vol II pg 61 ln 13, Vol II pg 61 ln 17, Vol II pg 64 ln 2, Vol II pg 125 ln 19, Vol II pg 126 ln 4, Vol II pg 129 ln 1, Vol III pg 158 ln 16, Vol III pg 277 ln 18, Vol III pg 316 ln 1, Vol III pg 318 ln 14)

Figure 16: Approximate location and configuration of the ELIZABETH M and tow after being pushed up to the 800 foot mark on the landside lock wall.

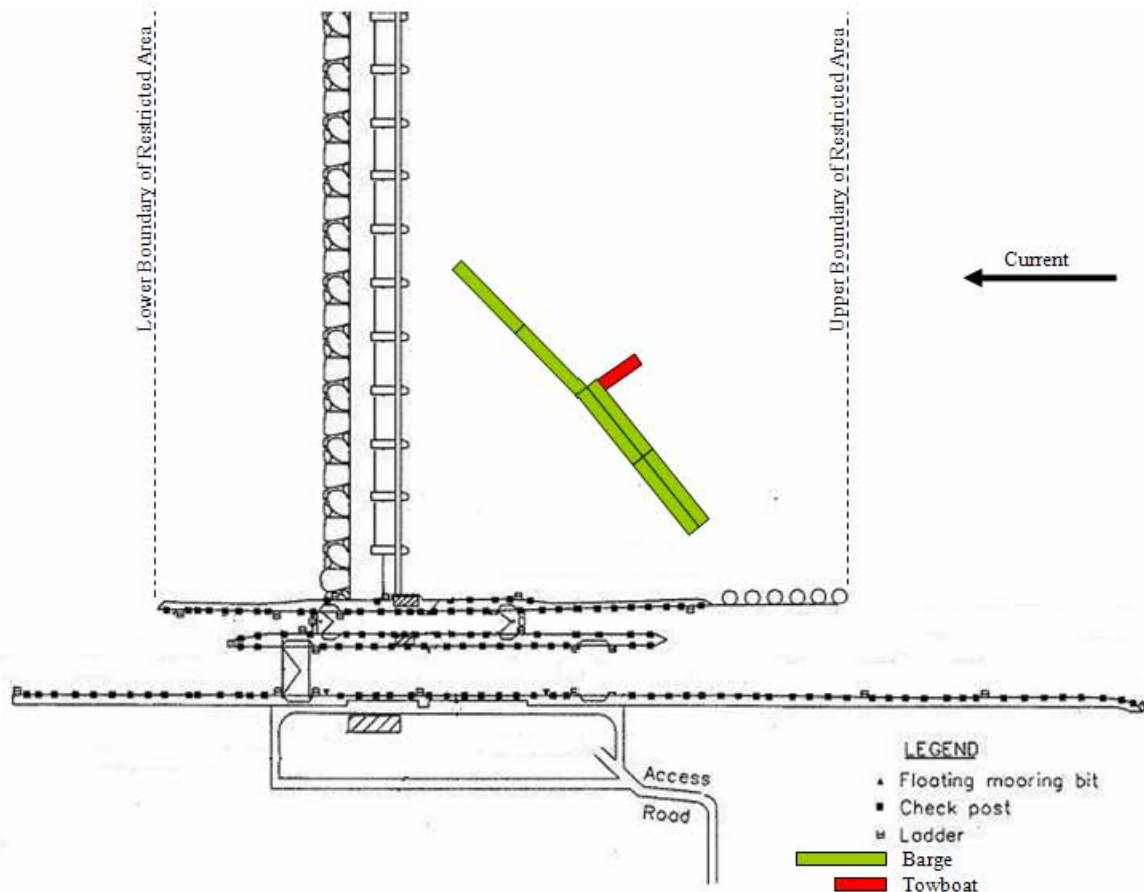


75. On 09JAN05, at approximately 0215, the LILLIAN G departed Bruce Mansfield Power Plant in response to a call for help from Montgomery Locks and Dam personnel. The Bruce Mansfield Power Plant is located approximately one mile below the Montgomery Locks and Dam. (IO Exhibit 85, Trans Vol V pg 229 ln 5)

76. On 09JAN05, at approximately 0218, after attempts to release the sinking barge were unsuccessful, the ELIZABETH M released the entire tow. [REDACTED] then maneuvered the ELIZABETH M around the starboard side of the tow and placed a line onto a timberhead

on the starboard bow of the center barge in the starboard string. At this time the towboat and tow were located well within the restricted zone above the dam. (IO Exhibit 050, Trans Vol II pg 53 ln 11, Vol II pg 64 ln 7, Vol II pg 131 ln 5, Vol III pg 160 ln 13, Vol III pg 161 ln 12, Vol III pg 162 ln 17, Vol III pg 278 ln 19, Vol III pg 318 ln 19)

Figure 17: Approximate location and configuration of the ELIZABETH M and tow after placing a line onto a timberhead on the starboard bow of the center barge in the starboard string.



77. Shortly after the deckhands put a line onto the timberhead, recapturing the tow, [REDACTED] attempted to back the barges upstream. The towboat and tow did not make any progress upstream. About this time Stewart told [REDACTED] he "Better turn it loose." [REDACTED] looked up and ordered "Turn it loose." [REDACTED] turned the tow loose and "...as soon as I got back on the boat, the boat started rising up in the air." (Trans Vol II pg 53 ln 22, Vol II pg 68 ln 2, Vol II pg 136 ln 14, Vol II pg 221 ln 4, Vol III pg 279 ln 4, Vol III pg 280 ln 4)

78. After the tow was released, [REDACTED] attempted to turn the ELIZABETH M to port to spin the bow upstream by going full astern on the port engine and greater than clutch ahead on the starboard engine. While the vessel was swinging to port, the starboard side



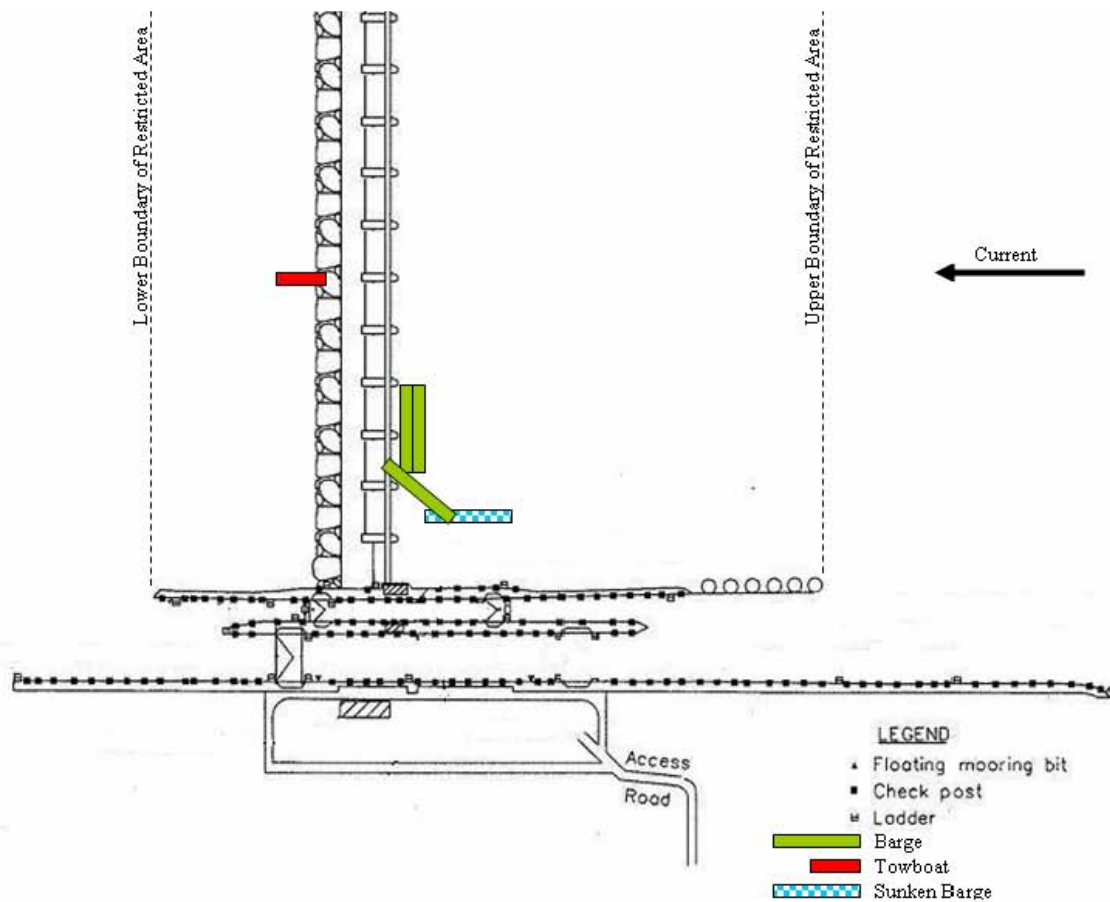
of the vessel collided with the tow causing the bow to be pulled back into the tow and pinning the ELIZABETH M starboard side to the tow. This was about the time [REDACTED] started taking pictures using his cellular telephone (picture capable) he had retrieved from the deck locker and recalled feeling a "bump." Further attempts by [REDACTED] to maneuver the ELIZABETH M away from the tow were unsuccessful. (IO Exhibit 123, Trans Vol II pg 54 ln 3, Vol II pg 54 ln 8, Vol II pg 68 ln 8, Trans Vol II pg 68 ln 19, Trans Vol II pg 137 ln 21, Vol III pg 163 ln 12, Vol III pg 217 ln 19, Vol III pg 223 ln 23, Vol IV pg 29 ln 7)

79. On 09JAN05, at approximately 0219, the LILLIAN G while en route to assist the ELIZABETH M passed two barges adrift and partially submerged. Upon arrival below the Montgomery Dam the Pilot on the LILLIAN G ([REDACTED]) saw the lights from the ELIZABETH M above the dam. Seconds later the lights went out as the vessel went through the dam. (IO Exhibit 85, Trans Vol V pg 229 ln 5)

80. [REDACTED] departed the bridge to get his lifejacket when it appeared imminent that the ELIZABETH M was going to go over the dam. (Vol II pg 54 ln 13)

81. On 09JAN05, at approximately 0220, the ELIZABETH M went over the Montgomery Dam. Just prior to the time the ELIZABETH M went over the dam one of the Locksmen ([REDACTED]) heard two distinct and separate "thumps" that were 10 to 15 seconds apart. The other Locksman ([REDACTED]), having completed opening dam gate 9, was walking towards gate 1 when "there was a loud bang, a real big -- a crash..." which caused him to lose his balance. [REDACTED] who was standing on the dam in the vicinity of gate 6, saw two barges start to get jammed in gate 6 but they quickly dislodged and went over the dam. The ELIZABETH M went over the dam shortly after the barges. [REDACTED] testimony regarding what he witnessed as the ELIZABETH M approached, allided with and went over the dam was "...before it started going over the rollers, the whole stern was completely submerged, and the rest of the quarter deck and so forth went very fast, and the only part I could physically see was the wheelhouse..." and "...the tow knees on the bow of the towboat on both sides. I could only see maybe a foot of that." The ELIZABETH M initially struck the dam "sideways" at a 45 degree angle on the starboard side of the vessel, then spun and went over the dam stern first through the spillway at dam gate 6. After going over the dam, the stern of the vessel submerged then resurfaced and drove the bow of the vessel into the outflow coming through the spillway. The bow then resurfaced, the stern re-submerged and the ELIZABETH M sank almost immediately. The vessel came to rest between dam gates 5 and 6. The four barges (the CTC 7712, CTC 962, CTC 8205 and CTC 8412) that remained in the pool above the dam eventually sank and came to rest in the vicinity of dam gates 1, 2, 3 and 4. The CTC 7616 came to rest near the Lower Approach Cells to the Montgomery Locks. The CTC 7638 came to rest near the right descending bank near mile marker 33.5 on the Ohio River. (IO Exhibits 003, 65, 70, 72, 77, 149, Trans Vol I pg 38 ln 12, Vol II pg 54 ln 13, Vol III pg 163 ln 12, Vol IV pg 198 ln 8, Vol IV pg 211 ln 21, Vol IV pg 254 ln 3, Vol IV pg 273 ln 7, Vol V pg 17 ln 10, Vol V pg 35 ln 3, Vol V pg 137 ln 5, Vol V pg 138 ln 4, Vol V pg 138 ln 21, Vol V pg 164 ln 22, Vol V pg 207 ln 12)

Figure 18: Approximate location of the ELIZABETH M and barges after striking the dam. The two barges not shown in the illustration are the barges that went over the dam before the ELIZABETH M and sank further downstream.



82. Just prior to the ELIZABETH M going over the dam [REDACTED] proceeded up the exterior steps on the port side of the towboat bow to the second deck. On the second deck he proceeded across to the starboard side and up to the pilothouse door. As [REDACTED] entered the pilothouse he saw Conklin and Stewart. Stewart was attempting to maneuver the vessel. [REDACTED] stated both main engines were at full ahead. [REDACTED] attempted to go below to the lounge area but couldn't because of the rising water so he returned to the pilothouse. Upon returning to the pilothouse he saw Stewart trying, unsuccessfully, to get the port pilothouse door open. About this time the towboat passed under the lock gate which came in contact with the top of the pilothouse causing Thomas to drop to the deck. The port door opened and Stewart exited the pilothouse and held onto the handrail. Thomas turned and saw [REDACTED] returning to the pilothouse but when he turned back around Stewart was gone. [REDACTED] was then washed out the port door. He grabbed the handrail and made his way around to the stern of the pilothouse to the outside ladder that leads to the top of the pilothouse. The ladder had been torn from the deck and bent to a

vertical position when the top of the pilothouse struck the dam gate. The ladder was still attached to the top of the pilothouse but, the damage to the ladder made it impossible for him to proceed any higher on the vessel so he held onto the ladder waiting for assistance. (IO Exhibit 123, Trans Vol III pg 280 ln 4, Vol III pg 280 ln 14, Vol III pg 281 ln 8, Vol III pg 282 ln 4, Vol III pg 282 ln 22, Vol III pg 339 ln 2)

83. [REDACTED] arrived back in the pilothouse about the time the ELIZABETH M was going over the dam. Water was quickly flooding the vessel interior and he observed Stewart and [REDACTED] exit through the port door. As [REDACTED] attempted to exit the pilothouse the water pressure on the door slammed it shut amputating the little finger of his right hand and knocking him backwards. The door then “popped back open” and [REDACTED] exited the pilothouse. He then made his way to the stern ladder that leads to the top of the pilothouse. [REDACTED] tried to hold onto a drain on the top of the pilothouse with his good hand but was struggling so [REDACTED] provided assistance until they were rescued by the ROCKET. In addition to the assistance rendered to [REDACTED], [REDACTED] also used his handheld to call for help on channels 13 and 16. (Trans Vol II pg 54 ln 22, Vol II pg 55 ln 2, Vol III pg 283 ln 16, Vol III pg 284 ln 14)

Figure 19: Post-casualty photograph of the ladder on the ELIZABETH M leading to the top of the pilothouse used by [REDACTED] to secure himself and [REDACTED] until they were rescued.





Figure 20: Post-casualty photograph of the top of the pilothouse. Also pictured is the drain [REDACTED] attempted to hold onto while waiting to be rescued.



84. During the course of this investigation there were indications the ELIZABETH M may have lost main propulsion power before going over the dam. Post-casualty analysis indicates the engines were running at or near full rated power until the vessel sank after going through the dam. Air was supplied to the main diesel engines (MDEs) from air filter housings located outside the engineroom on the 01 (Texas) deck. The MDEs air supply ran from the air filter housings through reinforced hard rubber elbows and steel piping which terminated approximately 4' above the MDEs. There were four sections of 6' long (approximately), 8" diameter, wire reinforced, thin wall (0.060") flexible PVC duct hose connected between the steel piping located above the MDEs and MDE's turbocharger inlets. These flexible duct hose sections did not meet minimum manufacturer's specifications which "...specify ridged piping & reinforced heavy wall elbows & flexible connections similar to the ELIZABETH M air supply above the PVC hoses." Air flow to the MDEs was restricted as the air filtering media swelled from being wetted after the vessel went over the dam. The restriction of airflow to the MDEs resulted in an increase of vacuum within the MDE's air intake supply system between the air filter housing and the MDE turbocharger inlets. The high vacuum within the system collapsed the flexible PVC duct hoses. The collapse of the duct hoses caused air starvation of the MDEs and the engines shutdown. All four sections of flexible PVC duct hoses collapsed in a similar fashion. No hydraulic lock damage was found in either MDE during the post casualty internal inspections. (IO Exhibit 146)

Figure 21: Pre-casualty and post-casualty photographs of the pilothouse console. The pre-casualty photograph shows the main engine clutch/throttle controls at all stop (neutral). The post-casualty photograph shows the main engine clutch/throttles controls were at full ahead when the ELIZABETH M went over the dam.



Pre-casualty



Post-casualty



Figure 22: Post-casualty photographs of air filter housing on the 01 deck and collapsed flexible PVC duct hoses in MDE air intake system.



Air filter housing



Collapsed PVC hoses at the steel piping connection from air filter housing.



Collapsed PVC hoses at MDE turbochargers inlets.



Collapsed PVC hoses at a MDE turbocharger inlet.

85. The last time [REDACTED] saw the Striker pilot (Conklin), he was on the head of the towboat before the ELIZABETH M went over the dam. A short time later, [REDACTED] and [REDACTED] saw Conklin leaving the pilothouse going below into the vessel interior before the vessel went over the dam. [REDACTED] and [REDACTED] testified they believed Conklin was going below to get a lifejacket. Rescue/recovery operations conducted immediately after the casualty were not successful in locating Conklin. (IO Exhibit 128, Trans Vol III pg 112 ln 5, Vol III pg 189 ln 12).

86. As the ELIZABETH M went over the dam [REDACTED], Crevda and Fisher were on the head of the towboat. They attempted to make their way to the pilothouse. Just before reaching the pilothouse the top of the ELIZABETH M hit "something" (the dam gate) so they "ran and jumped off the second deck into the yawl" located on the stern deck of the vessel – see Figure 2 stern view. Attempts to release the yawl were unsuccessful and [REDACTED]. Crevda and Fisher were washed overboard. [REDACTED] resurfaced downstream and made his way to a floating garbage bag which he used for additional flotation until being rescued. Crevda and Fisher were recovered but attempts to resuscitate them were unsuccessful. (IO Exhibit 126, 133, 134, 135, Trans Vol III pg 170 ln 23, Vol III pg 172 ln 23, Vol III pg 186 ln 5)

87. On 09JAN05, at approximately 0221, Montgomery Locks and Dam personnel noted two ELIZABETH M crewmembers clinging to the ladder on the rear of the pilothouse yelling for help. At this time lock personnel started closing dam gates 5 and 6 to reduce the turbulence and current in the area of the sunken ELIZABETH M. While closing the gates, [REDACTED] attempted to contact vessels in the area to render assistance. (IO Exhibit 70, Trans Vol IV pg 261 ln 3, Vol IV pg 261 ln 13, Vol V pg 140 ln 13, Vol IV pg 261 ln 20)

88. On 09JAN05, sometime after 0220, the LILLIAN G recovered one unconscious ELIZABETH M crewmember from the Ohio River, initiated first aid procedures and transported him to emergency medical service personnel located at the Mansfield Power Plant near mile marker 34 on the Ohio River. (IO Exhibits 85, 107, Trans Vol V pg 229 ln 5)

89. On 09JAN05, at approximately 0230, the SANDY DRAKE, located approximately one mile downstream from the Montgomery Locks and Dam, heard two mayday calls on CH 16 and one mayday call on CH 13 on the vessel's VHF-FM radio and proceeded to the lock to provide assistance. (IO Exhibit 78, Trans Vol V pg 214, ln 10)

90. On 09JAN05, at approximately 0240, the SANDY DRAKE arrived on-scene below the dam and recovered three ELIZABETH M crewmembers (one conscious ([REDACTED]) and two unconscious) from the Ohio River, initiated first aid procedures and transported them to emergency medical service personnel located at the Mansfield Power Plant near mile marker 34 on the Ohio River. (IO Exhibit 78, 107, Trans Vol V pg 220 ln 5, Vol V pg 214, ln 10)



91. All deckhands on the ELIZABETH M were wearing type III lifejackets prior to and during the casualty events. (Trans Vol II pg 76 ln 20, Vol III pg 168 ln 17, Vol III pg 169 ln 12, Vol III pg 331 ln 11)

92. On 09JAN05, at approximately 0250, the U.S. Coast Guard Captain of the Port at Marine Safety Office Pittsburgh, PA established a safety zone between mile markers 31 and 35 on the Ohio River. The river was closed for four days for search and rescue operations. (IO exhibit 107, 150)

93. On 09JAN05, at approximately 0306, Montgomery Locks and Dam personnel completed closing gates 5 and 6 which reduced the turbulence and current in the vicinity of the sunken ELIZABETH M. (IO Exhibit 70)

94. On 09JAN05, at approximately 0345, the crew of the ROCKET successfully rescued two crewmembers (██████████ and ██████████) from the partially sunken ELIZABETH M using ring life buoys attached to lifelines. Once ██████████ and ██████████ were safely aboard the ROCKET, the crew initiated first aid procedures and transported them to emergency medical service personnel located at the Mansfield Power Plant near mile marker 34 on the Ohio River. (IO Exhibit 070, 107, 112, Trans Vol II pg 76 ln 9, Vol III pg 287 ln 9, Vol V pg 252 ln 10)

95. On 09JAN05, at approximately 0800, a heavy petroleum sheen was observed emanating from the sunken ELIZABETH M. The ELIZABETH M had approximately 8,000 gallons of fuel on board at the time of the casualty. (IO Exhibits 080, 107, 111, Trans Vol I pg 22 ln 3)

96. On 09JAN05, Scott Stewart, Rick Conklin, Thomas Fisher, Edward Crevda all perished as a direct result of the casualty - see Table 3: Record of Deceased for particulars. (IO Exhibits, 003, 126, 133, 134, 135, Trans Vol II pg 82 ln10)

97. On 09JAN05, ██████████ and ██████████ were all injured as a direct result of the casualty - see Table 4: Record of Injured for particulars. (IO Exhibits 003, Trans Vol II pg 82 ln 10)

98. Campbell Transportation Co. did not conduct required chemical testing in accordance with 46 CFR Parts 4 and 16 for any of the seven ELIZABETH M crewmembers. Non-Department of Transportation chemical testing was performed on the Master (██████████) and the results were reported as ██████████ for drug or alcohol use. Toxicology reports were completed for the four deceased crewmembers and the results were ██████████ for drug or alcohol use. Chemical testing was not performed on the two surviving deckhands (██████████ and ██████████). (IO Exhibits 88, 94, 96, 97, 98, 102, Trans Vol II pg 82 ln 18)

99. The Coroner's reports for the four ELIZABETH M crewmen who perished as a result of the casualty, listed the manner of death, in all cases, as accidental drowning. (IO Exhibit 126, 133, 134, 135).



100. On 19JAN05, U.S. Coast Guard Marine Safety Office Pittsburgh issued a MSO Pittsburgh Information Bulletin establishing requirements for using helper boats or suspending navigation in the vicinity of the Emsworth Locks and Dam and Montgomery Locks and Dam when certain river conditions are reached. (PI Exhibit 001)

101. On 22JAN05 the barge CTC 7616 was salvaged near the lower approach cells to the Montgomery Dam. Damage noted appeared to be the result of the casualty. The barge was a total constructive loss. (IO Exhibit 149)

102. On 14FEB05 the barge CTC 7638 was salvaged near the right descending bank on the Ohio River at mile marker 33.5. Damage noted appeared to be the result of the casualty. The barge was repairable and will be placed back in service. Cost of repairs estimated at \$61,500. (IO Exhibit 149)

103. On 04MAR05, the M/V ELIZABETH M was raised without incident and transported to Industry Terminal located at mile marker 33 on the Ohio River. Oil was discharged from the ELIZABETH M during salvage operations. The body of Rick Conklin, the only crewmember who remained missing since the time of the casualty, was located in the forward port section of the engine room. After Conklin was removed from the ELIZABETH M the vessel was transported to, and secured at, the C& C Marine Maintenance Co. in Georgetown, PA located at mile 39 on the Ohio River. The vessel was a total constructive loss. (IO Exhibit 149)

104. On 07MAR05 the barge CTC 7712 was salvaged from the upriver side of the Montgomery Dam near gates 1 and 2. Damage noted appeared to be the result of the casualty. The barge was repairable and will be placed back in service. Cost of repairs estimated at \$30,000. (IO Exhibit 149)

105. On 16MAR05 the barge CTC 8412 was salvaged from the upriver side of the Montgomery Dam near gates 2 and 3. Damage noted appeared to be the result of the casualty. The barge was repairable and will be placed back in service. Cost of repairs estimated at \$52,080. (IO Exhibit 149)

106. On 18MAR05 the barge HBL 8205 was salvaged from the upriver side of the Montgomery Dam near gates 2 and 3. Damage noted appeared to be the result of the casualty. The barge was a total constructive loss. (IO Exhibit 149)

107. On 22MAR05 the barge CTC 962 was salvaged from the upriver side of the Montgomery Dam near gate 1. Damage noted appeared to be the result of the casualty. The barge was a total constructive loss. (IO Exhibit 149)

108. Post-casualty analysis indicated river velocity approximately 100 feet above the dam at 0230 on 09JAN05 was approximately 16.2 ft per second which equates to approximately 11.04 miles per hour. River velocity would have increased in the vicinity of the dam gates due to the river restrictions caused by the lock and dam structure. The current near the dam gates could have been as high as 13.2 MPH. Post-casualty analysis

also indicated the ELIZABETH M as a light boat, with the MDEs governors limiting engine speed to 1200 RPM, could not have produced enough propeller RPM to overcome the currents being experienced in the restricted area above the Montgomery Dam on 09JAN05. The analysis indicated the ELIZABETH M, as configured, had a maximum light boat velocity potential of approximately 11 MPH. (IO Exhibit 146)

109. A vessel survey was completed after the ELIZABETH M was raised. Pinholes and fractures were noted in the forepeak which appeared to be the result of hull wastage. Two cutouts approximately 25" x 25" were noted in the main deck below the poop deck in the vicinity of the steering gear. Both cutouts were located on the vessel's centerline (approximately) with one located approximately 10' forward of the transom and the other approximately 19' forward of the transom. The poop deck had been modified by installation of open grating which replaced approximately 30" of the stern section of the deck. The poop deck modifications compromised the vessel's weather/water tightness. Any water shipped on the poop deck would have drained directly into the interior of the vessel through the grating and the two 25" x 25" cutouts in the main deck. Hatch dogs were also found to be unserviceable. Post casualty analysis indicated, with the 25" x 25" openings in the main deck, "...given 60 seconds and some combination of static head and river flow, the aft void could have been mostly (if not completely) full of water." The analysis also concluded "...filling (to 100%) the aft void & deck box alone would not have caused the vessel to sink." However, it would have trimmed the vessel and made her more susceptible to downflooding. (IO Exhibit 144)

Figure 23: Post-casualty photograph of pinholes and fractures in The ELIZABETH M forepeak.



Figure 24: Post-casualty photograph of ELIZABETH M raised poop deck. Grating pictured on poop deck was used over the opening at the stern (top of photograph).



Figure 25: Example of unserviceable hatch dogs found on the ELIZABETH M. Heavy paint would make it impossible to properly secure a hatch.



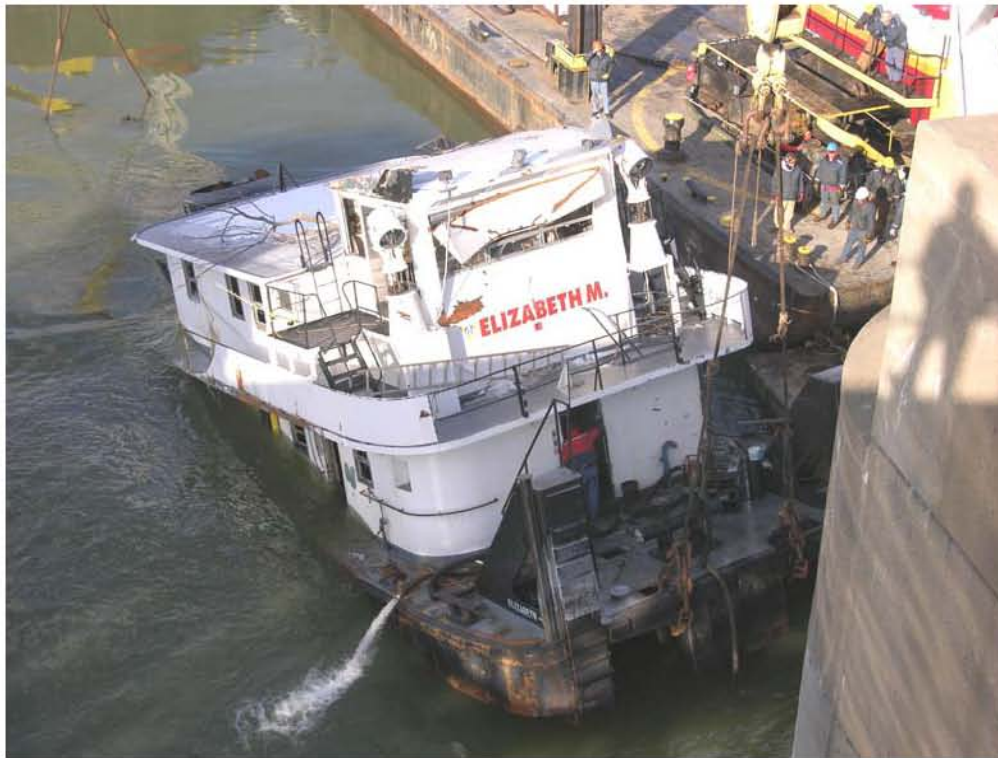


Figure 26: Post-casualty photographs of the two 25" x 25" cutouts in ELIZABETH M's main deck.





Figure 27: Post-casualty photographs of the ELIZABETH M taken during salvage operations and vessel survey.





Oil emanating from the ELIZABETH M during salvage operations.











## Conclusions

1. All of the causes of this casualty cannot be determined because four of the seven crewmembers aboard the ELIZABETH M perished as a result of the casualty. The actions taken by the personnel on-watch in the pilothouse during the early stages of the casualty up to the time the vessel's Master arrived in the pilothouse, after the general alarm was sounded, could not be determined with certainty. The only surviving crewmember who was on watch during the early stages of the casualty was the lead deckhand (██████) and he was on deck going between the towboat and the tow. (Facts 94, 96)
2. There are gaps and conflicts in the times and information provided by the witnesses that testified at the Coast Guard Hearing. Most of these are minor in nature and do not affect the key events that led up to the sinking of the ELIZABETH M and her tow.
3. Prior to the casualty, the ELIZABETH M had a recent history of being involved in numerous reportable marine casualties. None of the casualties appears to have contributed to the casualty that is the subject of this report. (Facts 11, 12, 13, 18)
4. The ELIZABETH M is a commercial towing vessel greater than 26 feet in length and was required to be under the direction and control of a person licensed as Master or Mate (Pilot) of towing vessels. On 08JAN05 and 09JAN05, the ELIZABETH M was properly manned in accordance with 46 CFR 15.610. (Facts 1, 3, 6, 7, 8, 26, 27, 28)
5. The RICHARD C is a commercial towing vessel greater than 26 feet in length and is required to be under the direction and control of a person licensed as Master or Mate (Pilot) of towing vessels. On 08JAN05 and 09JAN05, the RICHARD C was properly manned in accordance with 46 CFR 15.610. (Facts 28, 29, 30, 31, 37, 43, 44)
6. Modifications were made to the ELIZABETH M that were not completed in accordance with manufacturers specifications or good marine practice. The modifications reduced the vessel's survivability and degraded the vessel's propulsion system capabilities. (Facts 2, 109)
7. The configuration and method of securing the barges in the tow was adequate. (Facts 34, 35)
8. Contributing to the casualty was the high water conditions being experienced on the upper Ohio River. The ELIZABETH M was being operated in high water conditions prior to and during the casualty. (Facts 19, 20, 21, 22, 23, 24, 25, 36, 45)

9. The U.S. Coast Guard, U.S. Army Corps of Engineers and the marine industry were all using different standards for making a determination of when vessels were operating in high water conditions on the upper Ohio River. (Fact 24)

10. The Ohio River Valley Waterways Management Plan does address high water but is ineffective in protecting against casualties during high water conditions. The plan has specific trigger points and actions to be taken during low water conditions but no trigger points for actions to be taken during high water conditions. For the case at hand, during the high water conditions, inter-pool traffic was only limited by lock outages and inadequate bridge clearances resulting from the high water conditions. Although the Coast Guard had authority to restrict navigation as needed, actions taken as the river levels raised above normal pool to the time of the casualty, with the exception of the time the locks were out of service due to high water conditions, were left to the discretion of the vessel's owner/operator. (Facts 19, 20, 21, 23, 24)

11. The upper Ohio River was open to navigation on 08JAN05 and 09JAN05. (Facts 19, 22, 23, 25, 33, 37, 38, 39, 41, 43, 44, 47, 48, 49)

12. A proximate cause of this casualty was the departure of the ELIZABETH M and tow from the Georgetown fleet without the assigned assist vessel, the RICHARD C. (Facts 27, 28, 32, 33, 37, 38, 39, 41, 43, 44, 47, 48, 49)

13. There is evidence of misconduct on the part of the Master of the ELIZABETH M for disobeying company orders by departing the Georgetown fleet without the RICHARD C in attendance. (Facts 6, 27, 28, 32, 33, 37, 38, 39, 41, 43, 44, 47, 48, 49)

14. There is evidence of negligence on the part of the Master of the ELIZABETH M for departing the Georgetown fleet without the RICHARD C. (Facts 6, 27, 28, 32, 33, 37, 38, 39, 41, 43, 44, 47, 48, 49)

15. There is evidence of negligence on the part of the Pilot on the RICHARD C for failure to take appropriate actions when he knew the ELIZABETH M and tow had departed the Georgetown fleet in violation of company orders. (Facts 28, 33, 37, 43, 44, 46)

16. The format and wording of the vessel orders issued by Campbell Transportation Company on 08JAN05 were unclear. The ELIZABETH M orders simply stated "The RICHARD C will help." This order read on it's own, without the benefit of reviewing the RICHARD C orders, does not provide enough detail regarding the purpose of the RICHARD C such as what "help" the RICHARD C will provide or when "help" will be provided. However, taken all the vessel orders as a whole and considering the telephone conversation between the Master of the ELIZABETH M and the Master RICHARD C after the orders were issued, it is evident the RICHARD C was assigned as an assist vessel for the entire voyage between Georgetown and Tonomo. (Facts 27, 28, 32)

17. Contributing to the casualty was the schedule of the RICHARD C as established by the orders issued by Campbell Transportation Company on 08JAN05. They did not allow ample time for the RICHARD C to arrive at the Georgetown fleet in time to assist the ELIZABETH M in building the tow and/or to be standing by when the ELIZABETH M was ready to get underway after building the tow. (Facts 27, 28, 33, 37, 40, 43, 44)

18. Contributing to the casualty was non-compliance with procedures contained in the U.S. Corps of Engineers Navigation Notice No. 1-2004 for a tow leaving a lock in an up bound movement. For the case at hand, specifically part of paragraph 14 of the Operational Aspects section which states “For a single lockage, with a towboat only set over...a lock operator walks a line out with the tow until the towboat is again secured to the tow...” The ELIZABETH M initially started losing control of the tow during the two to three minute time period the towboat was attempting to get faced up to the tow on the fly while exiting the lock chamber. During this time period the tow was intentionally set adrift with no lines between the tow and towboat or between the tow and the lock/guide wall. (Facts 59, 62, 63)

19. There is evidence that Campbell Transportation Company personnel and the lock personnel employed at the Montgomery locks and Dam on the morning of the casualty were not conversant with all U.S. Corps of Engineers locking procedures. (Fact 59)

20. A proximate cause of the casualty was the overconfidence of the Striker-Pilot, Pilot and Master on the ELIZABETH M with regards to their abilities to regain control of the tow. As the chain of events unfolded, there were many opportunities to make decisions and take actions which could have prevented all or part of this casualty. The key decisions and events that allowed the chain of events to continue and consummate in the sinking of the ELIZABETH M and her six barge tow were:

- a. The decision of the Striker-Pilot to continue shoving the tow out of the lock chamber, towards the open river, after the initial allision and before regaining full control of the barges at the head of the tow. (Fact 66)
- b. The decision of the Pilot to remove the line that had been secured between the riverside lock wall and the tow after the second allision. (Facts 69, 70)
- c. The decision of the Master to shove the tow out of the, somewhat, protected area between the landside lock wall and the riverside lock wall into the open river in an attempt to reach the mooring cells above the upper end of the landside lock wall after the third allision. (Facts 71, 74)
- d. The decision of the Master to pursue the barges into the restricted zone above the dam. (Facts 58, 76, 81)

21. Contributing to the loss of the ELIZABETH M was the decision of the Master to swing the ELIZABETH M around to point the head of the towboat upstream before beginning to maneuver away from the tow just prior to the tow alliding with the dam, instead of backing the towboat away from the tow. The time taken attempting to execute the maneuver reduced the amount of time available to maneuver the towboat away from the tow and reduced the distance between the towboat and the dam. Based on testimony

from the Master, it appears he was predisposed to performing this maneuver because he considered the maneuver to be "...pretty normal..." and had performed the maneuver "...well into the hundreds of times. Maybe thousands." – see hearing transcript volume II page 139 lines 2 through 13. (Facts 78, 81)

22. There is evidence of negligence on the part of the Master of the ELIZABETH M in that he failed to recognize a risk of allision existed until shortly before the tow allided with the dam. He made this realization only after the Pilot told him "Better turn it loose." (Facts 6, 77, 81)

23. There is evidence of misconduct on the part of the Master of the ELIZABETH M for pursuing the tow into the restricted zone above the dam. (Facts 6, 58, 76, 81)

24. Once the six barge tow was out of shape and had drifted into the restricted area above the Montgomery Dam, the ELIZABETH M was not an adequate vessel for recovery of the tow due to the configuration of the vessel's main diesel engines and river conditions being experienced in the area immediately above the dam on 09JAN05. (Facts 3, 27, 28, 32, 47, 84, 108)

25. Contributing to the casualty was the outdraft at the upstream approach to the Montgomery Locks and Dam. (Facts 56, 57, 61, 64)

26. There is evidence the ELIZABETH M was experiencing significant downflooding of interior spaces prior to going over the dam. Improper modifications noted after the vessel was salvaged, such as the over-ballasting of the vessel in 1997 and the two 25" x 25" cutouts found in the aft main deck, increased vessel downflooding noted just prior to the vessel going over the dam and quickened the sinking of the ELIZABETH M after going over the dam. (Facts 2, 81, 82, 109)

27. The ELIZABETH M met all applicable regulatory requirements for lifesaving equipment and emergency drills. However, the regulatory requirements were insufficient for the safe egress of crewmembers from the ELIZABETH M as she sank. (Facts 14, 80, 81, 85, 86, 87, 88, 90, 91, 96, 99)

28. The actions of [REDACTED] saved the life of [REDACTED]. (Facts 82, 83, 87)

29. The actions taken by U.S. Army Corps of Engineers personnel ([REDACTED] and [REDACTED]) facilitated the successful rescue of [REDACTED] and [REDACTED] by the ROCKET. (Facts 87, 93, 94)

30. The actions taken by the crew of the ROCKET saved the lives of [REDACTED] and [REDACTED]. (Fact 94)

31. The actions taken by the crew of the SANDY DRAKE and the crew of the LILLIAN G saved the life of [REDACTED] and assisted in the quick recovery of the bodies of three other crewmembers. (Facts 75, 79, 86, 88, 89, 90)



32. There is evidence Campbell Transportation Company failed to comply with the requirements of 46 CFR 4.06 – Mandatory Chemical Testing Following Serious Marine Incidents Involving Vessels in Commercial Service. (Facts 96, 97, 98)

33. Campbell Transportation Company's written policy titled "Pilot Trainee or Steersman Program" was unclear regarding the responsibilities of, and for, the ELIZABETH M's Striker-Pilot (Conklin) because the policy does not refer to, or define the term "Striker Pilot." There is evidence that the policy was not followed by at least two Campbell Transportation Co. employees who operated the ELIZABETH M. (Facts 9, 26, 62)

34. There is evidence of misconduct on the part of the Master and Pilot on the ELIZABETH M for allowing the Striker-Pilot to operate the ELIZABETH M on the after watch (Pilot's watch). (Facts 6, 7, 9, 10, 26, 62)

35. There is evidence Campbell Transportation Co. failed to provide a written report, in accordance with 46 CFR 4.05-10, of a reportable marine casualty (grounding) involving the ELIZABETH M that occurred on 23SEP04. (Facts 12, 13, 15, 16)

36. There is evidence the Campbell Transportation Company cooperative towboat examination program is substandard. The last vessel examination under this program was completed while the ELIZABETH M was under a Captain of the Port order suspending operations until the cause of a power loss experienced on 24SEP04 could be determined and corrective action taken to prevent reoccurrence. The examination was completed by a Campbell Transportation Co. representative and no deficiencies were noted. However, the vessel was dry-docked on two different occasions within twelve days after completion of the examination and significant deficiencies were noted including cracks in fuel tanks, holed ballast tanks and cracks in the headlog. (Facts 2, 13, 14, 15, 16, 17)

37. There is evidence of a violation of 33 USC 1321(b) by Campbell Transportation Company for discharging oil into a navigable water of the United States. (Fact 95)

38. Except as noted above, there is no evidence of actionable misconduct, inattention to duty, negligence or willful violation of law or regulation on the part of licensed or documented persons.

39. Except as noted above, there is no evidence that the failure of inspected material or equipment, nor evidence that personnel of the Coast Guard, or any other government agency or any other person, contributed to the casualty.

## **Recommendations**

1. That the U.S. Coast Guard, U.S. Army Corps of Engineers and industry stakeholders:
  - a. Develop a single definition of, and a process for determining when, the upper Ohio River is in a state of “high water.” (Conclusions 8, 9)
  - b. Charter a working group to identify known high water hazards associated with vessel operations in the vicinity of the Montgomery Locks and Dam and the upper Ohio River. (Conclusions 8, 10, 24, 25)
  - c. Once the hazards in Recommendation 1.b. are identified:
    - (1) Develop methodologies to reduce the hazards associated with high water operations. (Conclusions 8, 10, 11, 24, 25)
    - (2) Establish trigger points to initiate mandatory actions to be taken as the river level rises and falls. (Conclusions 8, 10, 20, 24, 25)
    - (3) Promulgate the required trigger points and actions through a revision of the Ohio River Valley Waterways Management Plan and/or Federal Regulations. (Conclusions 8, 10, 20, 24, 25)
2. That the Officer in Charge Marine Inspection Pittsburgh, PA:
  - a. Initiates an administrative action (Suspension and Revocation) investigation against the U.S. Coast Guard license issued to [REDACTED] (Master of the ELIZABETH M) for all actionable negligence and/or misconduct. (Conclusions 4, 12, 13, 14, 20, 21, 22, 23, 24, 34)
  - b. Initiates an administrative action (Suspension and Revocation) investigation against the U.S. Coast Guard license issued to [REDACTED] (Pilot of the RICHARD C) for all actionable negligence and/or misconduct. (Conclusions 5, 15)
  - c. Opens a civil penalty investigation to determine whether Campbell Transportation Company, the owner/operator of the ELIZABETH M, violated any laws or regulations as noted in this report. (Conclusions 6, 32, 35, 37)
  - d. Audit Campbell Transportation Company procedures for conducting phase II towboat examinations under the U.S. Coast Guard Cooperative Towboat Examination program to determine the company’s suitability for continued participation in the program. (Conclusions 6, 36)
  - e. Audit Campbell Transportation Company’s chemical testing program procedures to ensure compliance with federal laws and regulations. (Conclusion 32)
3. That Campbell Transportation Company:
  - a. Inspect the other vessels in their fleet to ensure all vessel modifications have been completed in accordance with good marine practice and meet or exceed minimum manufacturer’s specifications. (Conclusions 6, 26)

- b. Implement a system to ensure their vessel operators are aware of, and comply with, policies and procedures such as the U.S. Corps of Engineers Navigation Notices. (Conclusions 18, 19)
  - c. Implement a system to ensure vessel movement orders are clearly articulated and not subject to misinterpretation by their vessel operators. (Conclusions 12, 16, 24)
  - d. Review and revise company policy for scheduling vessel movements to ensure adequate time is allowed for executing the orders. (Conclusions 12, 17)
  - e. Review and revise their Pilot Trainee or Steersman Program policy to reflect commonly used terminology and ensure it is clearly understood, and complied with, by all affected parties. (Conclusions 33)
4. That the U.S. Army Corps of Engineers:
- a. Review, and revise as needed, Navigation Notice No. 1-2004 (or subsequent revisions) to ensure the terms used in the policy are clearly defined (i.e. “towboat only set over”). (Conclusion 18)
  - b. Enforce compliance with the requirements of Navigation Notice No. 1-2004 (or subsequent revisions) by discontinuing the policy of allowing towboats to face up to a tow on the fly without maintaining some type of positive control over the tow. (Conclusions 18, 19)
  - c. Ensure personnel employed at their locks and dams are familiar with, and comply with, all locking procedures. (Conclusions 18, 19)
  - d. Ensure commercial vessel compliance with all locking procedures. (Conclusions 18, 19)
5. That the U.S. Coast Guard seek legislation requiring commercial towing vessels comply with certain minimum safety standards for lifesaving, hull condition, stability and machinery installations. This casualty highlighted the following specific areas where legislation could improve maritime safety:
- a. Lifesaving. Require primary lifesaving appliances, installed in a float free arrangement, to provide crewmembers egress from a quickly sinking vessel. (Conclusions 1, 27)
  - b. Emergency Drills. Require crewmembers routinely conduct emergency drills to include abandon ship and man overboard. (Conclusions 1, 27)
  - c. Hull condition. Require scheduled hull inspections (i.e. dry-docking) and testing (i.e. gauging) as needed to prove satisfactory condition. (Conclusion 36)
  - d. Hull openings. Require all hatches, hull openings and securing gear be maintained in a serviceable condition and openings in the hull to be kept secured except while the vessel is not operating. (Conclusions 26, 36)
  - e. Stability and subdivision. Require minimum stability and subdivision standards, including the proper installation of ballast. (Conclusion 26)

- f. Plan review. Require repairs or alterations to the hull, machinery or equipment that affects the safety of the vessel be submitted to the Coast Guard or a third party for review and approval. Third party review should be restricted to an authorized classification society, naval architect or professional engineer. (Conclusions 6, 26)
- 6. That the Coast Guard Investigative Service reviews this report for possible criminal action against the Master of the ELIZABETH M and the Pilot of the RICHARD C under 18 USC 1115 or any other applicable laws and/or regulations. (Conclusions 4, 5, 12, 13, 14, 22, 23)
- 7. That this investigation be closed.



## **List of Enclosures**

1. Hearing Exhibits Volume I of III (IO #001 - IO #035)
2. Hearing Exhibits Volume II of III (IO #036 - IO #100)
3. Hearing Exhibits Volume III of III (IO #101 - IO #122, PI #001 - PI #010)
4. Hearing Transcript Volume I
5. Hearing Transcript Volume II
6. Hearing Transcript Volume III
7. Hearing Transcript Volume IV
8. Hearing Transcript Volume V
9. IO Exhibits (IO #123 through IO #150) Introduced After Closing of the Public Hearing on 04FEB05