



The Wreck of Amtrak's *Sunset Limited*

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On September 22, 1993, the *Sunset Limited*, the pride of Amtrak, glided swiftly along through the warm, fall night. A dense fog hugged the countryside. Because there was nothing to see through the train's windows, many passengers dozed peacefully, lulled to sleep by the gentle, rhythmic, clickety-clack of iron wheels passing over jointed rails. Crewmembers roamed the aisles and halls making sure that those guests still awake were accommodated and comfortable. In less than a second, this peaceful scene was shattered by a thundering roar as seats were torn from the floor and passengers were sent flying through the cars. At 2:53 a.m. Amtrak's only transcontinental passenger train, the *Sunset Limited*, plunged into Big Bayou Canot, killing 47 passengers. Eight minutes earlier at 2:45 a.m., a towboat, pushing six barges and lost in a dense fog, unknowingly bumped into the Big Bayou Canot Bridge knocking the track out of alignment. The train, traveling at a speed of 72 mph in the dense fog, derailed as a result, burying the engine and four cars five stories deep in the mud and muck of Big Bayou Canot.^{4,7,8,10,12,13}

Bruce Barrett, a locomotive engineer, has described what might have been occurring in the cab of Amtrak engine Number 819 prior to the wreck.²

This scenario is based upon my 17 years' experience as a locomotive engineer on a major western railroad and upon the compilation of bits and pieces of data from public records and accounts of the accident.

Engineer Michael Vincent was at the controls of the two-week-old General Electric "AMD-

103" locomotive. Engineer Billy Rex Hall was in the cab with Vincent along with Ernest Lamar Russ who was qualifying as an AMTRAK engineer on this portion of the run.

I can almost see the instrument lights as they cast a soft, orange glow across the cab of the locomotive, highlighted by the light from the train's headlight bouncing off the impenetrable fog. I can hear the three men calling out the colors of the railroad signals (sort of like traffic lights for automobiles) as they came into view and discussing the restrictions that would affect the train over the next few miles. The new locomotive, shaped like a bullet, would have been the topic of conversation. Engineers enjoy comparing the "old days" with the new technology as it responds to the movement of their hands on the controls as the train clipped along at 103.53 feet per second. While the headlight beam may have reached 1,000 feet in clear weather, given the dense fog, the visibility would more likely have been less than 100 feet. As the Bayou Canot Bridge appeared in the fog, they would have had no hint of what lay ahead. Even if the headlight had detected the slight shift of the tracks to the left, there would have been less than a second for Vincent to react. I can see his hand as he reached too late for the emergency brake as the 150-ton locomotive turned into an uncontrollable beast and lurched to the left, starting a dive that would bury the locomotive 46 feet—equivalent to five stories—into the muddy bank of the bayou.

I can sense the bridge collapsing under me and momentarily hear the locomotives and lead cars dropping into the water and debris below. I can feel the locomotive's windshield glass against

my face and hands as it shatters inward. I can see myself recoiling in terror as water and mud extrude into the cab, helplessly entombing me and my two companions in our muddy coffin.

At 2:33 a.m., twenty minutes earlier, Amtrak's only transcontinental passenger train, had eased out of the Mobile, Alabama station to continue its streak eastward, thirty-three minutes behind schedule—scheduled departure was 2:00 a.m. (Exhibit 1). It had been delayed in New Orleans for repairs to an air conditioner and toilets on two cars. The train, as it left the Mobile station, consisted of three locomotives and eight cars and carried 202 passengers with a crew of 18. By the time the train was ten miles out of Mobile, it had reached a speed of 72 mph (authorized speed was 70 mph). The green signals indicated that the train was free to “proceed” at maximum track speed in spite of the dense fog, which reduced visibility to a few yards. At Mile Post 656.7 on the Chesapeake and Ohio (CSX) main track, the *Sunset Limited* approached a wood-and-steel bridge spanning a navigable estuary called “Big Bayou Canot.” Although the National Transportation Safety Board (NTSB) had recommended that all railroad bridges over navigable bodies of water be equipped with sensors to detect bridge damage, the Big Bayou Canot Bridge was not so equipped.^{4,7,8,10,12,13}

None of the engineers survived. The three locomotive units came to rest on the east side of the bayou. Part of Unit 819 was buried about 46 feet in the mud, and the part protruding above the embankment caught fire and burned. The verified records indicate that in addition to the engines, a baggage car, a baggage-dorm, and two coaches of the eight-car train dove into the 16 feet of water below the bridge. The last four cars remained on the bridge.⁸

The passenger cars in the bayou immediately began to fill with water, and the diesel fuel from ruptured locomotive fuel tanks began to burn atop the water. While some passengers were able to fight their way to the surface, others were hopelessly trapped in the wreckage. Parents lifted children to safety and, in their continuing efforts to save others, became victims themselves. Others dove repeatedly into the black waters in attempts to save fellow passengers.^{7,10}

Darkness prevailed outside the cars after the derailment. Battery-powered emergency lighting, available inside coaches, provided some illumination, but only the train crew had penlights to use while walking down the tracks in the dark. Once the

cars entered the water, the emergency lighting became inoperable, further complicating evacuation from the submerged cars. Without light from a few penlights and from the fire that ensued following the accident, no light would have been available. Because emergency lighting was unavailable in the submerged cars, passengers had difficulty locating and moving to exits.⁸

Since most on-board service crewmembers were asleep in the dorm coach and since the train attendants were in the cars on the bridge, passengers in the submerged cars had to make decisions on their own and evacuate without assistance. Fortunately, a few passengers took control of the situation, located exits, and told others what to do.¹³

Both the conductor and the assistant conductor were in the diner car, the next to the last car on the train. The assistant conductor reported that the accident took place without warning—no setting up of the brakes, no horn blast, and no communication to the locomotive crew. He was thrown onto a table in front of him and then into the middle of the car. The conductor was thrown over him. When the train stopped, the conductor attempted to contact the engineers in the lead locomotive using his portable radio but received no reply.⁸

The badly shaken but otherwise uninjured assistant conductor instantly contacted Warren Carr (the CSX trainmaster) who was responsible for monitoring all traffic in this portion of the CSX system and requested immediate assistance. But, in the confusion and blackness he was able to give only a general location of the wreck.⁷

The *New York Times* article entitled “Report Revises Times in Train Wreck” published October 8, 1993, included the following transcripts of three calls to 911 placed by Amtrak employees immediately after the accident.¹²

FIRST CALL: 3:01 A.M.

The first two calls came from officials of CSX Transportation Inc., owner of the tracks and bridge. Warren Carr, an assistant terminal trainmaster in Mobile, apparently made the first, to the Mobile police dispatcher.

Mr. Carr tells the operator a train has derailed at Bayou Sara drawbridge and that he understands people are in the water and the bridge is on fire. There are references to Prichard, a small town on the edge of Mobile and Chickasabogue, or Chickasaw

Creek, five miles southwest of the accident site (Exhibit 2).

911: Where is this? Where is that located?

CARR: It's off the Mobile River.

911: Um-hm.

CARR: It's north of Chickasabogue draw. You can't . . .

911: You can't . . . ?

CARR: You can't get there, can't get there by vehicle.

911: O.K., is that going to be, is that going to be in Prichard, north of Chickasabogue? Is that going to be it?

CARR: It's north of Chickasabogue.

911: Um-hm.

CARR: It's a passenger train. I got people in the water. I got cars on fire.

911: O.K., but . . .

CARR: It's a derailment.

911: O.K., a derailment, but is it in Prichard, there by Chickasabogue Creek?

CARR: No, it's on the river.

911: On the Mobile River?

CARR: You can't get to it over the road.

911: O.K.

CARR: You're going to have to get some helicopters and boats and Coast Guard and all those people.

Later, Mr. Carr gets frustrated as he tries to give a location.

CARR: No, it's, it's south of Mobile River, north of Chickasabogue River.

911: South of . . .

CARR: North of Chickasabogue, at the next, next major creek, north of Chickasabogue.

911: And south of, what other river was that?

CARR: South of Mobile River. It's right along beside Mobile River, where Bayou Sara comes off the Mobile River.

911: Bayou Seven?

CARR: Get me ahold of the Coast Guard.

SECOND CALL: 3:10 A.M.

The second call was from Ronnie Seymour, an assistant CSX supervisor for bridges and buildings in Mobile. During this call, operators confirmed that the train was carrying passengers and began to grasp the scope of the disaster. (Exhibit 3 provides a sequence of events.)

911: Can you tell me what the train was carrying?

SEYMOUR: The passengers.

911: Passengers? (She then speaks to another operator.) "It's going to be Saraland, but it's a passenger train that's derailed . . . crew in water, the train's on fire."

911: So it is a passenger train?

SEYMOUR: Yes, ma'am.

911: O.K., sir. It's going to be Saraland's but we have notified the proper authorities, O.K.?

SEYMOUR: Thank you very much.

THIRD CALL: 3:16 A.M.

The third call, 26 minutes after the accident is believed to have occurred, was from an unidentified Amtrak supervisor on the train.

AMTRAK: "We're on, we're on the Mobile River.

911: You're on the Mobile River?

AMTRAK: On the Mobile River. We've got cars burning. They're over, the bridge is out. There's a person in the water. We're trying to help them, but we need all kind of help.

911: So the bridge is out?

AMTRAK: Yes, ma'am, we need help. Send help, please.

Later, after telling the supervisor help is on the way, the operator asks about the location of the wreck.

911: This is the bridge that's out?

AMTRAK: Yes, ma'am. The bridge is out. Yes, ma'am.

911: O.K., which bridge is this that's . . . that's out?

AMTRAK: Ma'am, I don't know. We're on the Mobile River.

911: You're on the Mobile River?

AMTRAK: That's all I know.

911: But you don't know which bridge it is?

AMTRAK: No, ma'am. No, ma'am. I haven't been informed by the conductor. (The supervisor can be heard yelling: "John! John!" apparently to the conductor.)

The supervisor ends the call by telling the operator, "Ma'am, I have to go and assist these folks."

Source: The Associated Press

Neither Carr nor the Mobile Police Department's 911 operator were successful in their first attempts to contact the Coast Guard due to an incorrect listing of the number in the Mobile telephone directory. And, because there were no coordinated emergency response maps for the area, a confused 911 operator had a difficult time understanding the location of the wreck site being described by Mr. Carr. These two factors had the effect of slowing rescue efforts considerably.⁸

Immediately after the wreck, Amtrak crewmen and passengers noted a "large marine vessel 150 yards or more to the south." It was later identified as the *Mauvilla*. Survivors thought it strange that the *Mauvilla* did not move in to assist in the rescue efforts until 15-25 minutes after the crash.¹²

ON BOARD THE M/V MAUVILLA

Meanwhile, a short distance away at about 2:45 A.M., towboat captain, Andrew Stabler, realized that the "bump" which had awakened him from a sound sleep a few minutes earlier was more serious than simply glancing off the river bank in the dense fog. His tow, the *M/V Mauvilla* (*Mauvilla*), owned by Warrior and Gulf Navigation Company (WGN) had been traveling up the Mobile River pushing a string of six barges of coal, cement, logs, and woodchips on its normal run to Birmingham and Tuscaloosa. Pilot Willie Odom, who was piloting the towboat while

Captain Stabler napped, became lost in the fog and turned into Big Bayou Canot by mistake. Even though the towboat was equipped with radar, Pilot Odom had not been adequately trained in its use. National transportation regulations state that when boats become lost in foggy conditions, they must notify the Coast Guard immediately; however, this did not occur. River charts show the Big Bayou Canot Bridge as a trackline over the waterway but do not state its name, clearances, or the fact that it is a fixed bridge. The waterway was without channel markers and was restricted to barge traffic. Nevertheless, it was listed as a "navigable waterway" by the United States Coast Guard.⁸

On September 10, 1994, the National Transportation Safety Board published the following official account of activities aboard the *Mauvilla* immediately after it collided with the bridge:⁸

Pilot Odom stated as he maneuvered upstream that he saw an object on his radar that appeared to be lying across the waterway. No river charts were on board the towboat or were they required to be. Odom said that he never considered the object might have been something other than another towboat and barges that had swung out from the bank. In fact, the object was the single-track Big Bayou Canot railroad bridge, which has a vertical clearance of about 7 feet and is part of the CSX track system. The lead barge of the Mauvilla had a total height of 7 feet 10 inches.

At some point as he continued toward the bridge, Odom placed the throttles of the Mauvilla in reverse. He testified that he was "still trying to figure out what was in front of me. And, I never could." He said he felt a "bump" and thought he had run aground. The deckhand on duty testified that he also felt the "bump" while sitting in the galley and noted the time as 2:45 a.m. In fact, the lead port and starboard barges of the Mauvilla had struck the south and center piers of the bridge's through-girder span. The forward center barge, which protruded about 5 feet ahead of the port and starboard barges, struck the east girder between these two piers, displacing the south end of the girder span 38 inches to the west. This caused the east girder to obtrude into the space traversed by trains.

As a result of the collision, the port string of barges broke free from the tow. In the process of trying to retrieve the loose barges, the *Mauvilla* backed into the east bank of the Big Bayou Canot, where it remained pinned for about 8 minutes until about 2:53 a.m.

When the on-duty deckhand went on deck shortly after the collision with the bridge, he saw flames and said he heard "a hiss like a roar but not a boom or nothing like that." The deckhand estimated that the fire started 5 to 10 minutes after he felt the "bump." Odom then radioed the Mobile River bridge tender* and asked whether anyone had reported a fire; the tender replied, "No."

When Captain Stabler arrived in the wheelhouse shortly after he felt the bump and assumed control of the tow from the pilot, the starboard quarter of the towboat was up against the bank, limiting the vessel's movement. At about 3:05 a.m. Captain Stabler, concerned about his situation with the loose barges, broadcast a distress message on VHF/FM Channel 16:

Mayday, Mayday, Mayday, the motor vessel Mauvilla [garbled], got a tow broke up right below anchorage end of pier and seems to have a cable or something wrapped in the wheel, barges adrift southbound. . . . If anybody down there can help rounding them up, I would appreciate it."

The U.S. Coast Guard Group Mobile (Group) received the radio transmission; the radio operator on watch responded and asked for a position.

Captain Stabler replied: "We're between the upper end of Twelve Mile Island and the old maritime cut, somewhere in that area and I'm not exactly sure on the mileboard, over."

Responding to the Group radio operator's questions about 3:06 a.m., Captain Stabler said that four people were on board, that the *Mauvilla* was unable to move, and that the vessel was in no danger of sinking.

He added, "I believe we're right on top of this thing."

About 3:07 a.m., the Group told the captain that a train had derailed.

Captain Stabler replied, "I believe we're right below the train. . . . They's a helluva fire in the middle of the river and there ain't supposed to

be no fire up here and, like I say, I don't know exactly where we at. It's so foggy I can't tell . . . by looking at the radar, so there's something bad wrong up here."

The Group's operator asked Captain Stabler about 3:11 a.m. whether he was involved in the train derailment.

He replied, "I can't tell you for a hundred percent whether I'm involved or not. We are right below it, I'm not sure what's going on. I come up here it was so foggy I can't tell where I'm at. . . . I can't get away from the barges where I'm at. I'm gonna try to get out of here and see if I can't go up there and help somebody."

After extensive maneuvering of the *Mauvilla's* engines and rudders, Captain Stabler was able to free the towboat from its position between the bank and the port string of barges. He then ordered the deckhands to release the towboat from the barges that remained together, maneuvered the *Mauvilla* to the port side of the tow, and pushed all six barges onto the bank. Leaving the barges pushed into the northeast bank, he moved the towboat toward the fire. About 3:19 a.m., Captain Stabler called and advised the Coast Guard that he had his barges under control and that he would try to render assistance to survivors.

WHO WAS RESPONSIBLE?

The United States District Court for the Southern District of Alabama trial records describing the accident read as follows:¹

The incident occurred in the early hours of September 22, 1993, in state territorial waters near the Port of Mobile, Alabama. At approximately 2:45 that morning, a commercial towing vessel named the M/V Mauvilla ("Mauvilla") was traveling north on the Mobile River pushing a tow of six loaded barges toward a destination some three hundred and fifty miles upriver. The vessel, owned and operated by Warrior and Gulf Navigation, Inc. (WGN), was carrying a crew under command of a captain and pilot.

Early in the voyage, the Mauvilla was enveloped by a heavy fog that had settled on the river. The pilot of the vessel, with his visibility of the waterway compromised, decided to secure the Mauvilla and wait for the fog to abate. However, while attempting to secure the Mauvilla to the riverbank, the pilot allowed the vessel to veer into the mouth of Big Bayou Canot, a tributary of the Mobile River.

Unaware of what had transpired, and under the mistaken belief that he was still navigating on the Mobile River, the pilot continued to search for a place to secure the Mauvilla and its tow. While this task was being undertaken, an object appeared on the Mauvilla's radar screen that the pilot believed to be another vessel to which he could secure his vessel. The object was in fact a railroad bridge, owned and maintained by CSX, that crossed Big Bayou Canot.

As the pilot steered the Mauvilla toward the object, the tow struck a bridge support causing a portion of the track to become laterally misaligned. Soon after, a passenger train, operated by Amtrak, derailed while attempting to traverse the damaged section of rail. Three locomotives, two passenger coaches, a crew dormitory car, and a baggage car tumbled into the bayou, resulting in the death of forty-seven persons on the train, numerous personal injuries, and extensive property damage to the train and bridge.

The crash precipitated the filing of over one hundred personal injury and wrongful death suits against WGN, the pilot and captain of the Mauvilla, CSX, and Amtrak. The Judicial Panel on Multidistrict Litigation consolidated these actions in the United States District Court for the Southern District of Alabama for all pre-trial proceedings.

The media is often quick to assign blame for tragic accidents (See Appendices A and B). Those cited in this particular tragedy for being totally or partially responsible were the National Transportation Safety Board (NTSB), Amtrak, CSX, WGN, the U.S. Coast Guard, the towboat captain, the pilot, and the Alabama Emergency Response Network. However, because of the multitude of technical and environmental complexities surrounding the accident, determining responsibility is not a simple matter. The managers of the organizations,

the public administrators, and the various individuals who were linked with the disaster tended to have different perceptions than the media regarding blame and how to prevent similar accidents in the future. Others believed that, because of the complexity and types of interactions of the various organizational systems and subsystems involved, the Big Bayou Canot disaster should be considered a "normal" accident (See Appendix C).¹¹ A shocked nation was left pondering why this tragedy occurred, who was responsible, and what measures should be taken to prevent the recurrence of such a tragedy in the future.

Appendix A

Passenger Transportation in the United States³

People in America log more business and pleasure passenger miles than those in any other country in the world. In 1990, airlines, railroads, and bus lines in the United States accounted for 423.7 billion passenger miles and \$30.76 billion in revenues.

Of the three modes of public transportation, railroads allow passengers a more leisurely mode of transportation at fares higher than bus fares but lower than airfares. Cross country and commuter train passenger miles averaged 12.26 billion per year between 1983 and 1989, reaching 13.24 billion passenger miles in 1990. Cross-country train-travel in 1990 accounted for 6.04 billion passenger miles or 46% of this total versus 56% for commuter travel.

Cross-country passenger trains are operated by the North American Passenger Corporation, commonly known as "Amtrak." In stark contrast to crowded inter-city commuter trains, these trains offer passengers a nostalgic journey into the past by providing roomy accommodations with large floor-to-ceiling windows and vista domes. Amtrak also offers fine dining, a secure and relaxed environment, and first-class sleeping accommodations. Coach prices are reasonably affordable and the sleeping cars are still less costly than first-class airfare.

In the 1950s, air travel was rapidly gaining in popularity, and the automobile continued to chip away at the railroads' customer base. In a bold plan designed to win back the public to rail travel, the

railroads introduced air-conditioned, stainless steel streamliners with all the luxuries of a fine hotel. This proved to be "a final ill-fated attempt by the railroads to trim costs and to dull the attraction of a vastly improved interstate highway system." Passenger miles continued to plummet as travelers turned to the faster air travel and the ease of automobile travel on the nation's interstate highways. The actual cost of providing basic passenger service, much less providing luxury service, dropped revenues below the breakeven point.

By the late 1960s, rail passenger service costs exceeded revenues. A study by the Interstate Commerce Commission (1968) of eight major carriers recorded average passenger train expenses of \$1.83 for every \$1.00 of passenger train revenue. In addition, passenger trains slowed the departure and arrival of highly profitable freight trains because passenger trains were accorded scheduling priorities. Ultimately, declining patronage and mounting losses forced many railroads to discontinue passenger service. By 1970, virtually all passenger trains had disappeared from the nation's railroads.

AMTRAK

The few passenger trains that remained in service were "nationalized" on May 1, 1971, when the government-formed, semipublic National Railroad Passenger Corporation (NRPC) was given a charter to run the nation's railroad passenger service. This organization evolved into the North American Passenger Association (Amtrak). As with the aviation and highway systems, Amtrak has been subsidized by the Federal government throughout its 23-year existence, just as aviation and highways are subsidized.⁶

With the help of these hefty government subsidies and passenger revenues, Amtrak succeeded in forging a profitable national railroad passenger transportation network from a hodge-podge of run-down equipment and facilities inherited from an obsolete transportation system. New cars and locomotives were purchased to replace outdated cars and equipment. Run-down facilities with high operating costs were rebuilt or were replaced with new construction.

By 1996, Amtrak had received almost \$15 Billion in Federal subsidies and the NRPC still continues to be a burden to taxpayers:

Federal subsidies to Amtrak (1993 to 1996)

\$ 731 Million
909 Million
1,000 Million
700 Million

Amtrak itself owns and maintains only 730 route miles of track located mainly in the Northeast to compete with the airline commuter traffic between Boston, New York, Philadelphia, Baltimore, and Washington, DC. The remainder of the 23,270 miles of track on which Amtrak operates is privately owned and maintained by other railroads. Since its inception in 1971, Amtrak has carried passengers over 119 billion passenger miles. In its 27-year history, Amtrak has had 88 passenger fatalities due to train accidents, or .073 fatalities per 100 million passenger miles. This compares to a passenger fatality rate for planes of .025; buses .028; and automobiles, 1.03.^{8,9}

CHESAPEAKE SYSTEM RAILROADS (CSX)

CSX Corporation is a *Fortune* 500 transportation company providing rail, intermodal, container-shipping, barging and contract logistics services worldwide. Holdings include CSX Transportation, Inc.; Sea-Land Service, Inc.; CSX Intermodal, Inc.; American Commercial Lines, Inc.; and Customized Transportation, Inc. In 1997, CSX generated more than \$10.6 billion of operating revenue. CSX owns and maintains the track on which the Big Bayou Canot disaster occurred.^{5,9}

Financial Highlights (In Millions)

	1997	1996	1995	1994
Summary of Operations				
Operating Revenue	\$10,621	\$10,563	\$10,304	\$9,409
Operating Expense	9,038	9,014	8,921	8,227
Restructuring Charge	—	—	257	—
Total Operating Expense	9,038	9,014	9,178	8,227
Operating Income	\$1,583	\$1,522	\$1,126	\$1,182
Net Earnings	\$ 799	\$855	\$618	\$ 652

WARRIOR AND GULF NAVIGATION (WGN)

Organized in 1940, WGN had about 225 employees. Of that number, 45 were towboat captains or pilots, and 54 were deckhands. The remaining employees were managers, support personnel, and terminal operators. The company and the American Waterways Operators, Inc. consider WGN a medium-size operation; at the time of the accident it had about 250 barges and 24 towboats.⁸

The company typically moves six barges in a tow and occasionally eight. In the fast current of high-water conditions, tow size is usually held to four barges. One operator and one deckhand stand watch on a towboat on a 6-hour-on, 6-hour-off rotation, which is typical for the type of towing operation the company is engaged in. Between 1981 and 1994, the company experienced 45 reportable marine accidents, including the Big Bayou Canot accident. The 3.75 accidents-per-year average equates to 0.2 accidents per towboat-tow per year. A local Coast Guard official stated that he thought that WGN's accident record was better than average for inland towing companies.⁸

Appendix B

Safety Issues, Regulations, Recommendations, and Procedures⁸

AMTRAK

Prior to the accident, Amtrak used signs and placards, as well as briefings, to inform passengers about the safety features on its trains. Both on board service personnel and conductors had responsibility for safety on Amtrak trains and Amtrak's manuals stated that such briefings be routinely given at all stations. Signs in Amtrak cars indicated the location of first-aid kits, fire extinguishers, and emergency windows; signs on the ceilings adjacent to emergency windows were phosphorescent. Each emergency window had signs explaining how to remove it from both the

inside and the outside. Signs posted in the car vestibules and elsewhere throughout the cars also gave instructions about window removal.

Although the collision of the *Mauvilla* with the Big Bayou Canot Bridge displaced the south end of the structure about 38 inches horizontally, the rails remained intact. Had the rail broken as a result of the collision and subsequent displacement of the bridge and track, the signal at Bayou Sara, about 1.7 miles from the accident sight, would have displayed a red or "stop" aspect. Because the rails remained intact, the signal circuitry was not interrupted. The signal displayed for the *Sunset Limited* was clear or "proceed," as the assistant conductor confirmed when he heard the locomotive crew call the signal over the radio.

TOWBOAT REGULATIONS

Title 46 of the Code of Federal Regulations, Parts 24 through 28, set forth equipment requirements for uninspected vessels (under 1,600 tons). The regulations cover life preservers and other life saving equipment; fire extinguishing equipment; emergency position indicating radio beacons for vessels on the high seas; and cooking, heating, and lighting systems as well as other equipment. They do not cover navigation equipment. Thus, the *Mauvilla*, an uninspected towboat of less than 1,600 tons, was not required to be fitted with a radio, charts, or a compass.

BRIDGE REGULATIONS

No single entity is responsible for the safety of the nation's bridges. Federal, state, and local governments, as well as private industry, share the responsibility. This fragmentation of authority often leads to a piecemeal, uneven approach to bridge safety. Additionally, bridge safety involves several transportation modes (including marine, railroad, and highway) and several Federal agencies including the Coast Guard.

NTSB first addressed the issue of bridge alignment protection after a Union Pacific freight train, traveling westbound at 50 mph, struck a displaced bridge at Devil's Slide, Utah, on November 17, 1979, derailing 5 locomotive units and 56 cars.

Damage estimates exceeded \$5 million. As a result of its investigation of that accident, the Safety Board issued Safety Recommendation R-80-36, asking the Federal Railroad Association (FRA) to study “the feasibility of installing on bridges a mechanism to indicate when bridges are displaced.”

On May 6, 1981, the FRA responded, noting that the 98,000 route miles of track in the continental United States contain some 85,000 bridges. The cost of installing a detection device on each of these bridges would be about \$850 million; maintenance costs would total an additional \$85 million per year. CSX alone has 11,000 railroad bridges in service. The FRA also noted that of the 41,627 railroad accidents that occurred between 1976 and 1979, only 20 were caused by displaced bridges or bridges that failed under load. Of those 20, four resulted from misalignments that could be detected by the recommended mechanism.

Because the cost of compliance to the NTSB's recommendation was thought by railroads to far outweigh benefits, it was largely ignored. In addition, neither the US Army Corps of Engineers nor the Coast Guard required bridge protection systems, such as lights, markers, dolphins, and fenders; therefore, none were in place on the Big Bayou Canot bridge at the time of the accident. CSX testified that the bridge did not warrant such systems because it was not located on a commercially navigable waterway. The bridge had originally been built as a swing bridge, but the machinery had never been installed. Since the accident CSX has replaced the Big Bayou Canot Bridge with a permanent structure.

Appendix C

Normal Accidents

Normal accidents focus on the properties of systems themselves rather than on the errors that owners, designers, and operators make running them. They occur as a result of failure in a subsystem, or the system as a whole, that damages more than one unit and in doing so disrupts the ongoing or future output of the system. The disruption and/or damage to the system must be substantial enough to seriously interfere with ongoing or future tasks that will be demanded of things, objects, or people. Output ceases or decreases to the extent that prompt repairs are required.¹¹

In normal accidents, humans are treated as parts. However, the vast majority of “accidents” involving humans are only “incidents.” That is, the damage is limited to first and second party victims (operators and system users); system or subsystem failures do not damage or disrupt the system. For an accident to be classified as a normal accident it must involve third and fourth party victims; innocent bystanders, fetuses and future generations. It is not the source of the accident that distinguishes the two types since both begin with component failures; rather it is the presence of multiple failures that interact in unanticipated ways. In the Big Bayou Canot disaster an unanticipated connection occurred between three independent, unrelated subsystems that happened to be in close proximity to each other resulting in an interaction that was not planned, expected, or linear—a normal accident!¹¹

ENDNOTE

*The Mobile River bridge tender is responsible for raising and lowering the 14-mile swing bridge (drawbridge) across the Mobile River for river traffic. Because clearance of the bridge above the water is 4 inches and

because river traffic on the Mobile River is heavy, the bridge tender typically knows the location of all riverboats in the vicinity of the bridge at all times.

REFERENCES

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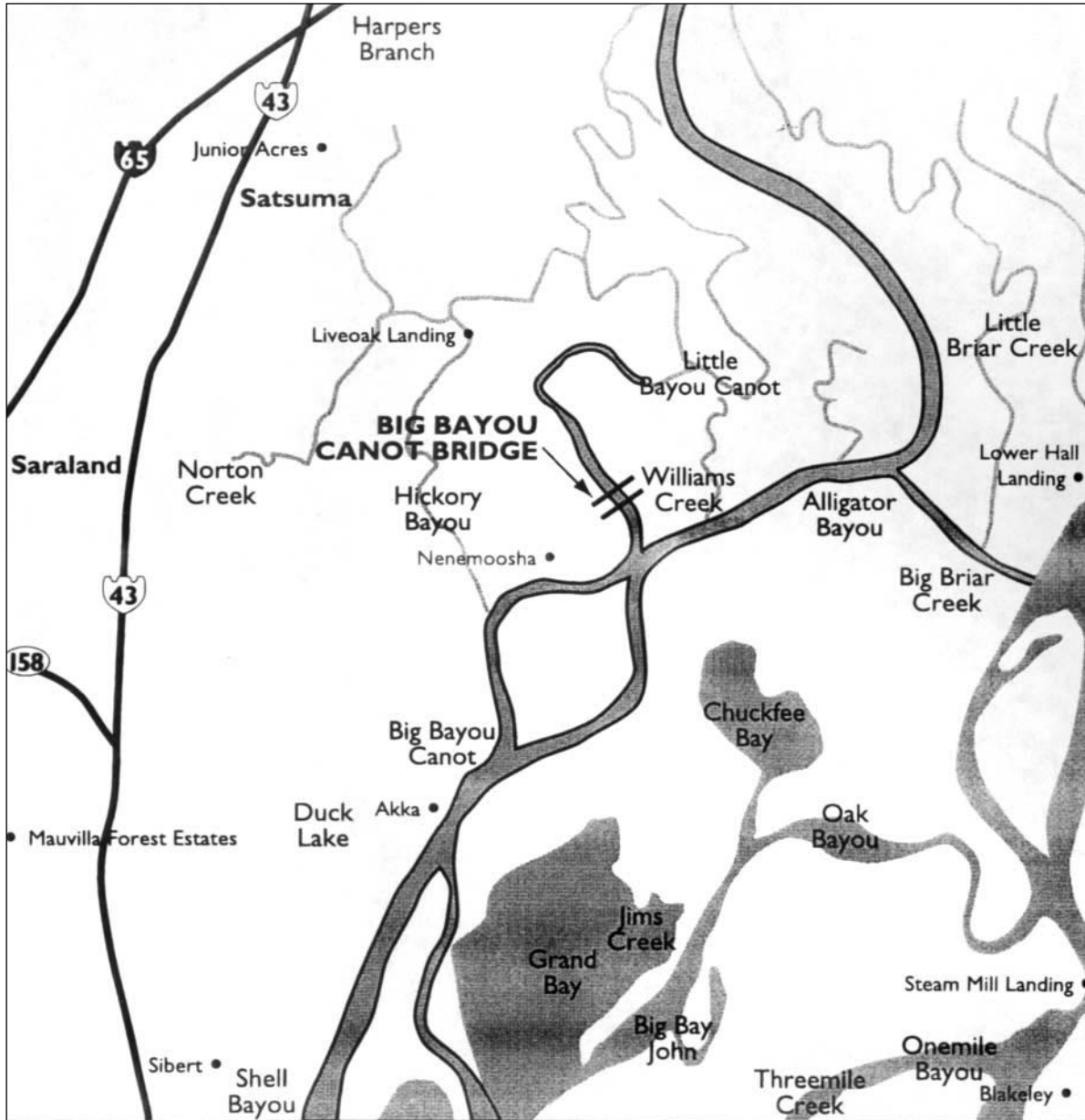


Exhibit 1 Mobile, Alabama, and Vicinity Showing Location of Wreck of Amtrak's *Sunset Limited*

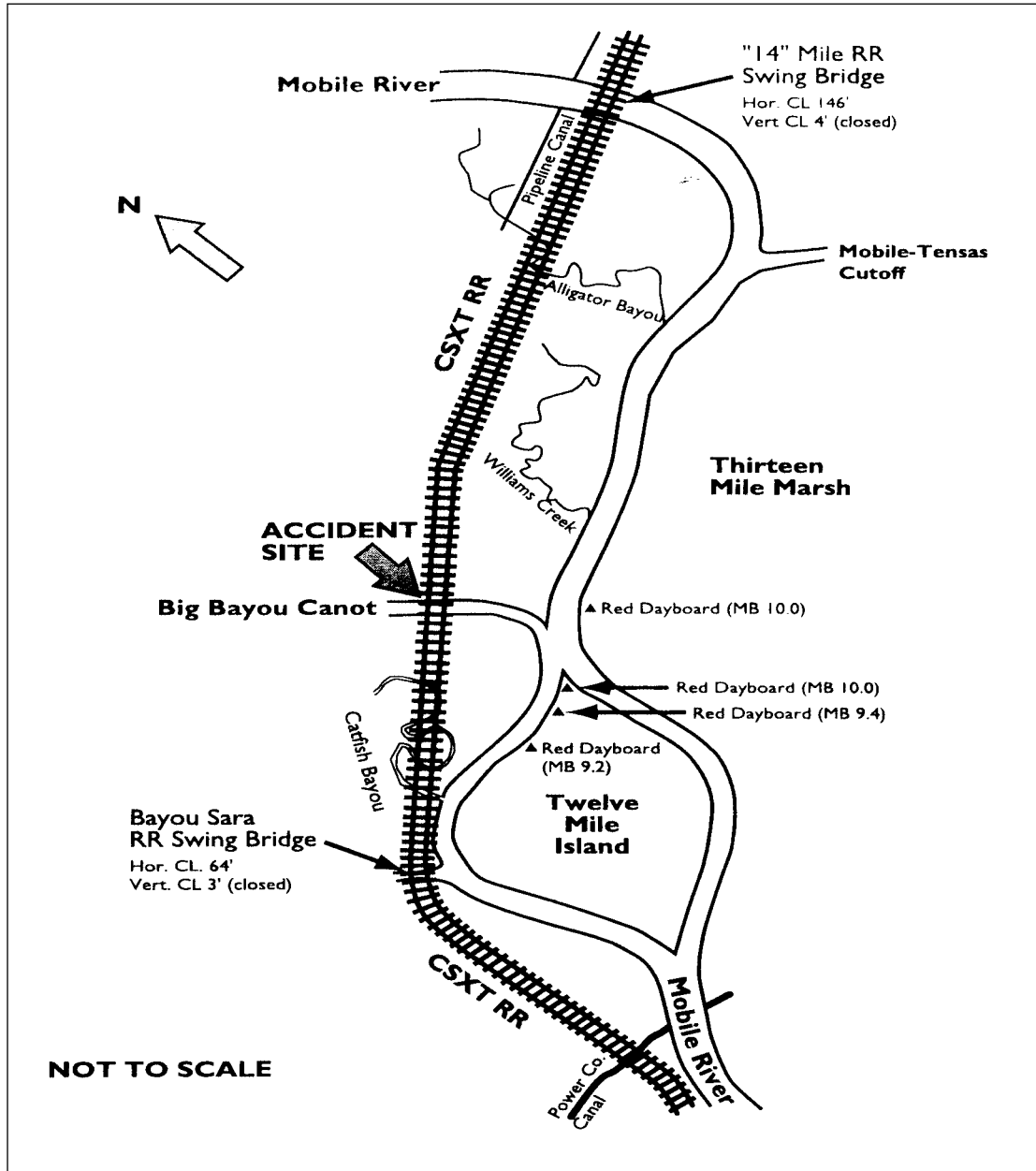


Exhibit 2 Mobile River Chart

Note: The accident site at Big Bayou Canot Bridge is in close proximity to the Mobile River, which has a deep and wide channel heavily utilized by commercial traffic. Big Bayou Canot, a tributary of the Mobile River, has a natural channel like the Mobile River. There are few natural landmarks that allow mariners to visibly distinguish this waterway and the Mobile River. The geography of Bayou Sara and Big Bayou Canot, and the Mobile River in the vicinity of the CSX railroad bridge, is similar enough that in periods of reduced visibility or at night time, mariners could become disoriented without additional aids. There are no obstructions or other hindrances to navigation between the Mobile River channel and the bridge site, thereby allowing commercial vessels unrestricted access to the bridge site. Vessels transiting the Mobile River may enter the Big Bayou Canot in error, particularly at nighttime or during periods of limited visibility.

Sequence of Events*SUNSET LIMITED***9/21/93**

9:30 p.m. Crew on duty, New Orleans

11:34 p.m. Train 2 departed New Orleans

9/22/93

2:30 a.m. Arrived Mobile

2:33 a.m. Departed Mobile

2:53 a.m. Derailment

2:56 a.m. Assistant conductor radioed "MAY DAY"

2:57 a.m. CSX dispatcher notified

3:00 a.m. CSX called 911

MAUVILLA

11:30 p.m. Pilot on watch

12:55 a.m. Departed National Marine
Fleet, mile 5, Mobile River2:15 a.m. Radioed towboat *Thomas B.*
McCabe

2:45 a.m. Hit bridge

3:05 a.m. Radioed "MAY DAY" lost
tow, need help

3:07 a.m. Reported fire via radio

3:08 a.m. Coast Guard advised
captain of accident.**Exhibit 3** Times Relevant to Accident ⁸

