SURVIVAL FACTORS GROUP CHAIRMAN'S FACTUAL REPORT

Biloxi, Mississippi

HWY17MH010

(24 pages)

NATIONAL TRANSPORTATION SAFETY BOARD
OFFICE OF HIGHWAY SAFETY
WASHINGTON, D.C.

SURVIVAL FACTORS GROUP CHAIRMAN'S FACTUAL REPORT

A. CRASH INFORMATION

Location: Rail crossing, Main Street, Biloxi, Harrison County, Mississippi

Vehicle #1: 2016 Van Hool CX45 Motorcoach

Operator #1: Echo Transportation of Dallas, Texas

Vehicle #2: CSX Freight Train, consisting of 3 locomotives, 27 loaded cars, 25 empty cars

Operator #2: CSX Railroad

Date: March 7, 2017

Time: 2:12 p.m. CST

NTSB #: **HWY17MH010**

B. SURVIVAL FACTORS GROUP

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C. CRASH SUMMARY

For the summary of the crash, refer to the *Factual Report of Investigation* in the docket for this investigation.

D. DETAILS OF THE SURVIVAL FACTORS INVESTIGATION

The Survival Factors Group focused its investigation on the elements of the crash related to survivability to include the timely, effective and efficient response of the first responders and the availability and use of safety equipment as it relates to the morbidity and mortality of the passengers in the bus.

1. 1996 General Electric Freight Diesel-Electric CW44-AC Locomotive

The freight train operated by CSX Railroad was comprised of three locomotives located in the front, twenty-seven loaded freight cars of which nineteen contained a hazardous material cargo and twenty-five empty freight cars. The freight train weighed approximately 4,599 tons or approximately 10,000,000 pounds. The train's hazardous material load accounted for 1,627 tons of the train's total weight.[1] The breakdown of the Hazardous Material cargo is provided in **Table 1.**

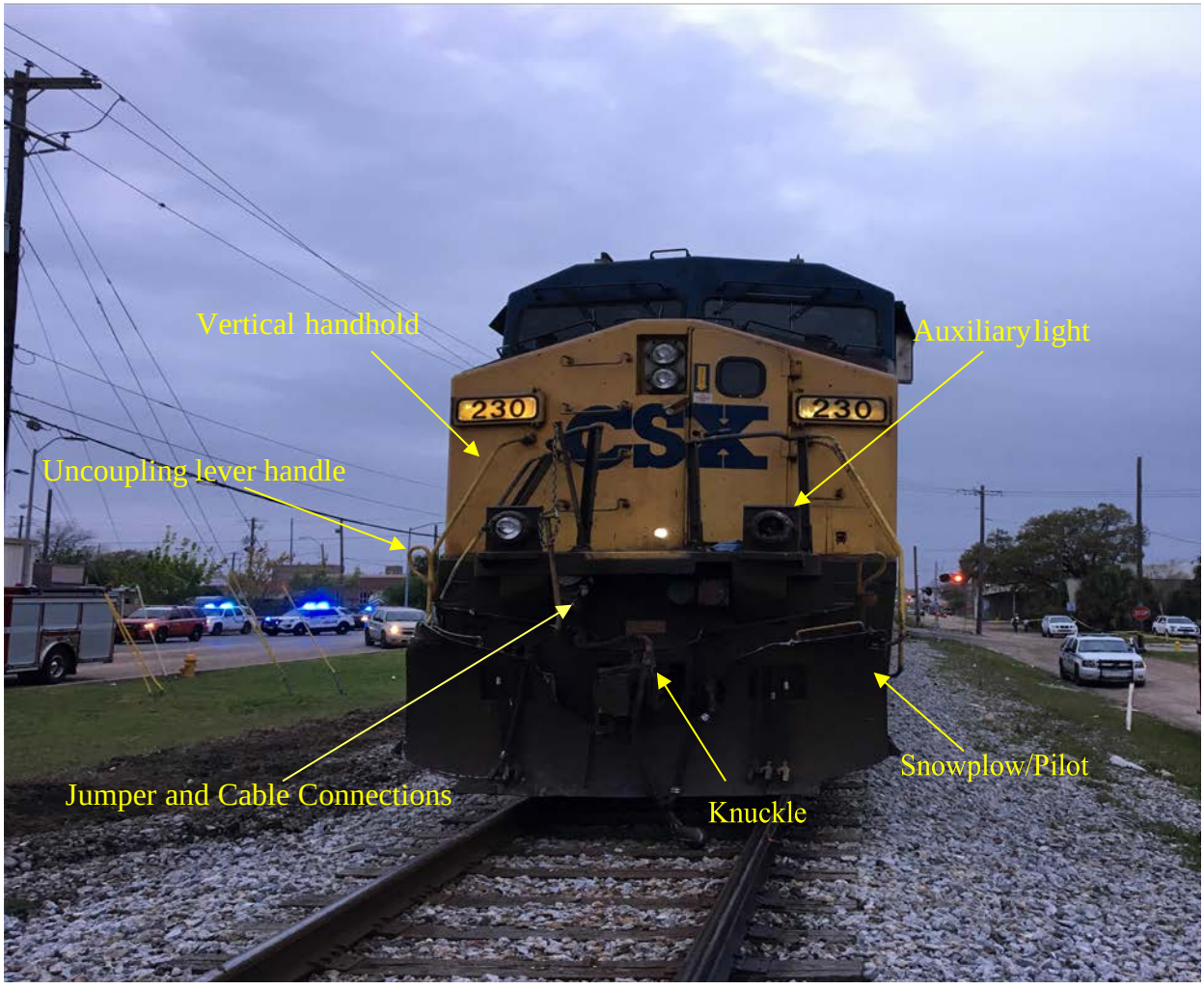
[1] Survival Factors Attachment: CSX train consist and data sheets

PRODUCT	POTENTIAL HAZARD	AMOUNT
Acetic Acid	Corrosive	257 Tons
Acrylonitrile	Flammable	245 Tons
Dimethylaminoethanol	Corrosive	126 Tons
Elevated Temperature Liquid	----------	72 Tons
Environmental Hazardous Waste	----------	224 Tons
Molten Phenol	Poison	259 Tons
Phosphoric Acid	Corrosive	158 Tons
Sodium Hydroxide	Corrosive	259 Tons
Sulfuric Acid	Corrosive/Inhalation	27 Tons

Table 1

1.1. Train Damage

Photo #1: Lead locomotive and contact areas with motorcoach.



1.2. Occupants

The crew of the freight train consisted of one locomotive engineer and one conductor. Neither member of the crew was injured in the crash.

2. 2016 Van Hool CX45 motorcoach

The 2016 Van Hool motorcoach operated by Echo Transportation has a seating capacity for 56 passengers and a gross vehicle weight rating (GVWR) of 54,000 lbs. There are 13 rows of seats on the right (passenger) side and 15 rows of seats on the left (driver's) side. The motorcoach is equipped with the Grand Lux 210 reclining seats, with footrests and three-point seatbelts manufactured by Van Hool. The overall interior ceiling height is 7 feet, measured from aisle floor to ceiling. The overall width is 8 feet from the right side interior sidewall to the left.

There are seven windows on each side of the motorcoach excluding the driver's windows, the window attached to the front-loading door and the window panel on the rear exit door on the right side. Window #1 on each side of the motorcoach is a non-emergency exit window. The window measure 64 inches in length, 43 inches in height at the forward most point, 36 inches in height in the center and 33 inches in height at the rear-most point. Windows #2, 3, 5 and 6 were emergency exit windows. Each window measures 64 inches in length and 33 inches in height. Windows #4 and 7 are non- emergency exit windows. Window #7, on the right side can only be accessed from the rear lavatory. These windows have the same dimensions as the emergency exit windows except for Window #7 on the right side. Instructional stickers found on all intact windows indicated the location and the operation of the emergency exit windows from the interior.

In addition to the exit windows, the motorcoach was equipped with two emergency roof hatches located above the center aisle-way adjacent to the third and twelfth rows of seats. There was a rear exit door, capable of American with Disabilities Act (ADA) functions, behind the last row of seats on the right side and immediately in front of the rear lavatory. This door was configured by the manufacturer to function as an emergency exit door. There is 17 inches of clearance available between the last row of seats and the rear lavatory wall for occupant egress. The distance from the bottom of the door to the ground was 4 feet 8 inches.

2.1. Motorcoach Damage

2.1.1. Exterior Damage

The motorcoach sustained extensive damage to the left side resulting from the impact with the train. As shown in **Photo #2**, the damage extended from the lower luggage compartments to the top of the metal frame for windows #3, 4 and 5 on this side. Evidence of intrusion into the motorcoach was located at seat row #5 on the left side and extended to just behind seat row #8. (See Vehicle Factors Group Chairman's report for further information.)

Photo #2: Exterior left side of the motorcoach

The motorcoach sustained minor damage to the right side in the collision. The damage, located just in front of the rear exit door resulted from the impact with the crossing gate. The rest of the damage was caused by the intervention of the first responders. The rear exit door was forcibly removed by the fire department after it was determined that the door was locked and prevented the necessary secondary access. Initially, access to the interior of the motorcoach was gained by breaking out the windows on the right side. Additional access was gained by cutting and prying the windows away from the motorcoach frame. **Photo #3** shows the damage sustained by the motorcoach to the right side.

Photo #3: Exterior right side of motorcoach (with rear door cut away)

2.1.2. Interior Damage

The seats were numbered starting from the front left side window seat and goes from right to left across each row. Damage to the interior of the motorcoach was extensive. The area of impact with the train started at the fifth row of seats on the left side and extended rearward behind the eighth row of seats. In this area, there was extensive sidewall intrusion that reduced the overall interior width of the motor coach from 8 feet to 6 feet 8 inches, sidewall to sidewall. The upper panel of the windows at the driver's position shattered during impact as well as Window #1, #3, #4, and #6 on the left side. Windows #2 and #5, on the left side, suffered damage to the frame that shifted the windows, but the glass pane remained intact. Window #7, on the left side was removed during extrication operations. Because of the impact with the train, the overall occupant space available in the aisle-way decreased from 17 inches to 8 inches at the point of impact between rows 5-8. **Photo #4** shows the interior damage of the motorcoach at the point of maximum intrusion and deformation.

Photo #4: Interior damage to motorcoach

2.1.3. Flooring

Because of the extensive intrusion of the sidewall on the left (driver's) side, the floor of the motorcoach buckled. The buckling of the floor started at row #4 on both sides of the aisle-way. On the passenger side in the fifth row, adjacent to seat #19/20, the floor buckled and partially collapsed; opening a space beneath seats #19/20 and extended rearwards encompassing seat #23/24 on the same side. Seat #19, dropped down into the void space approximately two inches below the normal height of the floor. Across from seat #19, on the left side, seat #18 detached from its securing point at the floor and shifted to the right, forward and downward into the void created by the partial collapse of the floor. At seat #17, there was extensive floor deformation and a partial collapse adjacent to the sidewall because of impact intrusion. The extensive buckling also raised the height of the floor starting at row #5 on both sides and extending two rows rearward. At this location, the interior height decreased from 7 feet to 6 feet. Row #8, left side, the floor buckled upward at the sidewall. The flooring in the ninth row on the left side adjacent to seat #33/34 suffered slight buckling with no major deformity to the motor coach sidewall or displacement of seats.

2.1.4. Seating and components

The collision caused several of the seats to shift, rotate or become detached from their securing point at the floor of the motorcoach. Post-crash inspection revealed extensive damage to seats and their components. Some showed signs of impact with the occupants. **Table 2** outlines the damage to the seats and their components.

ROW NUMBER	SEAT NUMBER	SEAT LOCATION	DAMAGE DESCRIPTION
2	7	Right side-aisle	Seat-back pushed rearward and rotated laterally towards the window.
3	9	Left side-window	Seat shifted towards the aisle-way.
	10	Left side-aisle	Seat-back shifted towards the aisle-way. Seat wedged against aisle armrest.
4	13	Left side-window	Seat shifted towards aisle-way.
	14	Left side-aisle	Seat-back shifted rearwards and rotated towards the aisle-way.
	15	Right side-aisle	Seat-back shifted rearwards and rotated towards right side window.
	16	Right side-window	Seat-back shifted towards right side window.
5	17	Left side-window	Seat shifted towards aisle, forward and downward.
	18	Left-side aisle	Seat shifted towards aisle, forward and downward.

5	19 20	Right side-aisle Right side-window	Seat dropped two inches into void space in floor. (Extrication damage also noted). Damage to center armrest caused by extrication.
6	21 22 23	Left side-window Left side-aisle Right side-aisle	Seat shifted towards aisle-way. **(Intrusion point)** Seat pushed forward and to the right towards aisle-way. Seat rotated towards right side window
7	25 26 27 28	Left side-window Left side-aisle Right side-aisle Right side-window	Seat shifted to the right, seat-pan and armrest wedged. **(Intrusion point)** Seat shifted towards aisle-way. Seat wedged against center armrest, locked in upright position. Seat shifted to the right and wedged against armrest and sidewall.
8 8	29 30 31 32	Left side-window Left side-aisle Right side-aisle Right side-window	Seat-pan shifted to the right and wedged against center arm rest. Seat-back shifted to the right towards aisle-way. Both arm rests for the seat were inoperable. Seat-back shifted towards right side window and rearwards.
9	33 35 36	Left side-window Right side-aisle Right side-window	Seat-back shifted towards aisle-way. Center armrest inoperable. Arm rest at aisle rotated towards right side window. Seat-back shows slight angulation towards right side window.
10	37	Left side-window	Seat-back shifted forward and towards aisle. Arm rest also shifted outward towards aisle-way.
11	42 44	Left side-aisle Right side-window	Seat-pan shifted to the right. Seat-back shifted upward. Seat and arm rest shifted to the right and wedged against sight side sidewall.
12	47 48	Right side-aisle Right side-window	Aisle arm rest rotated outward towards aisle. Seat-back shifted upward. Seat and armrest shifted towards right side window. Wedged against right sidewall.
13	50	Left side-aisle	Seat-back shifted forward. Aisle arm rest wedged against seat-pan.

Table 2

2.2. Motorcoach Occupants

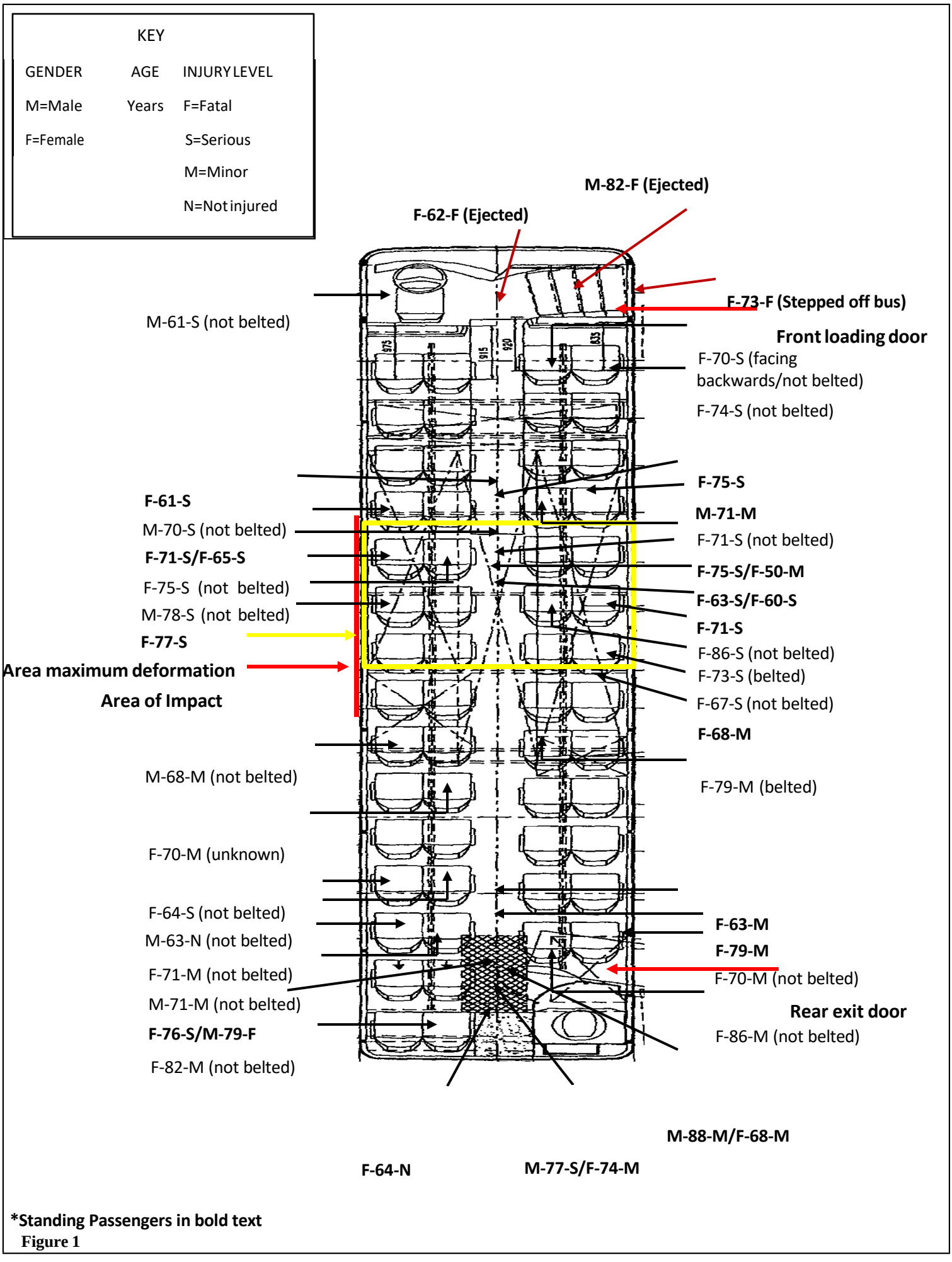
There were 49 passengers and an operator on the motorcoach at the beginning of the trip. The ages of the occupants ranged from 50 years of age to 88 years of age. Prior to the train's impact with the motorcoach, six of the passengers exited the bus. Due to the limited mobility of some of the passengers, a timely evacuation of the remaining passengers was not possible. One passenger required the use of a wheel chair while several others used canes and walkers and required assistance to walk. Prior to the start of the trip, the wheel chair and all the walkers were stowed in the luggage compartment underneath the motorcoach.

2.3. Occupant Injuries

At the time of the crash, 40 passengers and the motorcoach operator were still onboard the bus. Because of the crash, these occupants sustained injuries that required transport to various hospitals. As previously mentioned, six passengers successfully evacuated the motorcoach prior to the crash. These six passengers sustained no injury and were not transported.

The inward-facing Drive-cam camera showed three of the passengers attempting to exit the motorcoach at the time of impact. One passenger had just stepped down from the front loading-door when the train collided with the motor coach. The passenger was knocked down by the motorcoach and along with two other passengers who were ejected out the front-loading door; was run over by the motorcoach and the freight train.[2] Two of the passengers were pronounced on the scene and turned over to the Harrison County Coroner's Office. The third died in the hospital. A fourth passenger, who was standing in the rear of the motorcoach during the crash, was pronounced dead on the scene and turned over to the Harrison County Coroner's Office. **Figure 1** shows the schematic of the motorcoach, occupant location at time of impact and injury.

[2] Refer to Image Recorder Factual report in the docket for this investigation.



*Standing Passengers in bold text

Figure 1

Most of the seated occupants sustained minor injuries. This was regardless of their use of seatbelts. The occupants seated in the impact area sustained more injury than those seated outside of that area. The occupant of seat #24 sustained injuries to her lower extremities and the occupant of seat #23 sustained compression injuries resulting from the floor buckling and the opening of the void space beneath those seats. The passengers standing in the aisle-way adjacent to rows 4 and 5 located in the impact area, sustained severe injury resulting from the deformation of the interior structure, floor, and seating. Fourteen occupants, standing at the time of the impact, sustained serious to fatal injuries from the impact or from impact with the interior structure of the motorcoach.

2.4. Occupant Protection and Safety Equipment

2.4.1. Pre-trip Safety Briefing

The operator of the motorcoach reported that he provided a pre-trip safety briefing at the time the passengers were loaded on board in Bastrop, Texas. No subsequent safety briefing was provided to the passengers. Several passengers on the motorcoach reported that they remember some type of briefing by the driver but could not recall the details. Other passengers reported that they were not provided with a safety briefing by the driver.

Pre-trip safety briefings are currently recommended but not mandated by the Federal Motor Carrier Safety Administration. There is no requirement for a driver to provide a safety briefing each time the bus is loaded. The drivers are governed by the rules and regulations of each individual carrier. The accident carrier, Echo Transportation, trains their drivers to conduct a pre-trip safety briefing at the beginning of a trip according to company policy. The briefing is done by the driver and not by utilizing a pre-recorded video. The driver is provided with a check list of "bus safety tips" that covers the use of seatbelts and the location and use of emergency exits. The location or use of the rear door in an emergency is not an item included in the check list.[3]

2.4.2. Rear Exit Door (ADA)

In this crash, several passengers reported being trapped in the rear of the bus. These passengers were standing adjacent to the rear exit designated American with Disabilities Act (ADA) door and manywere unaware that the exit door was there. These passengers believed that the only means of egress from the motorcoach was the front-loading door. Starting in 2013, all Van Hool model CX 45 motorcoaches are equipped with a rear exit door which can potentially be used as an emergency exit when the motor coach is not configured for wheelchair use as in the crash motorcoach. The rear door is marked to allow its use during an emergency and provides instructions on how to manually override the door for egress from the bus. This manual override does not require any action on the part of the motorcoach driver. Placards mounted on the rear of the bus detail step by step instructions on the operation of the rear door in case of emergency. These steps are as follows.

[3] Survival Factors Attachment: Echo Transportation "bus safety tips" check list for drivers

- Turn the emergency door release valve located above the rear door. (This dumps any air that may be holding the door pistons in place.)

- Remove door handle from box that secures it to the rear lavatory wall.

- Insert the handle into the door and turn.

In addition, an emergency seatbelt cutter is also provided if a passenger becomes trapped their seatbelt.

Echo Transportation did not configure the rear exit door of the crash motorcoach for wheelchair access. The rear door is marked and could have been used to evacuate passengers after the crash and to provide needed access for first responders to the interior of the motorcoach. One of the first rescuers on the scene attempted to open the rear door from the interior of the motorcoach but was unsuccessful. The first responders did attempt to enter the motorcoach through the rear door from the exterior but found it locked. This resulted in the need for the first responders to cut away the door which delayed both the first responders access to the interior of the motorcoach and the evacuation of the passengers. Locking the rear door from the exterior does not adversely affect the use of the door during an emergency from the interior. Operating the door from the interior disengages the lock and allows the occupants to exit the motorcoach. The door handle, which was found attached to the rear wall of the lavatory, is required to open the rear exit from the interior.

ABC Companies, which distributes this model of motorcoach in the United States, reported that Van Hool does not "market" the motorcoach as having a secondary exit because Van Hool cannot determine the ultimate use of the motorcoach by the customer. Current regulations stipulate that rear exits are required on all buses that are over 10,000 GVWR. A rear exit can be either a door or a roof hatch. The crash motorcoach is equipped with a rear roof hatch and not required to have a rear emergency exit door. Echo Transportation had complied with federal regulations regarding the requirements for the rear exit.

Photo #5: Exterior view of crash motorcoach rear exit door (not configured for ADA/wheelchair use)

Photo #6: Interior view of rear exit door

Emergency door release **Location for emergency door handle**

Photo #7: Exemplar motorcoach rear exit door (also not configured for ADA/wheelchair use)

Photo #8: Exemplar motorcoach interior view of rear door panel.

Emergency handle placement

2.4.3. Seat belt Utilization

Post-crash examination of the seats and the seatbelts on the motor coach revealed that many of the passengers were not wearing their seatbelts at the time of the crash. Only seven of the 49 passengers reported utilizing their seatbelts during any portion of the trip. Two passengers were still belted at the time of the crash. In several seating positions, the buckle portion of the seatbelt had been pushed down between the seats and not readily accessible to the seat occupant.

2.5. Restraint System Design Defect

During the post-crash examination, twenty-seven seatbelt buckles were found to have a design flaw. The seatbelt buckle assembly is comprised of a hard, plastic covering that is designed to prevent the exposure of the internal locking mechanism to debris or to damage caused by other external forces that would prevent the buckle from functioning. In all twenty-seven of the seatbelt buckles, the hard, plastic covering has slipped downward, and the internal locking mechanism was exposed to the environment. In several seat positions, the exposed internal locking mechanism sustained damage when the adjacent seat-pan shifted during the crash and impacted the buckle's internal mechanism. One buckle, not located in the impact area, was found to be inoperative. The seatbelt buckle would release when pressure was exerted on the seatbelt. Four of these seatbelt buckles also showed signs of rescue damage. At the location of two occupied seats, the buckles were found taped up and not readily available for use. Subsequent investigation revealed that one of the seatbelt buckles was taped up by a passenger on this trip when the seat occupant complained of the buckle rubbing against her. The second seatbelt buckle was taped by an unknown individual prior to the crash.

The seat belts in the crash motorcoach were manufactured by Fasching Salzburg GmbH of Salzburg, Austria. The seatbelts and their components underwent testing by SGS North America, Inc. SGS North America, Inc. is a national testing facility recognized by the Department of Transportation that certifies the compliance of seatbelts and their components under the federal regulation. In April of 2015, the company certified the use of these types of seatbelts in all passenger vehicles, multi-purpose passenger vehicles, trucks and buses in the United States (49 CFR 571.209). The seatbelts were attached to the seats and installed in the motorcoach by Van Hool prior to the delivery of the motorcoach to ABC Companies.

The Director of Technical Services for ABC Companies, the authorized U.S. distributor for Van Hool motor coaches reported that the manufacturer was aware of the defect in the buckle portion of the seatbelt assembly. Van Hool is currently working to either re-engineer the buckle or find a new supplier for the seatbelts. The ABC Companies representative advised that ABC has been replacing the defective buckles upon notification by their customers. Pre-notification to customers is not being performed by either Van Hool or its U.S. distributor, ABC Companies.

Photo #9: Defective buckle

Photo #10: Defective buckle taped prior

3. Emergency Response

3.1. Law Enforcement response

The City of Biloxi Emergency Communication Center received the 911 call at 2:12 p.m. CST. The call classification was a "bus struck by a train". The 911 caller provided no additional information. The City of Biloxi Police Department (BPD) was the first emergency service to be dispatched. The first officers arrived on the scene at 2:14 p.m. Upon arrival, one critically injured female passenger was located under the locomotive. Two other passengers located on the north side of the tracks sustained injuries incompatible with life. BPD officers assisted those passengers able to walk from the motorcoach and then entered the bus to assist those who needed to be extricated. Several of the elderly passengers, though able to walk, were unable to move with any degree of speed. Others had to be carried off the bus. One passenger located unconscious in the rear of the bus and subsequently evacuated by the fire department was pronounced dead on the scene. BPD continued to provide first aid assistance until the arrival of fire department medical personnel. [4]

3.2. Fire Department/EMS services

The City of Biloxi Fire Department (BFD) was dispatched to the incident at 2:13 p.m. Engine Company #1, who received the initial dispatch, arrived at 2:17 p.m. along with the BFD Command staff. The "Mass Casualty" protocol was initiated at that time. The Emergency Communications Center immediately dispatched all nine fire stations in the city of Biloxi to assist. In all, 8 engine companies, 2 truck companies, 1 rescue truck and 1 air unit responded to the scene.[5]

[4] Survival Factors Attachment: Interviews with Law Enforcement personnel

[5] Survival Factors Attachment: City of Biloxi Call Sheet report

Upon arrival, the Biloxi Fire Chief immediately assumed the role of Incident Commander and assigned other chief officers to required positions. An immediate assessment performed by the first responders determined that no hazardous materials had been released.

A link was established so direct communications could be utilized between local and the private ambulance services.

Keesler Air Force Base, located within minutes of the scene, sent two Advanced Life Support (ALS) ambulances and emergency medical personnel to the scene. Physicians from the Air Force base responded to the local hospital, Merit Health Center, to help with the incoming trauma patients. Mutual aid assistance was received from the D'Iberville Fire Department and the Harrison County Fire Department who provided additional manpower and equipment at the scene and coverage for backfilling city fire stations. American Medical Response (AMR) and Acadian Ambulance Services provided a total of 8 Basic Life Support (BLS) ambulances and 18 Emergency Medical Technicians (EMTs) to augment the ALS ambulances from the fire departments. Three medevac helicopters were also utilized during this incident.

From the time of the first arrival of fire department personnel on the scene to the transportation of the last victim from the scene was 64 minutes. The forty-one passengers were transported to five area hospitals. Six passengers refused treatment and a school bus provided transport for them from the scene. The 41 injured passengers were transported to the treatment facilities outlined in **Table 4**. (See Biloxi Fire Department Incident Critique for additional response information.)[6]

Treatment Facility	Number of patients received
Merit Health Center	14
Ocean Springs Hospital	6
Singing River Hospital	11
Gulfport Memorial Hospital	7
Garden Park Medical Center	3

Table 4

*Three passengers were transferred to the University of Southern Alabama (USA) trauma center in Mobile, Alabama for specialized treatment.

[6] Survival Factors Attachment: Biloxi Fire Department Incident Critique

3.3. Emergency Preparedness

The city of Biloxi has an Emergency Management Plan (EMP) that addresses the preparation, response and recovery from all types of emergency incidents. The basis of the EMP was formulated from the National Incident Management System (NIMS) and the Incident Command System (ICS). Through NIMS and ICS, a standardized approach to command, control and the coordination of emergency response was implemented. As part of the EMP, the city of Biloxi takes part in an annual disaster drill training with various city agencies, neighboring jurisdictions and the Keesler Air Force base with which it has a Mutual-aid Agreement. The most recent disaster drill was conducted on February 16, 2017 and involved agencies from the city of Biloxi, fire departments from Harrison County and Gulfport, local contract ambulance services and Kessler Air Force base. The scenario presented at the most recent disaster drill involved a train derailment and a hazardous material spill.

Additionally, BFD undergoes a department wide yearly hurricane preparation drill.[7]

4. Interviews

4.1. The Passengers

Interviews conducted with the passengers of the motor coach revealed that the trip began on Sunday, March 5, 2017 in Bastrop, Texas. The main group boarded the motor coach at that location at 8:00 a.m. Several of the passengers confirmed that upon boarding the motor coach, the driver performed a pre-trip safety briefing which included the location and the operation of the emergency windows and the use of seatbelts. Most of the passengers could not recall the specifics of the briefing. Despite the pre-trip safety briefing given by the driver in Bastrop, Texas; several of these passengers reported that they were unaware that the motor coach was equipped with seatbelts. A second group of eight passengers boarded the motorcoach in Sealy, Texas on the same day. These passengers reported that they did not receive a pre-trip safety briefing and were unaware of the emergency evacuation procedures. Several passengers reported that they found the seatbelts on their own and used them at their own initiative. Most of the passengers were either unaware of or elected not to wear their seatbelt.

At the railroad crossing, several of the passengers reported that the driver stopped the motor coach well before the train tracks. The driver opened the front-loading door and waited for an unknown period before closing the door and proceeding forward. Some of the passengers reported hearing scrapping sounds coming from underneath the motor coach seconds before the bus stopped moving. Several other passengers were alerted to trouble by the lack of motion by the motor coach.

The passengers advised that the driver was attempting to disengage the bus from the crossing by shifting from drive to reverse and back again when they became aware of the approaching train. Several passengers advised that they first observed the train when it was far off in the distance but could not determine if the train was moving.

[7] Survival Factors Attachment: Biloxi Fire Department personnel interviews.

As the driver continued to try to move the motor coach, the passengers were alerted to danger by the warning bell and lights at the crossing, followed by the lowering of the crossing arms which struck the motor coach. Several passengers reported hearing the train whistle sounding from a distance away, which continued until the train struck the motor coach. Most of the passengers believed that the train was approaching at a relatively slow speed.

Several passengers reported that they did not react immediately to the impending danger because they believed that at that relatively slow speed, the train would be able to stop before striking the motor coach.

After the crossing arms came down and struck the motor coach, the driver opened the door and ordered all the passengers off the motor coach. The group leader and her assistant ordered the passengers off the motor coach. Several passengers located in the rear of the motor coach did not hear the order to evacuate and reported that they had not attempted to exit the bus immediately.

Due to the age and mobility of the passengers, the evacuation went too slow and most of the passengers became trapped in the aisle-way, unable to exit the motor coach. With the train still approaching, some of these passengers in the rear of the motor coach decided on their own to evacuate the motor coach but found their path blocked by the front passengers. One passenger reported hearing a passenger yell "hurry up you're blocking us" and another passenger reply "I'm going as fast as I can". Many of the passengers in the rear of the motor coach reported that after finding themselves trapped with no way to exit the bus, they elected to remain in their seats and "braced for impact". Other passengers left their seats and ran to the rear of the motor coach, to be away from the immediate impact area. Just prior to the collision, the driver yelled to the passengers to "brace".

After the collision, several passengers reported that the aisle-way was blocked by fallen and injured passengers and those who could walk could not evacuate the bus. One of the passengers reported that a good Samaritan had climbed into the bus through a window to assist them. The unidentified male attempted to get the passenger to open the rear door to allow the ambulatory passengers to evacuate. The passenger advised that she did not see the rear door and told the unidentified male that there wasn't a door there. This same passenger reported that she did observe a handle on the floor of the motor coach near the rear door but did not know what the handle opened. All the passengers remained on the motor coach until the arrival of the first responders.[8]

4.2. The Harrison County Coroner and State of Mississippi Chief Medical Examiner

Interviews were conducted with the Harrison County Coroner, who was present at the crash scene, and the State of Mississippi Chief Medical Examiner. Both documented the injuries sustained by the four passengers that were killed in the crash. The injuries sustained by the three passengers found outside of the motor coach were consistent with being run over by the motor coach and the freight train. The autopsy on the passenger found unresponsive inside of the motor coach revealed that he died of a fractured cervical spine at the C4, C5 vertebrae. This passenger was reported to have been standing at the rear of the motor coach at time of the impact with the train.[9]

[8] Survival Factors Attachment: Passenger Interviews
[9] Survival Factors Attachment: Medical Pathology Interviews

4.3. The Witnesses

Interviews were conducted with the witnesses to the crash. One of the first witnesses on the scene reported that he drove out of his housing subdivision adjacent to the railroad tracks and immediately observed the motorcoach already stuck on the grade crossing. The witness advised that he was on the southside of the track traveling west on Railroad Street towards Main Street. At the intersection of Main Street and Railroad Street, the witness stopped his vehicle at the stop sign directly adjacent to the rear of the motorcoach. The witness advised that the motorcoach was not moving and was obviously stuck. The center of the undercarriage was wedged against the roadway surface. The crossing lights were already activated, the bells sounding, and the crossing gate arms were down resting on the motorcoach. As the witness observed the motorcoach, he also saw the approaching train. The witness advised that the train horn was sounding and described it as "loud" and "constant". The train appeared to be less than two football fields away and the witness believed that it took less than 30 seconds before the train struck the motorcoach.

Just prior to the impact, the witness advised that he backed his vehicle up, away from the intersection and the rear of the motorcoach. When the train collided with the motorcoach, the witness observed several passengers being ejected out of the front door of the vehicle. When the train and the motorcoach had come to a stop, the witness ran to the front of the motorcoach to render assistance. The witness advised that one of the ejected passengers was lying near the front of the vehicle and was obviously deceased. The witness advised that his path was blocked so he elected to try to enter the motorcoach through one of the passenger side windows. The witness approached the windows and realized that they were too high for him to reach on foot. He ran back to his vehicle and drove it up alongside the motorcoach to use it as a step to get inside.

The witness advised that he was the first person to enter the motorcoach after the collision. Upon entering, he went to the rear of the motorcoach and attempted to open the rear door. The witness advised that he knew the rear door was there and had not tried to open it from the exterior. Attached to the rear wall was an "old crank" type handle that the witness stated was used to open the door. The witness removed the handle from its storage place and placed it in the door. The witness reported that the handle pulled off and fell to the floor. One of the female passengers who was standing in the rear of the motorcoach told the witness that "they tried the door" and "the door is broken". The witness advised that he began pushing and kicking at the door attempting to get it to open. The unidentified female passenger continued to tell him that "the door was broken". The witness advised that there was no obvious sign of damage to the door and he could not see why the door was not functioning. He noted that the impact with the train had occurred some 20 feet away and did not appear to have affected the door, but he could not be certain. After several attempts to kick the door open, the witness gave up trying and turned his attention to assisting the injured passengers in the motorcoach. The witness reported that responding police officers and members of the fire department attempting to open the rear door from the outside. When they were unable to get the door open, the fire department cut it off.

The second witness on the scene advised that he had heard the approaching train as he entered his residence, located across from the train tracks. The witness reported that there was nothing unusual about the train sounding its horn, so his attention was not immediately drawn to the crossing. The witness advised that he was called back outside by a family member who observed passengers jumping from the motorcoach before it was struck by the train. The witness advised that he exited his residence as the train came to a stop. The witness advised that his residence was on the northside of the railroad tracks and he approached the motorcoach from the front. The witness observed several deceased passengers lying on the ground in front of the vehicle. He observed a neighbor drive his vehicle up alongside of the motorcoach. He assisted this neighbor with entering the motorcoach through a side window. The witness advised that he never entered the motorcoach himself, instead he held the window open so that others could enter the motorcoach to assist the victims. The witness advised that he was 6'2 and this gave him the ability to reach the window and hold it open. Later, the fire department provided a "pole" to hold open the window and the witness left the immediate vicinity of the motorcoach.

This witness reported that he was unaware of the presence of the rear door and did not see anyone trying to enter the motorcoach through it.[10]

E. DOCKET MATERIAL

The following attachments and photographs are included in the docket for this investigation:

List of Attachments

Survival Factors Attachment- CSX train consist and data sheets

Survival Factors Attachment- Echo Transportation "bus safety" tip check list

Survival Factors Attachment- Interviews with Law Enforcement personnel

Survival Factors Attachment- City of Biloxi Call Sheet Report

Survival Factors Attachment- Interview with Biloxi Fire Department personnel

Survival Factors Attachment- Biloxi Fire Department Incident Critique

Survival Factors Attachment- Passenger interviews

Survival Factors Attachment- Medical Pathology Interviews

Survival Factors Attachment- Witness interviews

[10] Survival Factors Attachment: Witness Interviews

List of Photographs

Survival Factors Photo 1- CSX Freight train

Survival Factors Photo 2- Motorcoach exterior damage (left side)

Survival Factors Photo 3-Motorcoach exterior damage (right side)

Survival Factors Photo 4- Motorcoach interior damage

Survival Factors Photo 5- Crash motorcoach emergency rear exit

Survival Factors Photo 6- Crash motorcoach emergency exit equipment

Survival Factors Photo 7- Exemplar motorcoach configured for emergency rear exit use

Survival Factors Photo 8- Exemplar motorcoach rear door

Survival Factors Photo 9- Defective buckle

Survival Factors Photo 10- Defective buckle taped prior to crash

END OF REPORT

Sheryl Harley
Highway Crash Investigator