



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Research and Engineering
Washington, DC

Injury Factual Report

June 5, 2019

Mary Pat McKay, MD, MPH
Chief Medical Officer

A. ACCIDENT: RRD18MR003; Cayce, SC

Accident Type: Train Collision
Location: Cayce, SC
Date: February 4, 2018
Time: 2:27 am
Train#1: 91
Carrier#1: Amtrak (National Railroad Passenger Corporation)
Train #2: F777 03
Carrier#2: CSX

B. GROUP IDENTIFICATION:

No group was formed for the development of this report.

C. DETAILS OF INVESTIGATION

Purpose

This investigation was performed to document the injuries to the occupants of Amtrak Train 91. There were 141 passengers and 8 crewmembers on board at the time of the collision and derailment.

Methods

Amtrak provided NTSB with a list of occupants and the hospitals they visited. Medical records for the injured were requested from the hospitals and reviewed. Narrative descriptions of the injuries are provided in the following tables. NTSB injury levels are coded in accordance with Title 49 *CFR* 830.2 which defines *fatal injury* as “any injury which: results in death within 30 days of the accident” and *serious injury* as “an injury which: (1) requires hospitalization for

more than 48 hours, commencing within 7 days from the date the injury was received; (2) results in a fracture of any bone (except simple fractures of fingers, toes, or nose); (3) causes severe hemorrhages, nerve, muscle, or tendon damage; (4) involves any internal organ; or (5) involves second- or third-degree burns, or any burn affecting more than 5 percent of the body surface.“ The *minor injury* category includes all other people, not cited in the other injury categories, who were diagnosed with a symptom or specific injury during their hospital visit in the first 24 hours after the injury. Those coded as “None” were evaluated at a hospital but not diagnosed with any injury. Occupants coded as “Unknown” were believed to have been evaluated at a hospital but records of the visit were not able to be obtained by NTSB. This typically occurs when there is a discrepancy in the spelling or completeness of a name, when the date of birth was unknown or if there was an error in the date of birth, or when the hospital uses a pre-coded “disaster name” for a patient and does not then re-code the record with the person’s real name.

Results

The overall injury levels are provided in table 1. A total of 91 surviving occupants from Train 91 were evaluated at local hospitals; 3 of these were found to be uninjured.

Table 1. Train 91 Occupant Injury Severity

Injury Type ^a	Amtrak Crew Passenger cars	Train Crew Locomotive	Passengers	Total
Fatal	0	2	0	2
Serious	1	0	8	9
Minor	3	0	62	65
None	0	0	3	3
Unknown	0	0	14	14
Total	4	2	87	93

According to interviews with hospital personnel and first responders, decisions about how many patients were taken to individual hospitals were made mutually, generally with communication by cell phone about available hospital capacity. Hospitals received very different numbers of patients but the numbers were believed to be appropriate by those involved. Table 2 documents the injury severity by hospital. Of note, a single adult with serious injuries was initially evaluated at the VA hospital and transferred to the trauma center (Parkland). He was counted in the Parkland group. The uninjured or those who refused medical care were transferred to an assistance center.

Table 2. Train 91 Injury Severity by Hospital

Hospital	Serious	Minor	None	Unknown	Total
Palmetto Richland	4	29	0	9	42
Lexington	3	19	3	0	25
Palmetto Baptist	1	4	0	1	6
Palmetto Parkridge	0	8	0	1	9
VA Medical Center	1	5	0	3	9

Table 3 on the following pages documents the individual injuries for the occupants of Train 91 who visited the hospital. Included is the type of seat the individual was seated in, based on their ticketing. Hospital data is not included in this table. The injured are grouped by their injury severity but there is no other order to the listing. Passenger numbers were simply assigned in order. In some of the cases among the unknown injury severity, the age and sex are blank because they were not known.

Table 3. Occupant Injuries, Amtrak Train 91

Occupant Number	Age	Sex	Class of Service	Injury Description	NTSB Injury Level
1	36	M	Locomotive Crew	Multiple traumatic injuries	Fatal
2	54	M	Locomotive Crew	Multiple traumatic injuries	Fatal
3	63	M	Coach	Fractures, right ribs 8-12 Liver laceration, ~6 cm, Grade III Splenic laceration ~1 cm	Serious
4	57	M	Coach	Fracture right 11 th rib Contusion, right shin	Serious
5	55	M	Crew	Subdural hematoma Subarachnoid hematoma Contusion, right frontoparietal brain	Serious
6	11	F	Coach	Fracture left malar eminence Fracture lateral wall left orbit Facial hematoma	Serious
7	67	F	Coach	Laceration left cheek, 5 cm, complex Subdural hematoma, thin	Serious
8	35	M	Coach	Pneumothorax, right Fractures, multiple right ribs	Serious
9	72	F	Coach	Compression fracture, T12 Neck pain Chest wall strain Low back strain Foot pain	Serious
10	58	M	Coach	Forehead laceration Traumatic collapse of the femoral head with pre-existing underlying damage (avascular necrosis)	Serious

Occupant Number	Age	Sex	Class of Service	Injury Description	NTSB Injury Level
11	50	F	Coach	Fracture, complex intra-articular, left distal tibia Fracture, distal left fibula, comminuted Fracture, head of fibula, right Thoracic strain Lumbar strain	Serious
12	46	M	Coach	Contusions, head, left foot Cervical strain Strains, right hip and right shoulder Muscle spasm of back Abrasion, left foot	Minor
13	60	F	Coach	Right ankle sprain Right foot pain	Minor
14	60	M	Coach	Left shoulder sprain Abdominal pain	Minor
15	22	F	Coach	Sprain, left ankle Contusion, left foot	Minor
16	71	M	Coach	Superficial laceration left shin	Minor
17	67	F	Coach	Right shoulder pain Bilateral shin pain	Minor
18	66	F	Coach	Left AC separation Bilateral leg swelling	Minor
19	57	F	Roomette	Left knee pain/contusion	Minor
20	16	F	Coach	Fracture, tooth #8 (class III) Subluxation, teeth #7 and 8 Abrasion, upper lip	Minor
21	57	F	Coach	Ankle sprain, right Facial contusion	Minor
22	51	M	Coach	Low back pain Right knee pain	Minor
23	40	M	Coach	Abrasion, left hand Bilateral knee pain	Minor
24	58	M	Coach	Fracture, tooth #9 Ankle sprain, Right Back pain	Minor
25	51	F	Coach	Low back pain Bilateral ankle pain	Minor
26	45	F	Coach	Ankle sprain, right Contusion left knee	Minor
27	38	M	Crew	Contusion, chest wall	Minor

Occupant Number	Age	Sex	Class of Service	Injury Description	NTSB Injury Level
28	37	F	Crew	Head injury Right shoulder pain	Minor
29	38	F	Crew	Head injury	Minor
30	3	M	Coach	Laceration, forehead, 3 cm	Minor
31	20	F	Coach	Back pain	Minor
32	25	F	Coach	Head injury Contusion, right foot	Minor
33	76	F	Coach	Laceration, right leg, 10 cm Contusion, right elbow	Minor
34	23	F	Coach	Forehead laceration, 1 cm Pain, right ankle Pain, left hand	Minor
35	24	M	Coach	Abrasion, nose Displaced nasal bone fracture Left ankle sprain	Minor
36	24	F	Coach	Right knee abrasion Left knee pain	Minor
37	44	M	Coach	Laceration, left shin, 1 cm Contusions, bilateral shins Contusion, lip	Minor
38	69	F	Coach	Chest pain	Minor
39	48	M	Coach	Right ankle sprain	Minor
40	55	M	Coach	Neck pain Abdominal pain	Minor
41	29	F	Coach	Forehead contusion Left leg contusion Back pain	Minor
42	47	F	Coach	Head injury Dizziness Right arm pain	Minor
43	45	F	Coach	Right knee pain Right hip pain	Minor
44	62	F	Coach	Coccyx bruise	Minor
45	69	M	Coach	Abrasion left knee Multiple contusions	Minor
46	64	F	Coach	Back and neck pain Ankle sprain Knee sprain, right	Minor
47	28	F	Coach	Back strain Contusion, left knee	Minor

Occupant Number	Age	Sex	Class of Service	Injury Description	NTSB Injury Level
48	71	F	Coach	Left frontal hematoma Bilateral knee pain	Minor
49	74	M	Coach	Abrasion left leg Left knee sprain	Minor
50	77	F	Coach	Laceration right forehead, 4cm Bilateral knee pain Left ankle pain	Minor
51	84	M	Coach	Nasal laceration 1 cm Fracture, right nasal bone Back pain	Minor
52	60	F	Bedroom Accessible	Multiple abrasions Multiple contusions	Minor
53	63	F	Coach Accessible	Head injury	Minor
54	61	M	Coach	Left hamstring strain Left knee contusion	Minor
55	76	F	Roomette	Neck pain Chest pain Head injury	Minor
56	56	F	Coach	Right hip pain Contusion, right lower leg Contusion, forehead Contusion, nose Abrasion, lip	Minor
57	34	M	Coach	Laceration, right lower leg, ~2 cm Laceration, lip internal, 3 cm Laceration, chin, ~3 cm Impacted front teeth	Minor
58	56	F	Coach	Hip pain, left Head injury Contusion, right knee	Minor
59	20	F	Coach	Abrasion, left arm Contusion, left arm	Minor
60	52	F	Coach	Contusion, left lower leg	Minor
61	48	M	Coach	Contusion, right elbow Contusion, right knee Strain, right shoulder	Minor
62	80	M	Coach	Abrasion, lower leg	Minor

Occupant Number	Age	Sex	Class of Service	Injury Description	NTSB Injury Level
63	56	F	Coach	Cervical strain Left knee pain Left lower leg pain Back strain	Minor
64	56	F	Coach	Knee pain, left	Minor
65	73	F	Coach	Bilateral knee pain Bilateral hip pain	Minor
66	73	M	Coach	Abrasion, right knee Lumbar strain Cervical strain	Minor
67	38	M	Coach	Contusion, left hand	Minor
68	28	M	Roomette	Cervical strain Contusion, chest wall Contusion, head	Minor
69	23	F	Coach	Contusion, left lower leg Contusion, abdominal wall	Minor
70	76	M	Coach	Abrasion Contusion, right leg	Minor
71	63	M	Coach	Abdominal pain Contusion, right knee	Minor
72	32	F	Coach	Strain, right shoulder	Minor
73	2	F	Coach	Abrasion of scalp	Minor
74	30	M	Coach	Cervical strain Thoracic strain Contusion, chest wall Contusion, face Abrasion, lip	Minor
75	53	M	Coach	Cervical strain Thoracic strain Lumbar strain Contusion, left foot	Minor
76	57	M	Coach	Abrasion, right forehead Abrasion, left knee Contusion, left knee	Minor
77	35	M	Coach	None	None
78	41	M	Roomette	None	None
79	2	M	Coach	None	None
80		M	Roomette	No documentation available	Unknown
81			Coach	No documentation available	Unknown
82	80	F	Coach	No documentation available	Unknown
83		M	Coach	No documentation available	Unknown

Occupant Number	Age	Sex	Class of Service	Injury Description	NTSB Injury Level
84	54		Coach	No documentation available	Unknown
85		F	Coach	No documentation available	Unknown
86	79		Coach	No documentation available	Unknown
87		F	Roomette	No documentation available	Unknown
88	18	F	Coach	No documentation available	Unknown
89			Coach	No documentation available	Unknown
90		F	Bedroom Accessible	No documentation available	Unknown
91	34	M	Coach	No documentation available	Unknown
92	37	F	Coach	No documentation available	Unknown
93	26	M	Coach	No documentation available	Unknown

Overall, 90 of the 149 (60.4%) occupants of Train 91 were injured in this accident. This included 2 fatally injured train crew riding in the locomotive. Among the 6 crewmembers riding in the passenger cars, 1 was seriously injured and 3 had minor injuries.

Seven of 32 (21.9%) passengers ticketed in roomettes or bedrooms and 77/109 (77.6%) of passengers ticketed in coach seats were taken to hospitals and found to be injured. None of the passengers ticketed in roomettes or bedrooms were seriously injured. According to the medical records, most of the passengers reported having been asleep or resting; those in seats were thrown out of their seats and against the furniture in front of them. The majority of skin injuries (lacerations and contusions) were to the face, head, and knees or shins. Two people had broken teeth, one had a broken nose, and one had a facial fracture. Of those seriously injured, 3 reported falling against the edge of a table and one reported falling out of an upper bunk.

D. SUMMARY

Overall, 90 of the 149 (60.4%) occupants of Train 91 were injured in this accident. Both the crew on the locomotive died. Those ticketed in coach seats were more likely to seek immediate medical attention than those in roomettes or bedrooms. None of the passengers ticketed in roomettes or bedrooms were seriously injured. According to many passenger reports documented in the medical records, the seated occupants were thrown out of their seats during the crash sequence. The majority of skin injuries (lacerations and contusions) were to the face, head, and knees or shins. Two people had broken teeth, one had a broken nose, and one had a facial fracture. Of those seriously injured, 3 reported falling against the edge of a table and one reported falling out of an upper bunk.