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

SURVIVAL FACTORS GROUP CHAIRMAN'S FACTUAL REPORT

A. CRASH INFORMATION

Location:	1300 Block of Seabreeze Boulevard, Fort Lauderdale, Broward County, Florida
Vehicle #1:	2014 Tesla Model S P85D
Date:	Tuesday, May 8, 2018
Time:	6:46 p.m. local time
NTSB #:	**HWY18FH013**

B. SURVIAL FACTORS GROUP

Thomas Barth, Survival Factors Investigator, Group Chairman
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C. CRASH SUMMARY

For a summary of the crash, refer to the Crash Summary Report in the docket for this investigation.

D. DETAILS OF THE SURVIVAL FACTORS INVESTIGATION

The Survival Factors Group investigation collected evidence pertaining to the vehicle, the occupants, and the emergency response.

1. Law Enforcement

1.1. Fort Lauderdale Police Department (FLPD)

Fort Lauderdale Police Department located at 1300 West Broward Blvd. Fort Lauderdale, FL 33312 had primary jurisdiction for investigating the crash. The FLPD assisted in collecting information and coordinated inspection of the Tesla.

1.2. Broward Sheriff's Office (BSO)

The Broward Sheriff's Office had the 911 call center and dispatch for the incident. The communications incident summary for incident number L3418050800072859 was obtained.[1] The initial call was received at 6:46 p.m. with a report that a vehicle had crashed into a wall and was on fire and was then reported to have injured persons. Units were dispatched at 6:47 p.m. and arrived on scene at 6:49 p.m. The request to have units respond to the call occurred at 6:48 p.m., and additional units were requested at 7:02 p.m. FLPD homicide was advised at 7:04 p.m. The roadway was clear and ready to be reopened for traffic at 1:13 a.m. on May 9th, 2018.

1.3. Medical Examiner

The medical examiner, located at the Broward County Office of Medical Examiner and Trauma Services, 5301 SW 31st Ave, Fort Lauderdale, FL 33312, provided the autopsy reports for the fatal victims of the crash. These were reviewed and a summary is provided in section 4 of this report.

2. Fire, EMS, Hospital

2.1. Fort Lauderdale Fire Rescue (FLFR)

The FLFR had primary jurisdiction for the fire, rescue and pre-hospital patient care response. Battalion 13 from Station 49 responded to the crash. FLFR Station 49 is located at 1015 Seabreeze Blvd, Fort Lauderdale, FL, 33316. The FLFR Incident Report 2018-0818018114-000 was obtained.[2] The alarm occurred at 6:46 p.m. and the incident type was logged as: 13 – Mobile Property (vehicle) fire. The first apparatus, L49 was dispatched and enroute at 6:46 p.m. and arrived at 6:50 p.m. The list of responding apparatus with information of times, staff, and other information was provided in the incident report. The report also contains narrative descriptions of the response.

The Battalion Chief responded to the scene, arrived at 6:55 p.m. and served as the Incident Commander (IC). The IC was interviewed by telephone on May 10th, 2018, and the transcript was audiotaped and transcribed. See the Interview section of this report for more information.

An NTSB investigator also interviewed a captain and a Fire Fighter (FF) who responded at Station 49 on May 11, 2018. Another FF was also brought into the interview via telephone. They indicated that when they arrived on scene, it was approximately 30 seconds after the first arriving

[1] SF Attachment: Broward Sheriff's Office Communication Incident Summary
[2] SF Attachment: Fort Lauderdale Fire Rescue Incident Report

police unit, and the vehicle was fully engulfed in flames. The surviving passenger was already sitting on the sidewalk. There was a bystander who indicated that he was one of the first people to arrive, and they asked about the surviving passenger, but this bystander did not know if the survivor had been ejected. The captain and FF said that they had not heard reports of the survivor being ejected at the scene.

They indicated that they immediately attacked the vehicle fire, as there was a chance that the occupants could survive. Bystanders were reporting that the occupants were moving. They used a 1.75 inch fire hose with an adjustable nozzle. The FF reported that the vehicle interior fire was knocked down in under a minute, and then he focused on the more intense fire at the right front corner of the vehicle floor, just forward of the front passenger seat. He said that he approached as close as he could, but the heat was very intense. He estimated that this was approximately 30 ft from the vehicle. He noted that when he's responded to vehicle fires in the past, they did not seem as intense, and he was typically able to approach closer. He stated that he was initially not aware that it was an electric vehicle.

They FF stated that he initially used a fog setting, for the interior, and then used a tighter stream and more foam for the floor-pan fire.[3] He estimated that he used a total of about 200 to 300 gallons. He felt that the foam was very effective. There was arcing and intense flames, and the FF said he did not notice shooting debris. The FF noted that while he was on-scene after attaching the fire, another FF at the scene asked him if he noticed pieces of the vehicle shoot by him, and he had not. He noted that it had a unique and loud sound, a whine or buzz, sort of like a vehicle turbo charger. He said that he saw electrical arcing, and thought that the foam would help dissipate the energy by providing a conduit path (by the conductive nature of the water/foam). Once he saw it stop burning and arcing, he stopped application of the water/foam.

They indicated that there were 2 pieces of battery completely separated from the vehicle. One was approximately 25 feet behind the vehicle, in the street, and looked to be very damaged, sort of torn in pieces. The other part appeared more intact, and was about 4 feet behind the vehicle. Neither of these appeared to be on fire but the FF blanketed them with water/foam.

He was asked if the occupants were moving and if he felt they might be conscious. The FF saw them moving, but it did not appear they were making conscious movements. The Captain also indicated that he saw movement, but also felt that it was not conscious or purposeful. They were asked if they could tell if the vehicle occupants were wearing their seatbelts. Neither was able to determine this. This crew was not part of the occupant recovery or vehicle loading.

The EMS crew reported that they found the surviving passenger on the sidewalk. They performed a verbal check and he was able to answer detailed questions (such as where he was and what day it was), but he did not recall the events of the crash. He was noted to have obvious road rash trauma, which they supposed must have been from asphalt or concrete, and he did not exhibit thermal injuries or exposure. The transport unit was an Advanced Life Support (ALS) unit housed at Station 49.

[3] A fire hose fog nozzle creates a spray that breaks the stream into small droplets.

The crews were asked about training for electric vehicles and stated that they have not had any specific training for these vehicles.

2.2. Broward Health Medical Center

The surviving passenger was treated at Broward Health Medical Center, located at 1600 S. Andrews Ave, Fort Lauderdale, Florida, 33316. The Risk Manager was contacted and facilitated access. The patient was interviewed on May 9th, 2018 at the hospital, and the interview was audiotaped and transcribed. See the interview section of this report for more information.

3. Westway Towing

The vehicle was recovered on scene by Westway Towing, located at 3681 W. Oakland Park Blvd, Ft Lauderdale, FL 33311. The tow truck operator provided a description of his activities. Efforts to obtain tow truck video footage were unsuccessful.

The tow truck operator stated that he has attended a Tesla training class and was very familiar with these vehicles. He provided a list of tow operations with Tesla vehicles over the last approximately 11 months.[4]

He noted that both tow trucks (the one carrying vehicle debris and the other carrying the vehicle) had reignition events of the battery components described as follows.

- The individual separated modules reignited on the flatbed tow truck at the scene as a chain was passed over them. The fire extinguished itself and no intervention by the fire department was necessary.

- The vehicle battery reignited and the battery case became separated from the vehicle as they attempted to winch the vehicle onto the flatbed at the scene. A brief application of additional water/foam by the fire department were used to suppress the fire.

- The battery case/modules reignited at the tow yard upon unloading from the truck. This included arcing and smoke. They self-extinguished and no fire operations were used.

4. Persons Involved

There were 3 occupants in the Tesla. The driver of the Tesla was an 18-year-old male. He was fatally injured in the crash. The autopsy report for the driver, ME Case No. 18-1412 was obtained. The cause of death was listed as thermal injuries and manner of death was accident. He was measured at 69 inches and 184 pounds. The report lists extensive thermal injuries. No fractures or asymmetries were noted in the head, neck and chest. Internally, all body organs were noted as in the normal anatomical position and no abnormal collections of fluid were present. The blood toxicology was positive for carbon-monoxide with a saturation of 11%. Blood toxicology was negative for ethanol or drugs.

[4] SF Attachment: Westway Towing list of Tesla towing operations

The front seat passenger was an 18-year-old male. He was fatally injured in the crash. The autopsy report was obtained. The front seat passenger autopsy report for ME Case No. 18-1413 was obtained. The cause of death was listed as thermal injuries and manner of death was accident. He was measured at 69 inches and 172 pounds. The report lists extensive thermal injuries. There were also blunt trauma injuries noted to the head and torso. The head injuries included a linear fracture of the left middle cranial fossa, anterior to the petrous portion of the temporal lobe; two linear fractures in the right middle cranial fossa; a thin subarachnoid hemorrhage overlying the basal aspect of the frontal lobes and left temporal and parietal lobes of the brain; contusions of the left basal frontal, left temporal, left parietal, and left occipital lobes of the brain; contusions of the right temporal lobe. The torso injuries included anterior lateral fractures of the second through sixth ribs; lacerations of the right lobe of the liver. The blood toxicology was positive for carbon-monoxide with a saturation of 1%. Blood toxicology was negative for ethanol or drugs. While the cause of death was listed as thermal injuries, the medical examiner opinion stated that he "died as a result of multiple blunt impact and thermal injuries".

The right rear seat passenger was an 18-year-old male. He was seated in the right rear seat of the car and sustained serious injuries. He was interviewed at Broward Health Medical Center and the interview was audio taped and transcribed. See the interview section of this report for more information.

Summary notes from the interview are as follows. He stated that he was seated in the right rear passenger seat and not wearing his seat belt. He denied that alcohol or drugs were involved, and clarified that the two boys following them were friends driving a BMW 5 series. His memory was not clear, and initially said that he just remembered being on the stretcher, and did not recall being ejected. Later he said that one of his friends from the following vehicle pulled him out (or away) from the car. He said he gave a statement to police. He said they were going about 100mph, and this vehicle was the driver's regular car, that he's driven for a while. They were familiar with this stretch of road. He said described several serious injuries including a fractured pelvis on the right side, two "cracked" ribs on his left side, two fractures on his right clavicle, and a left shoulder "tear". He was not sure, but thought the front seat boys were belted.

5. 2014 Tesla Model S

The 2014 Tesla Model S, Vehicle Identification Number (VIN) 5YJSA1H24EFPXXXXX.[5] was transported to Westway Towing, located at 3681 W. Oakland Park Blvd, Ft Lauderdale, FL 33311. Video recording obtained during the investigation provided some information regarding the state of the vehicle during and after the crash, which are noted in the Image Recorder Specialist's Factual Report.[6]

Telsa provided assistance in identifying the location and information about the data chips on the vehicle.

[5] The last 5 digits of the VIN were replaced with "X".
[6] Available in the accident docket.

5.1. Exterior Inspection

A general inspection of the vehicle was conducted on May 11, 2018 at Westway Towing, and a follow up inspection, focused on the vehicle traction battery, was conducted on June 7, 2018 also at Westway Towing. The Tesla was destroyed and several major components of the vehicle were separated and found loaded on a wooden palate or in a debris pile stored near the vehicle. The largest portion of the vehicle consisted of the chassis, left wheels, body and interior, as shown in Figure 1.

Figure 1. Left Side of Tesla

Both right side wheels and some suspension components, the entire traction battery pack, both front doors, right front fender, front electric drive motor, hood, and front of the car were displaced from the body, as shown in Figure 2.

Figure 2. Right Side of Tesla

There was extensive fire damage, which was most severe in the middle front portion of the passenger compartment. The outer paint on the sides and rear of the Tesla was intact, and the upper portions of the car exhibited thermal damage. The left front wheel was intact and the tire was flat. The left rear wheel was intact and the tire was inflated. The left side B-pillar exhibited damage consistent with rescue extrication operations. The left rear window glass was intact and fire damaged. The windshield and roof glass were broken out.

The rear of the Tesla was mostly intact, but with the upper portion of the bumper trim displaced, as shown in Figure 3. The rear window glass was intact and fire damaged. The right rear corner of the car aft of the rear wheel was intact above the bumper, but damaged and with body panels missing at the level of the bumper and below the bumper. Impact damage and extended from the right-rear wheel and forward the entire length of the car. All window glass on the right side was broken out. The right-rear door remained attached, but the entire aft-half of the door was deformed forward.

Figure 3. Right-rear of the Tesla.

The entire right-front corner of the car had significant portions missing, as previously noted. The right A-pillar and upper body frame was missing from the car. The entire right front body of the car was also missing.

The right front door was found in the debris pile. It exhibited severe thermal damage and a large vertical deformation pattern which had dimensions similar to the impacted light pole at the scene of the crash, as shown in Figure 4.

Figure 4. Tesla right front door.

The Tesla hood was found in the debris pile and placed onto the front of the car, as shown in Figure 5. The middle and aft portion of the hood were damaged and partially consumed by fire. Severe thermal damage was evident along the left side and front, and the right side exhibited impact damage. The left front fender, forward of the left front wheel, also exhibited thermal damage.

Figure 5. Tesla left front with hood.

Both right side wheels were found in the debris pile, and both wheels were fractured from impact damage. Neither of the wheels exhibited fire damage.

5.2. Traction Battery Information

The traction battery refers to the large lithium-ion battery which provided power to drive the Tesla, as opposed to the auxiliary battery, used to power the 12 volt vehicle accessories. The traction battery case was completely separated from the vehicle and was found on a wood pallet with a large pile off vehicle components piled on top. The determination was made to inspect the traction battery as a separate task, and the components were not moved from the pallet during the first inspection, in order to avoid potential reignition. The battery case and battery were inspected with appropriate precautions on June 7, 2018. Refer to the Battery Group Chairman's Factual Report for information regarding the battery case and battery inspection.

5.3. Interior Inspection

The interior of the Tesla was severely fire damaged. The front dashboard area and steering wheel were consumed by fire, with most non-metallic material combusted. The front seats were heavily fire damaged and large portions of the cushions combusted. The driver seat buckle assembly was not found in the wreckage. The front passenger seat belt buckle was found, and the connector was inserted into the buckle. Most non-metallic components of the buckle were combusted. The rear seating compartment had severe thermal damage, and the seat cushions were mostly intact. There rear seat belts were stowed in their non-used positions.

The Restraints Control Module (RCM) and the Media Control Unit (MCU) were recovered from the vehicle.[7] The RCM indicated that both the driver and the front passenger seat belts were buckled, and there was a crash deployment event. The rear passenger seatbelt was not buckled. No data was recovered from the MCU.

6. Scene Inspection

A scene inspection was conducted on May 9, 2018. Components, including the leading edge of the battery case, a section of battery case cover, wheel pieces, and battery cells were observed at the scene. The battery case components were removed and relocated with the vehicle, and the FLPD was informed of the other debris.

A second inspection of the scene was conducted on May 11, 2018 in attempt to locate parts of the windshield and Mobileye windshield mounted camera, which were not found in the debris pile at the tow yard. The areas on the other side of the walls and bushes impacted by the vehicle were searched, but nothing was found. A local homeowner and yard maintenance crew working at the vacant home were questioned about any further debris, but had not seen anything.

[7] Refer to the Vehicle Recorders Specialists Factual Report, available in the crash docket.

E. INTERVIEWS

Interviews were conducted by NTSB investigators for the survival factors investigation.[8]

1. Tesla Passenger

The 18-year-old male passenger of the Tesla was interviewed on May 9, 2018 at Broward Health Medical Center. The interview was recorded, and a transcript of the interview is provided in the attachment.

2. Fire Chief, Fort Lauderdale Fire and Rescue

The fire chief on duty was interviewed by telephone on May 10, 2018. The interview was recorded and a transcript is provided in the attachment.

F. DOCKET MATERIAL

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

LIST OF ATTACHMENTS

SF Attachment: Broward Sheriff's Office Communication Incident Summary

SF Attachment: Fort Lauderdale Fire Rescue Incident Report

SF Attachment: Westway Towing List of Tesla Towing Operations

SF Attachment: Interviews

END OF REPORT

Thomas Barth, Ph.D.
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[8] SF Attachment: Interviews