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

SURVIVAL FACTORS GROUP CHAIRMAN'S FACTUAL REPORT

PHOENIX, ARIZONA – HWY21MH008

A. CRASH INFORMATION & CRASH SUMMARY

Refer to the *Crash Information and Crash Summary Report* in the docket for this investigation.

B. SURVIVAL FACTORS GROUP

Ronald Kaminski, Survival Factors Investigator, Group Chairman
NTSB Office of Highway Safety
490 L'Enfant Plaza East, S.W., Washington, DC 20594

C. DETAILS OF THE SURVIVAL FACTORS INVESTIGATION

The survival factors investigation focused primarily on the interior damage sustained by the crash involved vehicles, the sustained injuries by the occupants in the vehicles, and the emergency response. All of the vehicles were examined and photographed by the NTSB at the Arizona Department of Public Safety (AZDPS) impound lot located at 2610 16th street, Phoenix, Arizona. The interior examinations consisted of photographic and written documentation of the damage.

1. 2016 Freightliner Cascadia Truck Tractor with a 2015 Walker Tank Trailer

The crash-involved truck-tractor was a 2016 Freightliner truck-tractor (Freightliner) in combination with a 2015 Walker tank-trailer (Walker). The Freightliner was occupied by a 47-year-old male driver.

1.1. Freightliner Exterior Deformation

The Freightliner sustained extensive damage to the front end, as shown in **Figures 1** and **2**. A post-crash fire consumed the Freightliner truck-tractor cab. The examination of the Freightliner found that the side saddle fuel tanks were not compromised in the post-crash fire. The 2015 Walker tank-trailer became detached during the crash sequence and was also damaged in the crash. Additional damage descriptions of the Freightliner truck-tractor and tank-trailer are located in the *Vehicle Group Chairman's Factual Report*.

Figure 1. Front left angle view of damage to Freightliner.

Figure 2. Frontal view of damage to Freightliner.

1.2. Freightliner Interior Damage

The cab of the Freightliner was consumed in the post-crash fire as shown in **Figure 3**. There did not appear to be any deformation to the driver's seat frame.

Figure 3. Interior view looking from rear to front at the burnt Freightliner.

2. 2021 Chevrolet Equinox

The 2021 Chevrolet Equinox was occupied by a 35-year-old female driver who was fatally injured in the post-crash fire.

2.1 2021 Chevrolet Equinox Exterior Deformation

The Equinox sustained significant deformation to both the rear and front end and was consumed in the post-crash fire as shown in **Figures 4-5**. There was a significant reduction of the left side postcrash wheelbase of almost 26-inches (original wheelbase is 107.3-inches, postcrash

was 81.6-inches). The vehicles High-Density Polyethylene (HDPE) gas tank was significantly damaged in the post-crash fire.

Additional exterior damage descriptions are located in the *Vehicle Group Chairman's Factual Report*.

Figure 4. Frontal view of Equinox deformation.

Figure 5. Left side view of Equinox deformation.

2.2 2021 Chevrolet Equinox Interior Damage

The interior examination was limited due the post-crash fire and the significant amount of intrusion into the rear seating area. The Airbag Control Module (ACM) in the Equinox was destroyed in the post-crash fire.

3. 2015 Nissan Altima

The 2015 Nissan Altima was occupied by a 22-year-old male driver and three adult passengers.

3.1 2015 Nissan Altima Exterior Deformation

The Altima sustained significant deformation to the front and rear as shown in **Figures 6-7**. The vehicle's subsequent rollover also resulted in roof damage. The rearview window was broken out. The left side postcrash wheelbase was reduced almost 13-inches from the original (original wheelbase is 109.3-inches, postcrash was 96.5-inches). Additional damage descriptions are located in the *Vehicle Group Chairman's Factual Report*.

Figure 6. Front right-angle view of deformation. **Figure 7.** Rear right-angle view of deformation.

3.2 Nissan Altima Interior Damage

Photographs show that there was a significant amount of intrusion into the rear seat area due to the rear impact. Interior photographs show that the driver's side curtain airbag and both frontal airbags deployed in the crash. The deployed driver side curtain airbag extended from upper interior roof panel at window and door edge down to the top of the door sill and front to rear covering the entire driver window. The front airbag deployed the steering wheel and front right passenger frontal airbag deployed from the dashboard. On-scene photographs taken by the AZDPS show the Altima at final rest with the windshield shattered but still intact with the right front passenger door open. The rear bench seat was pushed forward, and the rearview window was broken out. The driver's side door window and right rear passenger door windows were all broken out. Both the driver and front right seatbacks were displaced aft (approximately 65 degrees and 55 degrees respectively) as shown in **Figures 8-9**. The Altima was equipped with an Active Head Restraint (AHR) which appeared to be activated by extending upward above the seatback in the front right passenger seat position.[1]

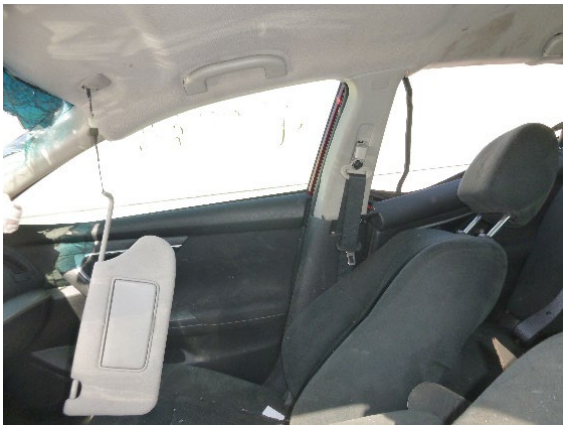

Figure 8. Interior view of damage looking rear to front. **Figure 9.** Interior view of front passenger seating area.

[1] An Active Head Restraint (AHR) system is designed to lessen the impact of whiplash and is located in the front and passenger headrests. The AHR system protects against whiplash by deploying and extending the front half of the headrest forward during a rear end collision to 'catch' the occupant's head.

3.2.1 Event Data Recorders

The Altima was equipped with an Airbag Control Module (ACM) that had event data recording capabilities. The ACM was imaged by AZDPS, and the data from the vehicle's ACM was downloaded. The ACM showed that the left side airbag curtain deployed as well as both frontal airbags. The ACM also showed that five seconds prior to the crash, the Altima was stopped, and both the driver and front right passenger lap/shoulder belt were not buckled. The ACM data documented that the frontal airbag warning lamp was on or blinking but was not specific which airbag was affected. For additional information on the data imaged by the AZDPS from the Altima ACM, refer to the *Technical Reconstruction Group Factual Report*.

4. 2016 Ford Fusion

The 2016 Ford Fusion was occupied by a 20-year-old male driver and three adult passengers.

4.1 2016 Ford Fusion Exterior Damage

The Fusion sustained significate damage as a result of the front and rear impacts as shown in **Figures 10-11**. The roof of the Fusion had rubber tire transfer marks along the left side. The vehicle's left side postcrash wheelbase was reduced 9-inches from the original (original wheelbase is 112.2-inches, postcrash was 103.2-inches). Additional damage descriptions are located in the *Vehicle Group Chairman's Factual Report*.

Figure 10. Rear view of catastrophic damage.

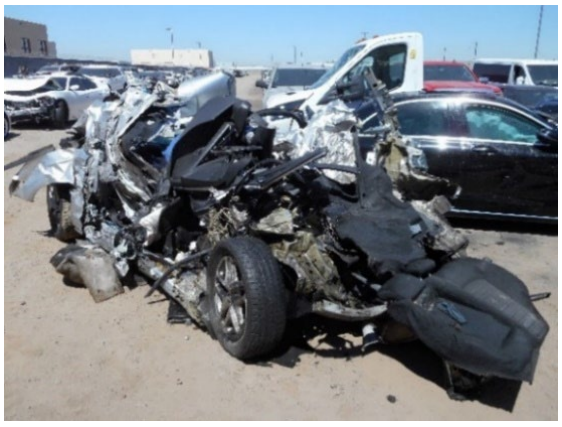

Figure 11. Frontal view of deformation.

4.2 2016 Ford Fusion Interior Damage

As shown in **Figures 12-13** there was a significant loss of occupant survival space to the Fusion due to the rear and frontal impacts with Freightliner tire transfer marks along the left top side of the roof. Photographs show the roof collapsed below the interior headrests. The rear seats had been torn from the vehicle and were found hanging out the rear of the Fusion. On-scene photographs taken by the AZDPS show the right front passenger seatback bent aft. The interior examination showed that both frontal airbags deployed during the crash and the driver's seatbelt appeared to be abraded and cut by first responders.

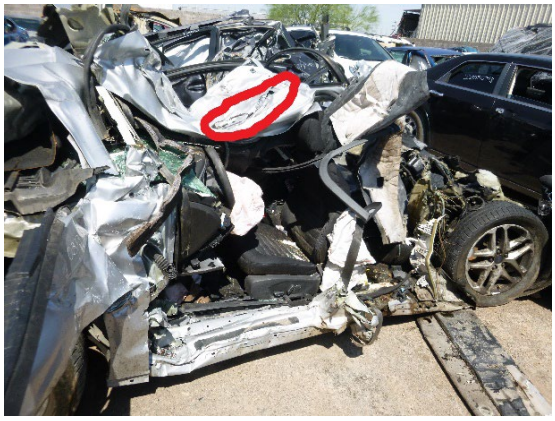

Figure 12. Exterior view showing rubber transfer to roof. **Figure 13.** Overhead view of Ford Fusion.

4.2.1 Event Data Recorders

The Fusion was equipped with an ACM that had event data recording capabilities. The ACM was removed by AZDPS, and the data from the vehicle's ACM was downloaded. The ACM showed that the Fusion was equipped with frontal airbags, a side thorax airbag (seatback) for the driver, side curtain airbags, and inflatable knee bolsters for the driver and front right passenger. The ACM showed that five seconds prior to the crash, the Fusion was stopped, and both the driver and front right passenger's lap/shoulder belt were buckled and the pretensioners fired. For additional information see *Technical Reconstruction Group Factual Report*.

5. 2013 Toyota Prius

The Toyota Prius was occupied by a 30-year-old male driver.

5.1 2013 Toyota Prius Exterior Deformation

The Prius sustained extensive deformation to both the rear and front end as shown in **Figures 14-15**. The vehicle's left side postcrash wheelbase was reduced almost 30-inches from the original (original wheelbase was 106.3-inches, postcrash was 76.8-inches). Additional damage descriptions are located in the *Vehicle Group Chairman's Factual Report*.

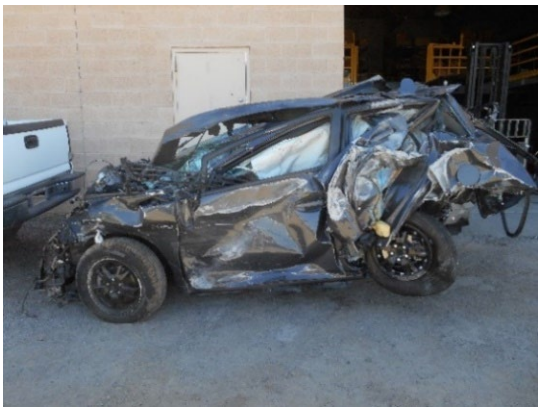

Figure 14. Left side view of deformation to Prius. **Figure 15.** Front right-angle view of Prius deformation.

5.2 Toyota Prius Interior Damage

Interior photographs show a moderate amount of intrusion to the front driver seating area and the rear seat area. As shown in **Figure 16**, the driver's frontal airbag and both side curtain airbags deployed during the crash. Interior photographs appear to show the driver's seatback being broken back (approximately 50 degrees) and the headrest missing. The Prius was equipped with an AHR which based on an interior photograph did not activate in the crash. The driver airbag and both side curtain airbags deployed in the crash. The driver's seatbelt pretensioner fired as well. The windshield was cracked, and the rearview window backlight was partially broken out. Additionally, the sunroof was broken out.

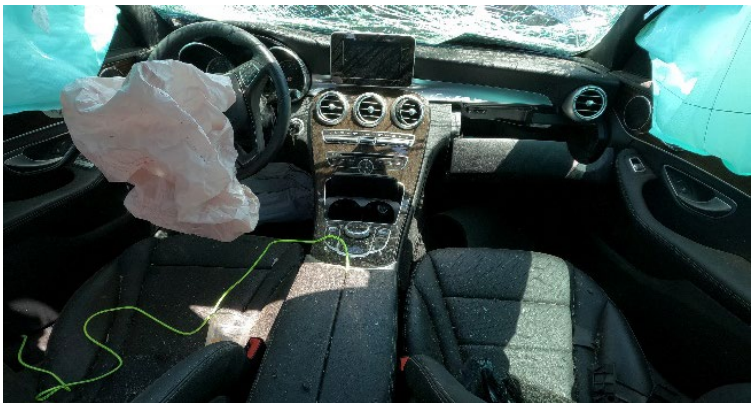

Figure 16. Interior view of driver seating area**.**

5.2.1 Event Data Recorders

The 2013 Toyota Prius was equipped with an ACM that had event data recording capabilities. The ACM was imaged by AZDPS, and the data from the vehicle's ACM was downloaded. The ACM showed that the Prius was equipped with frontal airbags, side curtain airbags, a rear window airbag, active head restraints and seatbelt pretensioners. The ACM showed that five seconds prior to the crash, the Prius was stopped, and the driver's lap/shoulder belt was buckled and the pretensioner fired at impact. For additional information see *Technical Reconstruction Group Factual Report*.

6. 2018 Mercedes Benz C300W

The Mercedes was occupied by a 29-year-old female driver and a 6-year-old child was seated in the rear seat.

6.1 Mercedes Exterior Damage

The Mercedes sustained impacts to the front and the rear bumper, as shown in **Figures 17-18**. The rearview window was broken out, the sunroof was totally displaced, and the front windshield was holed and shattered. Additional damage descriptions are located in the *Vehicle Group Chairman's Factual Report*.

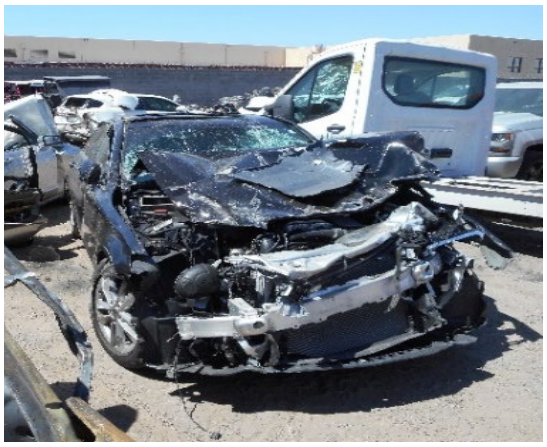

Figure 17. Frontal view of deformation to Mercedes. **Figure 18.** Rear view of deformation to Mercedes.

6.2 Mercedes Interior Damage

Interior photographs indicated that the vehicles front, side curtains, and the driver's knee airbag all deployed during the crash as shown in **Figure 19**. The ACM also indicated that the driver's seat belt pretensioner fired and the seatbelt was found in the extended and locked position as shown in **Figure 20**. Interior photographs show that the driver's seatback was bent aft (approximately 60 degrees). The Mercedes was equipped with an AHR.

Figure 19. View of deployed airbags from outside driver's door. **Figure 20.** View of extended and locked seatbelt.

6.2.1 Event Data Recorders

The 2018 Mercedes Benz was equipped with an ACM that had event data recording capabilities. The ACM was imaged by AZDPS, and the data from the vehicle's ACM was downloaded. The ACM showed that the Mercedes Benz was equipped with frontal airbags, a thorax airbag (seatback), a frontal vent (knee) airbag, side curtain airbags, and a seatbelt pretensioner for the driver and front right passenger. The ACM showed five seconds prior to the crash, the Mercedes Benz was stopped, and the driver's lap/shoulder restraint was belted and the pretensioner fired. For additional information see *Technical Reconstruction Group Factual Report*.

7. 2013 Lexus CT200H

The Lexus was occupied by a 42-year-old female driver.

7.1 Lexus Exterior Deformation

The Lexus sustained deformation to the rear end and the driver's door as shown in **Figures 21-22**. Additional damage descriptions are in the *Vehicle Group Chairman's Factual Report*.

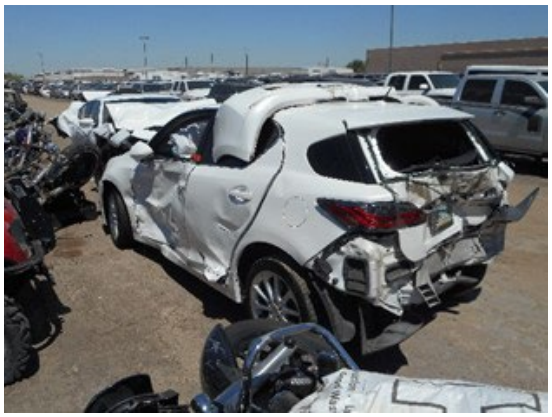

Figure 21. Rear left angle view of deformation.

Figure 22. Front right-angle view of undamaged front end.

7.2 Lexus Interior Damage

As shown in **Figure 23**, the vehicle's side curtain and torso airbags deployed during the crash. The driver's front airbag did not deploy. The ACM also indicated that the driver's seat belt pretensioner fired. The rearview window was broken out and there is intrusion into the rear hatchback area. The vehicle was equipped with an AHR that did not activate.

Figure 23. Interior view of side curtain and driver torso airbags deployed.

7.2.1 Event Data Recorders

The 2013 Lexus was equipped with an ACM that had event data recording capabilities. The ACM was imaged by AZDPS, and the data from the vehicle's ACM was downloaded. The ACM showed that the Lexus was equipped with frontal airbags, a thorax airbag (seatback), side curtain airbag, and a seatbelt pretensioner for the driver and front right passenger. The ACM showed that from 4.6-seconds to 0.1-seconds the vehicle was at a constant speed of 0 miles per hour. At 0.1-seconds the vehicle was reported to be traveling 3.1 miles per hour. At time zero the report showed the vehicle was traveling at 3.7 miles per hour The ACM showed that the thorax and side curtain airbags deployed, and the driver's lap/shoulder belt was buckled and the pretensioner fired. For additional information see *Technical Reconstruction Factual Report*.

8. 2015 Dodge Charger

The Dodge Charger was occupied by a 44-year-old male, driver and a 37-year-old female passenger.

8.1 Dodge Charger Exterior Damage

The Dodge sustained front and rear end deformation in the crash as shown in **Figures 24-25**. The vehicles left side postcrash wheelbase was shortened less than 2-inches but there appears to be some override to the rear bumper (postcrash wheelbase was 118.7-inches and the original wheelbase is 120.2-inches). The rearview window was broken out. Additional measurements and damage descriptions are located in the *Vehicle Group Chairman's Factual Report*.

Figure 24. Frontal view of deformation. **Figure 25.** Rear angle view of deformation.

8.2 Dodge Charger Interior Damage

As shown in **Figure 26** there was extensive intrusion into back seat area. Additionally, interior photographs showed both frontal airbags and the driver's knee airbag deployed during the crash as shown in **Figure 27**. The Charger was equipped with manual anti-whiplash adjustable front head restraints in which the driver's anti-whiplash headrest was missing. The front right passenger seatback appears to be bent slightly aft (approximately 65 degrees).

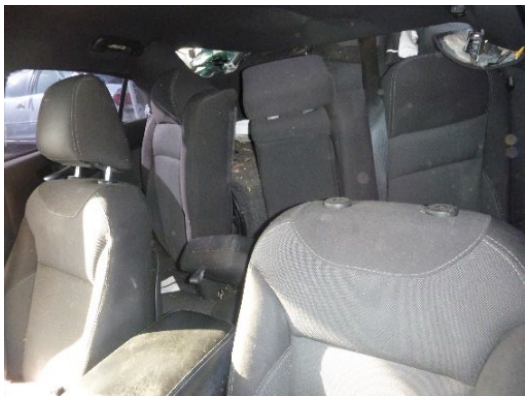

Figure 26. Interior view showing intrusion into back seat. **Figure 27.** Frontal view of deployed airbags.

8.2.1 Event Data Recorders

The 2015 Dodge Charger was equipped with an ACM that had event data recording capabilities. The ACM was imaged by AZDPS, and the data from the vehicle's ACM was downloaded. The ACM showed that the five seconds prior to the crash, the Charger was stopped, and the driver's lap/shoulder belt was not in use and the driver's a buckle and retractor pretensioner did not deploy/fire. The ACM showed that the front right passenger was using their lap/shoulder belt and it shows the buckle and retractor pretensioner did deploy/fire. For additional information see *Technical Reconstruction Group Factual Report*.

9. Fuel Tank Integrity

The Freightliner truck-tractor with tank-trailer was recorded as traveling about 62 mph just prior to impacting and overriding the Ford Fusion then striking the Toyota Prius and Chevrolet Equinox. Neither the Fusion nor the Prius showed evidence of post-crash fire. The Chevrolet Equinox did have significant post-crash fire damage. Federal Motor Vehicle Safety Standard (FMVSS) 301 specifies requirements that fuel tanks must have to prevent fires in rear impacts.[2,3] NHTSA issued a final rule to upgrade FMVSS No. 301, Fuel System Integrity, on December 1, 2003, to amend the prior standards in rear and side impacts. By increasing the impact speeds to 49.7 mph, and using a moving deformable barrier, the amended test conditions are more comparable with real-world crashes than the prior standards.

The NTSB's Office of Research and Engineering conducted statistical research into fire involvement in rear end crashes involving Sport Utility Vehicles (SUV's). Using the National Highway Traffic Safety Administrations (NHTSA's) Motor Vehicle Crash Data Querying and

[2] 49 CFR § 571.301 - Standard No. 301; Fuel system integrity. | CFR | US Law | LII / Legal Information Institute (cornell.edu)

[3] Vehicles manufactured on or after September 1, 2006. When the vehicle is impacted from the rear by a moving deformable barrier 80 ±1.0 km/h (49.7 mph) with a 70 percent overlap, with 50th percentile test dummies as specified in part 572 of this chapter at each front outboard designated seating position, under the applicable conditions of S7, fuel spillage must not exceed 28 g (1 ounce) from impact until motion of the vehicle has ceased and cannot exceed 142 g (5 ounces) in a 5 minute period following cessation of motion.

Reporting database they found that between 2015-2019 out of 2,825 rear end crashes involving a fire only 3% (85) involved SUV's.

10. Seatback Failures

This crash involved eight vehicles in which seven sustained rear impact damage. The pre-crash seatback position in any of the vehicles could not be determined, however based on the severity of the rear impacts, the tow yard examination and several on scene photographs show damaged front (driver and front right passenger) seatbacks.

Of the seven vehicles that sustained rear impacts, five vehicles (2013 Toyota Prius, 2015 Nissan Altima, 2018 Mercedes C300W, 2013 Lexus CT200H, and the 2015 Dodge Charger) showed evidence of either the driver and/or passenger seatback bent aft. All five of these vehicles were equipped with either Active Head Restraints (AHR) or Manual Anti-Whiplash Adjustable Front Head Restraints. Only the 2015 Nissan Altima and 2018 Mercedes C300W had rear seat passengers.

11. Injury Information[4]

Medical information was obtained for all eleven of the injured occupants and autopsy reports were obtained for the four deceased occupants.

Table 1. Summary of Occupant Injuries

8 Vehicles and 16 total Occupants	**Injury Information***			
	Not Injured	**Minor**	**Serious**	**Fatal**
2016 Freightliner Cascadia truck tractor with a 2015 Walker tank trailer				
Driver (1)	1			
2021 Chevrolet Equinox SUV				
Driver (1)				1
2015 Nissan Altima				
Driver (1)		1		
Passengers (3)		1	1	1
2016 Ford Fusion				

[4] https://www.azleg.gov/ars/28/00909.htm Arizona's main seatbelt requirement is a secondary enforcement law: Arizona Revised Statute (ARS) 28-909. ARS 28-909 states that in all vehicles manufactured in 1972 and later, front-seat occupants must use seatbelts while the vehicle is in motion. All front seat occupants must keep the lap and/or shoulder belt (whichever the vehicle has) properly fastened and adjusted at all times while the vehicle is moving.

Driver (1)				1
Passengers (3)			2	1
2013 Toyota Prius				
Driver (1)			1	
2018 Mercedes C300W				
Driver (1)		1		
Passenger (1)		1		
2013 Lexus CT200H				
Driver (1)		1		
2015 Dodge Charger				
Driver (1)			1	
Passenger (1)		1		
Totals	**1**	**6**	**5**	**4**

11.1 2016 Freightliner Cascadia truck-tractor

The 47-year-old male driver was restrained (per interview and inward facing video) and exited the truck before it was consumed in the post-crash fire. The driver reported to EMS that he was not injured and signed a medical release form on scene.

11.2 2021 Chevrolet Equinox SUV

The 35-year-old female driver (restraint use unknown) sustained fatal injuries. The Maricopa County Office of the Medical Examiner (MCOME) reported the cause of death as "thermal injuries with smoke and soot inhalation."

11.3 2015 Nissan Altima

The Nissan Altima was occupied by the driver and three passengers at the time of the crash.

The 22-year-old unrestrained (per ACM imaged data) male driver was transported, treated, and released. Driver sustained a concussion with no other injuries.

The 21-year-old unrestrained (per ACM imaged data) female, front right passenger was fully ejected from vehicle and sustained fatal injuries. According to the MCOME autopsy report the female passenger sustained a visibly fractured skull, and the brain parenchyma was exposed with visible disruption, palpable fractures of the frontal bone, nasal bones, maxilla and mandible, multiple left rib fractures, bilateral fractures to humerus, and left radius. Multiple abrasions and lacerations to head, torso, and extremities. The MCOME reported the cause of death as "multiple blunt force injuries."

The 22-year-old restrained (per medical patient transport records) male rear left seat passenger was transported from the crash scene to hospital. A follow-up call to treating facility revealed he was treated and released early the next morning; however, no treatment records were located at treating facility.

The 22-year-old male unrestrained (per interview) rear right seat passenger (67-inches tall and weighed 315 lbs.) transported and hospitalized for a cervical spinal fracture to the C4 vertebra and right vertebral artery occlusion. Interviewee reported a bruise to his buttocks and tailbone.

11.4 2016 Ford Fusion

The Ford Fusion was occupied by the driver and three passengers.

The 20-year-old restrained (per ACM imaged data) male driver sustained fatal injuries. The MCOME autopsy report documented the driver sustained subdural and subarachnoid brain hemorrhages, spinal column with fracture and dislocation at approximately the level of T4/T5, fractures of anterior and lateral right ribs 2 through 5, fractures of anterior, lateral, and posterior left ribs 1 through 9 with multiple lacerations to the lower lobes of the right and left lungs. There was a fracture to the left femur and multiple lacerations and abrasions to the head, torso, and both upper and lower extremities. The MCOME reported the cause of death as "multiple blunt force injuries".

The 20-year-old restrained (per medical record and ACM imaged data) male passenger seated in the front seat was extricated from the vehicle and transported to hospital. This passenger sustained a laceration to forehead and chin, seatbelt abrasion to central neck, chest and abdomen, abrasions to bilateral knees, right temporal contusion, concussion, small pulmonary hemorrhage to left lower lobe, mild superior endplate compression of T2-T5, diffuse axonal injury with small subarachnoid hemorrhage along the right fronto-temporal convexity, and multiple small parenchymal hematomas bilaterally to cerebrum.

The 20-year-old restrained (per medical record) female right rear seat passenger was extricated from vehicle, transported, and hospitalized with multiple left rib fractures, a nasal bone fractures, scattered subarachnoid hemorrhages, abrasion to left thigh and leg, degloving laceration to left elbow.

The 20-year-old restrained (per autopsy report) female left rear seat passenger sustained fatal injuries consisting of: fractures of neurocranium and viscerocranium with disruption of brain parenchyma, fracture and dislocation of spinal column at approximately the level of T2-T3, facial fractures to nasal bones and mandible, fractures of the ribs, pelvis, right tibia, and right fibula and exposed abdominal viscera with lacerations of the liver. There were multiple abrasions, contusions, and lacerations to the head, torso and both upper and lower extremities. The ME described the injuries associated with the seat belt syndrome[5] as a 23 x 4-cm red-yellow abrasion on the anterior midline torso, extending onto the left supraclavicular chest in a band-like distribution. On the right

[5] The use of seat belts is associated with a unique injury profile collectively termed "the seat belt syndrome". Skin abrasions of the neck, chest and abdomen – i.e., the classic seat belt sign – indicate a high chance of an internal injury. https://www.sciencedirect.com/science/article/pii/S2210261216000262

lower quadrant of the abdomen are scattered red abrasions over a 13.5 x 5-cm area. On the left upper quadrant of the abdomen are scattered red abrasions over a 13 x 3.5-cm area. Involving the lower left side of the abdomen and extending onto the lower left side of the back, in a roughly horizontal distribution, is a large laceration measuring at least 82-cm in greatest dimension with a gaping width of approximately 12-cm and a depth of approximately 17-cm. The MCOME reported the cause of death as *"*multiple blunt force trauma*"*.

11.5 2013 Toyota Prius

The 2013 Toyota Prius was occupied by a 30-year-old restrained (per NTSB interview and ACM imaged data) male driver. The driver was transported from the scene and hospitalized. The interviewee and his medical records state that he was partially ejected. On-scene AZDPS photographs show the Prius was partially overturned and leaning against the Ford Fusion at an approximate 230-degree angle at final rest. His medical records state that he sustained a bilateral pulmonary contusion, 2 ribs fractured to the left side of chest with small hemopneumothorax, lacerations to head (5-cm with 9 staples), back, and shoulder.

12.6 2018 Mercedes C300W

The 2018 Mercedes was occupied by the driver and one passenger.

The 29-year-old restrained (per interview and ACM imaged data) female driver was not treated but went with her daughter in an ambulance to Children's Medical Center. During her interview with NTSB investigators the driver self-reported bruises to both hips.

The passenger was a 6-year-old female (50-inches tall and weighed between 55-60 lbs.) was seated in rear seat. She was restrained (per interview with mother) and post-crash was transported to Children's Medical Center, treated and released. This passenger sustained a seatbelt abrasion to right side of neck and whiplash. The driver/mother stated that her daughter was not using a Child Safety Restraint System (CSRS). In the state of Arizona, children under the age of 8 but older than 4 and are 4-foot 9-inches in height or shorter (57-inches) must use a federally approved safety seat or device when riding in a vehicle.[6]

12.7 2013 Lexus CT200H

The 2013 Lexus was occupied by only the driver.

The 42-year-old restrained (per ACM imaged data) female driver was transported and hospitalized overnight. She sustained a concussion and a right eyebrow laceration.

12.8 2015 Dodge Charger

The Dodge was occupied by the driver and one passenger.

The 44-year-old unrestrained (per ACM imaged data) male driver was transported and hospitalized. He sustained a fracture to tibia/fibula of right leg with open reduction and internal

[6] Arizona Revised Statutes (ARS) 28-907 is a primary enforcement law https://azleg.gov/ars/28/00907.htm

fixation, comminuted fracture to nasal bone, left medial orbit wall blowout fracture, and posterior malleolus fracture, T3-T4 compression fractures and a concussion.

The 37-year-old restrained (per ACM imaged data) female front right passenger was transported, treated, and released. She sustained a seatbelt contusion to abdomen and right anterior chest wall.

12. Emergency Response

The Phoenix Operational Communications (OpComm) Bureau of the AZDPS was notified of the crash at 10:11 p.m. and were told it was a vehicle crash involving injury and fire.[7] Phoenix Fire Department's Regional Dispatch Center (PFDRDC or "Alarm Room") was notified from the OpComm at 10:12 p.m.[8, 9, 10]

The Phoenix Fire department (PFD) initially dispatched Engine 29 at 10:13 p.m. and arrived at 10:22:50 p.m. with the captain who initially assumed Incident Command (IC). After seeing the crash scene, the IC called the Alarm Room and requested a balance 1st Alarm.[11] The first AZDPS unit was dispatched at 10:13 p.m. and arrived on scene at 10:23 p.m.

According to the initial IC, upon arrival he observed the number of involved vehicles and levels of damage and told his engine crew to go past the crash-involved vehicles to the truck-tractor fire. The IC instructed the crew to start extinguishing the fire and he walked back to the crash-involved vehicles to check on the injured. The IC stated that when Engine 11 and Ladder 11 arrived at 10:24 p.m. and 10:25 p.m., he instructed them to begin triage on the injured. At 10:27 p.m. the event was changed to a 2nd Alarm - medical with fire after the IC counted a total of 12 patients with 5 being immediate need of care and 2 patients needing extrication.[12] The IC then contacted the Alarm Room which in turn contact Level 1 hospitals and advise the hospitals of the situation, location, and number of patients involved. The Level 1 hospitals determined current ability to receive patients and the Alarm Room then communicated each hospitals availability back to the IC.

The second PFD engine unit along with the Battalion Chief 2 (BC2) was dispatched at 10:18 p.m. and arrived at 10:28 p.m. and after doing a face-to-face with the Captain the BC2 assumed incident command at 10:31 p.m. Squad 8, with the extrication equipment was dispatched at 10:18 p.m. and arrived at 10:30 p.m. Upon their arrival the IC instructed them to start the extrication of the two viable people entrapped in their vehicles. When Ladder 11 arrived, they were instructed to assist Squad 8 with the extrication of the two deceased occupants that were entrapped. On the way back to his Engine, the Captain stated he observed one vehicle on top of another car

[7] The Phoenix Operational Communications (OpComm) Bureau of the Arizona Department of Public Safety is considered the "Primary Answering Point" in the 911 System. See Survival Factors Attachment - Arizona Department of Public Safety CAD Reports.
[8] Phoenix Fire Department's Regional Dispatch Center is considered a "Secondary Answering Point" in the 911 System. See Survival Factors Attachment - Responding Fire Department CAD Reports.
[9] PFDRDC operates twelve (12) different tactical channels for incident communications. One is a mutual aid channel that allows multiple agencies working the same incident to communicate with each other.
[10] All units responding to an incident switch to the assigned channel immediately after dispatch.
[11] A balance 1st Alarm assignment consists of 5 engines, 2 ladder companies, and 4 command officers.
[12] A balance 2nd Alarm would consist of an additional 6 engines, 3 ladder companies, 1 medic fire response vehicle, 1 rescue fire response vehicle, 1 crisis care unit, 1 utility truck, and 3 command officers.

and observed a deceased person inside and radioed the BC2 IC informing him. The captain then went back to his Engine and was told by his crew that they were running low on water so he phoned the BC2 IC and requested him to have Tempe fire department respond so they would have more water for fighting the post-crash fire available. The first of nine PFD ambulances, R11 arrived at 10:27 p.m. and departed with 2 critically injured patients to Maricopa County Medical Center (MCMC) at 10:35 p.m. At 11:11 p.m. the last 2 viable patients were extricated from their vehicle and were transported by Rescue 22 to St. Joseph's Hospital and Medical Center.

Table 2 below shows dispatch and response times of some of the key police and fire apparatus sent by responding agencies.

Table 2. Responding Agency and Apparatus

Agency	Dispatch Time	Arrival Time	Apparatus Sent
Phoenix FD	10:13 pm	10:22 pm	Engine 29
AZDPS	10:13 pm	10:23 pm	DPS Squad car
Phoenix FD	10:18 pm	10:24 pm	Engine 11
Phoenix FD	10:18 pm	10:25 pm	Ladder 11
Phoenix FD	10:23 pm	10:27 pm	R11 departed w/ patients to MCMC at 10:35 pm
Phoenix FD	10:23 pm	10:28 pm	R13 departed w/ patients to MCMC at 10:37 pm
Phoenix FD	10:18 pm	10:28 pm	Engine 4 and BC 2
Phoenix FD	10:18 pm	10:30 pm	Squad 8 w/ extrication equipment
Tempe FD	10:23 pm	10:35 pm	1 Engine, 1 ladder, 3 officer cars, and 6 mutual aid vehicles
Mesa FD			1 Engine unit came to scene and was in staging only
Phoenix FD	10:23 pm	10:32 pm	R8 departed w/ patient to Banner UMC at 10:43 pm
Phoenix FD	10:28 pm	10:38 pm	R9 departed w/ patient to Children's MC at 11:04 pm
Phoenix FD	10:28 pm	10:37 pm	R61 departed w/ patients to Banner UMC at 10:51 pm
Phoenix FD	10:31 pm	10:35 pm	R28 departed w/ patients to St. Joseph Hosp at 11:02 pm
Phoenix FD	10:30 pm	10:37 pm	R3 departed w/ patients to Banner UMC at 11:04 pm
Phoenix FD	10:31 pm	10:46 pm	R32 departed w/ patients to Banner UMC at 11:09 pm
Phoenix FD	10:35 pm	10:44 pm	R22 departed w/ patient to St. Joseph Hosp at 11:11 pm

12.1 Hospital and Medical Examiner Information

According to the Incident Commander, ten people were transported from the scene to four local hospitals. Two drivers (the Freightliner driver and the driver of the Mercedes) refused transport to hospitals.

Treating facilities

Banner University Medical Center
1111 E McDowell Rd
Phoenix AZ 85006

Maricopa County Medical Center
2601 E Roosevelt St
Phoenix AZ 85008

St. Joseph's Hospital and Medical Center
350 W Thomas Rd
Phoenix AZ 85013

Phoenix Children's Hospital
1919 E Thomas Rd.
Phoenix AZ 85016

The four deceased were transported from the scene to the Maricopa County Office of the Medical Examiner office (MCOME) where the Medical Examiner performed a full autopsy on all four fatally injured vehicle occupants.[13] Autopsy and injury information is included in section 11 of this report.

13. Interviews

A witness traveling behind the Equinox SUV in the adjacent lane was interviewed. Interviews were also conducted with the initial Incident Commander (IC) and subsequent IC as well as several fire department and EMS responders.[14]

13.1 Occupant Statements

Right rear passenger in Nissan Altima.
22-year-old, male
Interviewed 6-12-21 at St. Joseph's Hospital

"Traffic was backed up, so we pulled onto shoulder to get off at the next exit but then saw traffic start clearing so we pulled back into the travel lane."
"We were maybe going 5-10 mph."
"I passed out when we got hit and the passenger in back next to me woke me up."
"We smelled fuel, so we all crawled out the front window."
"The front right passenger was thrown out the right front window."
"I went to the shoulder and laid down thinking I may have neck and back injuries."
"I called my sister and mom telling them what happened and where I was."
"Some guy came up that wasn't a fireman or cop and asked if I was okay."
"I sustained a neck fracture with a fragment that was blocking an artery, I have a major bruise to my buttocks and tailbone, and I have an injury to my right shoulder."

[13] Maricopa County Office of the Medical Examiner, 301 West Jefferson Street, Phoenix, Arizona 85003.
[14] Incident Commander interviews and the entire driver and passenger interviews are in the docket for this investigation. See Survival Factors Attachment – Incident Commander Interviews, Survival Factors Attachment – Driver and Passenger Interviews and Survival Factors Attachment – Witness Interviews.

Driver of Mercedes Benz
Telephonic interview 6-16-21
Female, 29-year-old

"I was in the right lane in the stop and go traffic when I heard a huge noise then I felt the impact. I think I was stopped when I got hit.

"I got hit from the car behind me and I hit the one in front of me. The one behind me rolled over into the barricade."

"I could see fire ahead of me and some people on the ground."

"I was seat belted as was my daughter seated in the right rear."

"The impact broke my sunroof and my airbags deployed."

"I looked out my sunroof before getting out and saw everything stopped."

"We got out and went on the other side of the barricade."

"I had seatbelt bruises to my hips and my neck, back and shoulders are in pain."

"My daughter sustained an abrasion from her seatbelt to her shoulder and neck with minor bruising to her hips."

Driver of Toyota Prius
In-person interview 6-13-21
Male, 30-year-old

"Police had traffic stopped at Priest. I saw the sign overhead."

"I looked back and saw the truck approaching fast."

"I didn't have time to react, and I blacked out."

"The traffic was stop and go. I was maybe going 5 mph."

"I was told I was partially ejected even though I was wearing my seat belt."

"I had a concussion, a head laceration that needed 9 staples, 2 fractured ribs on my left side and a laceration to my shoulder."

13.2 Witness Statements

Witness 1
In-person interview 6-13-21

"I was on the 202 going east in the 2nd lane, the one next to the HOV lane and saw brake lights ahead at the off ramp. I saw the 2 right lanes were backed up, so I slowed down."

"I was a couple 100 yards to the left and behind the truck and I noticed he didn't have his brake lights on and realized he was going to hit the car in front of him."

"I saw a white car change lanes from right 2nd lane to left. I'm not sure if the truck hit it but the white car never stopped."

"I saw the truck hit the cars and it glanced off to the left hitting the center barrier. "I stopped and called 911."

Witness 2
Telephonic interview 6-14-21

"I was on the 202 going east in the 2nd lane from the right going about 65-70 mph."

"As I was coming up to the 52nd street exit I saw traffic at a dead stop."

"I started slowing down pretty aggressively, hoping I we could stop sooner rather than later."

"I saw all the cars behind me start slowing except for the lane to my right."

"We came to a stop and when we noticed that the truck wasn't slowing down."

"It was like no one was driving the truck and it went completely straight. It went through the car like there was no friction same with the second car."

"After it hit the second car you could see the third and fourth car spun into the middle of the road. I lost vision of any other cars further ahead."

"At that point the truck veered to the left, hit the median and that's when the tanker went over to the westbound lanes and then the truck veered back, lit on fire and that's the scene that I saw."

"The left lanes were pretty sparse. Only the one right lane was backed up."

"The only other thing I'd say is if there was an emergency braking system on that truck this wouldn't -- it probably wouldn't have happened."

14. Docket Material

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

LIST OF ATTACHMENTS

Survival Factors Attachment -	Arizona Department of Public Safety CAD Reports
Survival Factors Attachment -	Responding Fire Department CAD Reports
Survival Factors Attachment -	Incident Commander Interviews
Survival Factors Attachment -	Driver and Passenger Interviews
Survival Factors Attachment -	Witness Interviews

END OF REPORT

Ronald Kaminski
Senior Survival Factors Investigator