

National Transportation Safety Board

Office of Highway Safety

Washington, DC 20594



HWY23FH013

SURVIVAL FACTORS AND HUMAN PERFORMANCE

Group Chair's Factual Report

April 30, 2024

TABLE OF CONTENTS

A. Crash	4
B. Survival Factors and Human Performance Group.....	4
C. Crash Summary.....	4
D. Details of the Survival Factors Investigation	4
1.0 Vehicles.....	4
1.1 2018 Freightliner Cascadia with 2014 Utility Softside Van.....	5
1.2 2001 Ford E-350 Van and Utility Trailer	6
1.3 2023 Freightliner Cascadia with 2023 Utility Dry Van Trailer.....	10
2.0 Occupants.....	11
2.1 2018 Truck	11
2.2 Van	11
2.3 2023 Truck	17
3.0 First Responders	17
3.1 Police	17
3.2 Fire Rescue and Emergency Medical Services.....	17
E. Details of the Human Performance Investigation.....	20
1.0 Crash Location	20
1.1 Highway.....	20
1.2 Weather.....	21
2.0 Electronic Data	23
2.1 2018 Truck Driver's Cellphone Records	23
2.2 2018 Truck Electronic Logging Data.....	26
3.0 2018 Truck Driver Toxicology Results.....	32
4.0 Interviews.....	32
4.1 2018 Cascadia Driver - OSP	32
4.2 Witness 1 -NTSB and OSP	33
4.3 Witness 2 -NTSB and OSP	33
F. List of Attachments.....	33

LIST OF FIGURES

Figure 1: 2018 truck exterior.....	5
Figure 2: 2014 trailer.....	6
Figure 3: 2018 truck interior.	6
Figure 4: Van exterior photos	8
Figure 5: Van front seats (driver left, passenger right).	9
Figure 6: Van Row 1 (left) and Row 4 (right) bench seats.....	9

Figure 7: Van utility trailer (post-crash left and exemplar on right).....	10
Figure 8: Dry van trailer from the 2023 truck.....	10
Figure 9: Van Seating Diagram.....	13
Figure 10: Positions of fatal occupants.....	14
Figure 11: METCOM coverage area.....	18
Figure 12: Crash location on I-5.....	20
Figure 13: Santiam rest area.....	21
Figure 14: 2018 truck travel on the day before the crash.....	27
Figure 15: 2018 truck travel on the day of the crash.....	30

LIST OF TABLES

Table 1: Van Details.....	7
Table 2: 2018 Truck Occupant Information.....	11
Table 3: Van Occupant Summary.....	12
Table 4: 2023 Truck Occupant Information.....	17
Table 5: Summary of CAD Logs.....	19
Table 6: Weather Observations.....	22
Table 7: Sun Data at Crash Scene.....	22
Table 8: Driver’s phone records - three days prior.....	23
Table 9: Driver’s phone records - two days prior.....	24
Table 10: Driver’s phone records - one day prior.....	25
Table 11: Driver’s phone records - day of the crash.....	26
Table 12: Travel details on the day before the crash.....	28
Table 13: Travel details on the day of the crash.....	31

A. CRASH

Location: Millersburg, Linn County, OR
Date: May 18, 2023
Time: 2:05 p.m. Pacific Daylight Time

B. SURVIVAL FACTORS AND HUMAN PERFORMANCE GROUP

Group Chair John Humm
National Transportation Safety Board
Washington, DC

Group Member Lt. Chris Zohner
Oregon State Police
Salem, OR

Group Member Louis Gisler
Jefferson Fire District
Jefferson, OR

C. CRASH SUMMARY

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

D. DETAILS OF THE SURVIVAL FACTORS INVESTIGATION

The Survival Factors Group investigation collected evidence from the vehicles, occupants, and the emergency response for the collision. Vehicle information focused on the survival aspects, such as seats, seatbelts, and occupant space integrity. Occupant information included age, sex, and injury severity. Emergency response information focused on agencies and equipment used and the response timeline. Interviews were conducted with first responders.

1.0 Vehicles

NTSB investigators conducted external examinations of all the involved crash vehicles. Access was restricted to the vehicle's occupant space due to the District Attorney's (DA) concern about their pending criminal investigation.

1.1 2018 Freightliner Cascadia with 2014 Utility Softside Van

1.1.1 Exterior inspection

The 2018 Freightliner Cascadia Truck (2018 truck) and trailer were inspected on May 22, 2023, at Wiltse's Towing on 3118 Cherry Ave NE, Salem, OR. An interior inspection was limited to a visual inspection from outside the vehicle due to concerns with the DA's office. Photographs of the 2018 truck are shown in Figure 1 (the lower part of the left side of the cab and the lower part of the left door have been redacted). Damage to the truck was primarily to the front, left front engine compartment, axle-1-left tire and wheel assembly, and driver's side door.



Figure 1: 2018 truck exterior.

The 2014 Utility Softside Dry Van Trailer had minor damage to the front left side of the trailer (Figure 2). The lower two-thirds of the front surface of the trailer is redacted in the photograph. Please refer to the *Technical Reconstruction Factual Report* in the docket for this investigation for information on the exterior damage.



Figure 2: 2014 trailer.

1.1.2 Interior inspection

An internal inspection of the 2018 truck was conducted on June 2, 2023, by OSP and observed by the NTSB. An inspection of the driver's seatbelt indicated no signs of loading. Items associated with drug use were recovered inside the vehicle and documented by OSP. The electronic control modules (ECM) were removed and secured by OSP for download. Photos of the 2018 truck's interior are shown in Figure 3.



Figure 3: 2018 truck interior.

1.2 2001 Ford E-350 Van and Utility Trailer

The 2001 Ford E-350 Van XLT Super Duty Extended Club Wagon (van) was inspected on May 22, 2023, at Wiltse's Towing on 3118 Cherry Ave NE, Salem, OR.

NTSB investigators were not allowed inside the vehicle. The vehicle details are given in Table 1.

Table 1: Van Details

Parameter	Value
Year	2001
Make	Ford
Model	E-350
Trim	XLT Super Duty Extended Club Wagon
VIN¹	1FBSS31L01HA54631
Build Date	October 2000
GVWR²	9100 lb.
Front GAWR³	3250 lb.
Rear GAWR	6084 lb.
Wheelbase	138 in.
Seating capacity	15

Inspection photographs of the van are shown in Figure 4. There was extensive damage to the vehicle. The rear floor pan and body were separated from the chassis. There was significant vehicle deformation between the outer surface of the vehicle body at the bottom of the right rear door and the back surface of the chassis. The body of the van was crushed to approximately the mid-point of the rear side door on the right side of the vehicle. The pillar supporting the door was buckled towards the front of the vehicle. The rear axle was separated and displaced from the vehicle frame. Severe buckling of the roof and separation from the roof rails were observed near the back of the vehicle. The damaged section of the roof extended well above its original plane. The exterior body on the left side of the van was torn from the roof rails and lower frame and peeled rearward from the B-pillar to the left rear pillar. This created a large ejection port for the rear passengers. The left A-pillar was bent downwards, starting just above the bottom of the windshield. The left B-pillar buckled rearward at the mid-point of the pillar. A partial tear was at the top of the left B-pillar at the roof rail. The left front corner of the roof was intact with the roof rail and was depressed downward with the top of the A- and B-pillars. Please refer to the *Technical Reconstruction Factual Report* in the docket for this investigation for information on the exterior damage.

¹ Vehicle Identification Number.

² Gross Vehicle Weight Rating (GVWR) is the total maximum weight that a vehicle is designed to carry when loaded, including the weight of the vehicle itself, plus fuel, passengers, and cargo.

³ Gross Axle Weight Rating (GAWR) is the maximum distributed weight that a given axle is designed to support.



Figure 4: Van exterior photos

The van had front bucket seats with integral head restraints and four rows of bench seats.⁴ The vehicle was equipped with lap/shoulder belts at all the outboard seating positions and lap belts for the inboard seat positions. The van's rear occupant compartment had little survivable space rearward of Row 1. The area between Row 1 and Row 4 nearly collapsed on the right side of the vehicle. The vehicle's floor was crumpled and elevated in the back such that the seating surface of the Row 4 bench

⁴ In this report, the occupant seating positions are called the front seats (driver or passenger) for the front bucket seats and Rows 1-4 for the four bench seats in the rear occupant compartment.

was just above the top of the Row 1 seat back. Additionally, the left half of the Row 4 bench was angled backward about its vertical axis and conformed with the intruded rear surface of the van. The left outboard surface of the seat cushion was torn off and missing. Rows 3 and 4 were missing and found outside the van post-crash. The Row 1 bench seat appeared connected to the vehicle's floor pan. However, the mounts could not be inspected due to limitations from the DA. The Row 1 seat was intact, with slight forward displacement of the right side of the seat. The Row 1 seat belt tongue and latch plates were not on the seat pan but on the vehicle's floor. The right front passenger bucket seat was reclined at least 45 degrees and nearly in contact with the seat back of the Row 1 seat. Pictures from the vehicle interior are shown in Figure 5 and Figure 6 (images were redacted).



Figure 5: Van front seats (driver left, passenger right).



Figure 6: Van Row 1 (left) and Row 4 (right) bench seats.

The utility trailer was destroyed in the crash. Photos of the remaining trailer frame and exemplar are given in Figure 7.



Figure 7: Van utility trailer (post-crash left and exemplar on right)

1.3 2023 Freightliner Cascadia with 2023 Utility Dry Van Trailer

An external inspection of the 2023 Freightliner Cascadia (2023 truck) and the 2023 Utility Dry Van trailer was conducted on May 22, 2023, at AA Auto Wrecking and Towing at 260 E. Queen Ave, Albany, OR. Photographs of the trailer are shown in Figure 8. The 2023 truck had no evidence of damage. The bottom right corner of the trailer was redacted in the photos. The roll-up rear door was separated from the trailer, and the right upper corner of the roof was unsupported and displaced downwards. The right corner of the bumper was displaced forward by approximately ten inches. The Mansfield bar was also displaced forward on the right edge. The trailer's exterior was torn and peeled forward on the right side up to the middle of the rear axle. Please refer to the *Technical Reconstruction Factual Report* in the docket for this investigation for information on the exterior damage.



Figure 8: Dry van trailer from the 2023 truck

2.0 Occupants

A summary of the occupant injuries for each vehicle is given in the following sections.

2.1 2018 Truck

The driver was the only occupant in the vehicle. A summary of his information is given in Table 2.

Table 2: 2018 Truck Occupant Information

ID	Sex	Age	Injury Severity	Ejected	Hospital
TA01	M	52	Minor	No	Salem Heath

Injury Details

- The driver was transported to Salem Hospital by Falck Ambulance. According to his medical records, he suffered a closed head injury with the potential loss of consciousness (self-reported for unknown length), contusion to left rib(s), and an abrasion to the right anterior tibia.

2.2 Van

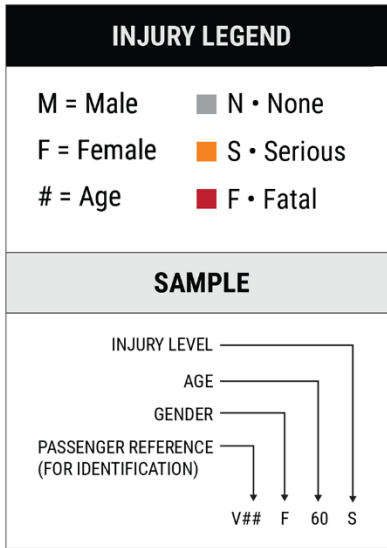
Before the crash, the van's driver (V01) was outside the vehicle fixing an issue with the utility trailer and ran out of the way when he saw the 2018 truck approaching their vehicle. The other ten occupants were in the van. A summary of the occupants is given in Table 3. Note that the autopsy reports were not released to the NTSB. Therefore, the injuries to the fatalities are unknown. A seating diagram of the occupants is shown in Figure 9.

Table 3: Van Occupant Summary

ID	Sex	Age	Injury Severity	Ejected	Restrained⁵	Hospital
V01	M	40	None	n/a	n/a	Salem Health
V02	M	31	Fatal	Yes	Unknown	n/a
V03	M	36	Fatal	No	Unknown	n/a
V04	M	30	Fatal	No	Unknown	Salem Health
V05	M	30	Fatal	No	Unknown	n/a
V06	M	59	Fatal	Yes	Unknown	n/a
V07	F	39	Fatal	Yes	Unknown	n/a
V08	M	28	Fatal	Yes	Unknown	n/a
V09	M	45	Serious	No	No	Salem Health
V10	M	41	Serious	Possible	No	Salem Health
V11	F	60	Serious	No	Yes	Salem Health

⁵ NTSB inspection photos of the Row 1 bench seat showed the lap belts on the vehicle's floor. This was confirmed with OSP photos of the vehicle before the deceased were removed. These occupants (V09 and V10) were considered unbelted. The driver (V01) reported seeing V11 after the crash, and she was wearing her seat belt. The other occupants were likely unrestrained. However, this could not be confirmed as the NTSB was not allowed to inspect the interior of the vehicle.

HWY23FH013
 Millersburg, OR



Source: NTSB

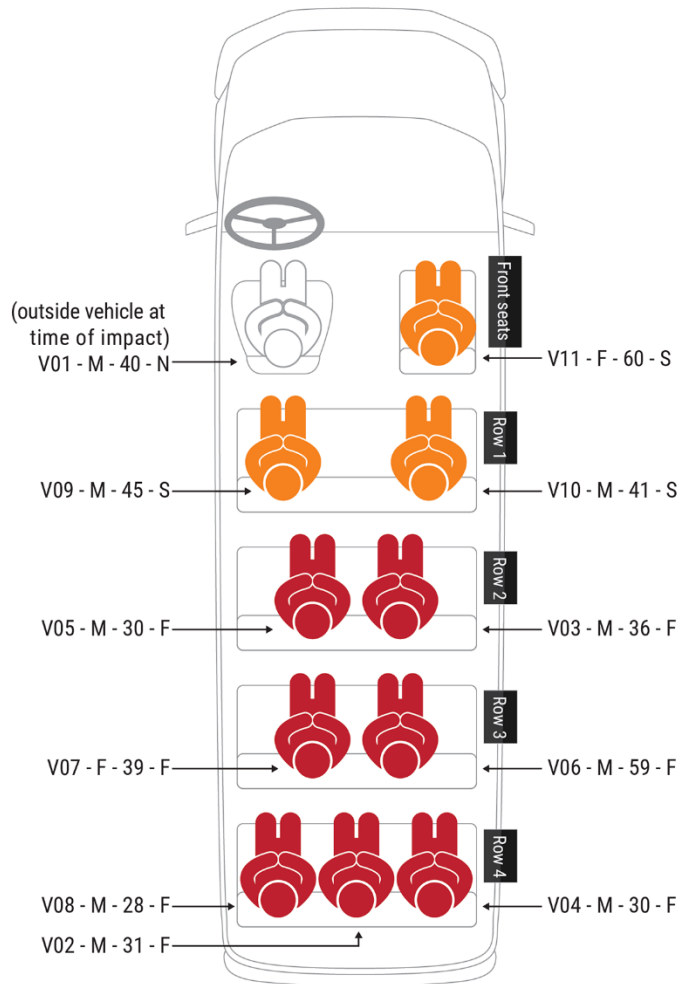


Figure 9: Van Seating Diagram.

The final rest locations of the fatal occupants are shown in Figure 10. Note that the positions of V02 and V08 could not be determined.

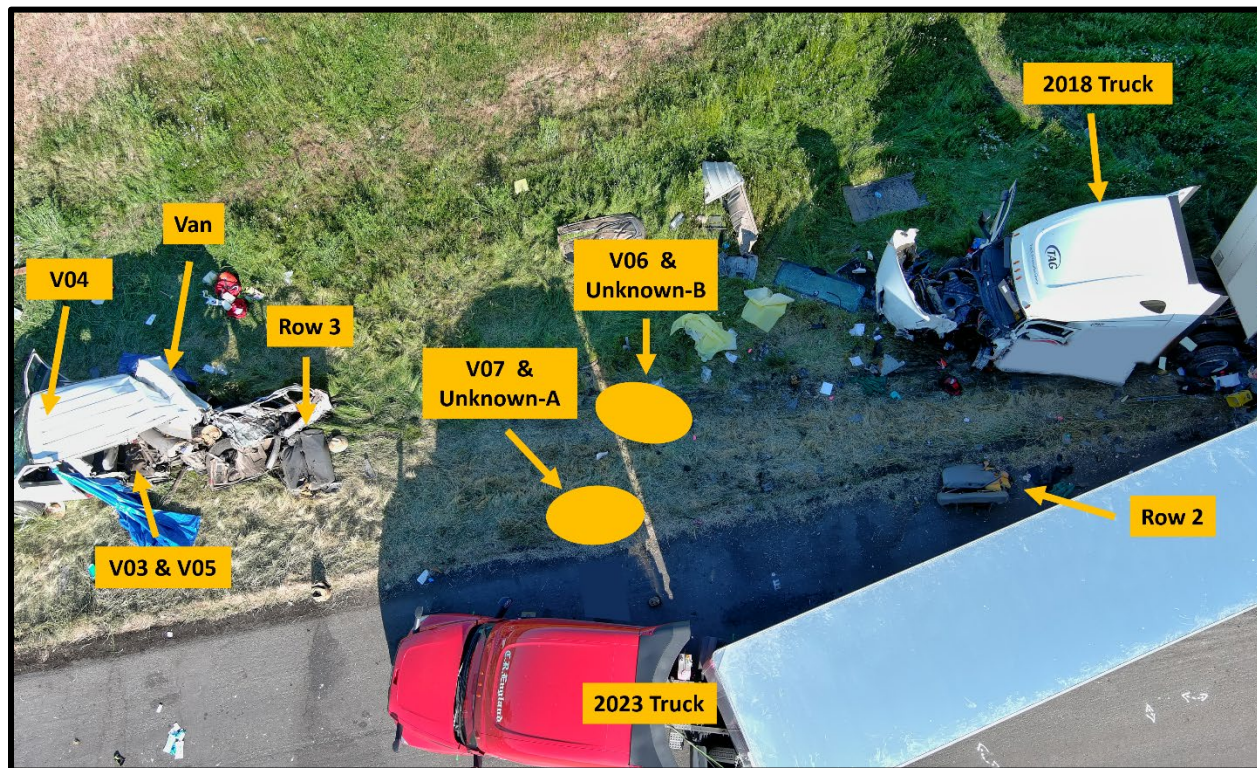


Figure 10: Positions of fatal occupants
(Photo source OSP)

Injury Details⁶

- V01 was a 40-year-old male who was not in the vehicle during the crash and was not injured. He was transported to Salem Hospital for mental health treatment.
- V02 was a 31-year-old male and was declared dead on the scene. He was seated in the fourth row at the time of the crash and ejected. His final rest and injuries are unknown (see Unknown-A or Unknown-B for description).
- V03 was a 36-year-old male and was declared dead at the scene. He was seated in the second row at the time of the crash and was found lying over the top of the Row 1 seat back with his ventral torso resting towards the seat back and head on the seat cushion. His left foot was on the van floor behind the seat, and his right foot appeared trapped in the crushed floor pan rearward of his left foot. He had blood covering his face, and the source may have been a wound on the top of his head. His left tibia appeared broken since the foot and ankle were displaced towards the midline, which may have been caused by a lateral bending fracture. He also had a transverse laceration of the anterior abdomen

⁶ Injuries for the fatal victims were estimated from OSP scene photos as autopsy reports were not available to the NTSB.

on the left side between the inferior margin of rib 12 and the anterior superior iliac spine.

- V04 was a 30-year-old male in the right outboard position in Row 4. After the crash, he was found face down on the floorboard between Row 1 and the passenger front seat. EMS initially reported no respiration on the scene. He demonstrated agonal breathing⁷ after airway adjustment. He was transported to Salem Hospital by the Life Flight Network Helicopter. The victim was intubated, and the responders administered CPR⁸ for the flight's duration. He was turned over to the emergency department at Salem Hospital with pulseless electrical activity. The victim was declared dead after further attempts to revive.⁹
- V05 was a 30-year-old male and was declared dead at the scene. He was seated in Row 2 and was found on the floor of the vehicle, lying with his back in between the base of Row 1 and the crushed floorboard. His right tibia was over the top of the Row 1 seat back. His left leg extended out the exposed left side of the vehicle with his knee near the edge of the frame, his tibia bent with 90 degrees of flexion, and his left foot close to the ground. His head rested against the crushed floorboard and flexed forward with right axial rotation so his nose was pointed to the top of the Row 1 seat back. His right arm was slightly elevated and bent at the elbow such that the forearm was superior to the ear and the hand rested above and behind the head on the floorboard. His left upper extremity was bent at the elbow with his left hand near his left cheek. The victim had dried blood emanating bilaterally from the nostrils and possibly the right edge of his mouth.
- V06 was a 59-year-old male and was declared dead at the scene. He was seated in Row 3 and ejected from the vehicle. He was found with another occupant (Unknown-B) in the grass off the shoulder in the path of the van's left tires. He was prone with his feet toward the 2023 truck's trailer. He had a gouge on his back at approximately the T10 spinous process and demonstrated several other angled lacerations in different locations. His left hand was amputated near the wrist. His abdomen did not appear to show bruising or injuries consistent with lap belt use.
- V07 was a 39-year-old female and declared dead at the scene. She was seated in Row 3 and ejected from the vehicle. She was found with another occupant (Unknown-A) near the edge of the shoulder, approximately in line with the front axle of the 2023 truck's trailer, and her head pointed away from the van. She appeared to have a fracture of the left femur or disarticulated left hip. She had at least two lacerations above her left eye near her temple. Diagonal abrasions on her abdomen were likely not consistent with lap belt use.

⁷ Agonal breathing is an abnormal pattern originating from the lower brainstem neurons characterized by labored breaths, gasping, and grunting. It is usually caused by cardiac arrest or stroke.

⁸ Cardiopulmonary resuscitation

⁹ NTSB was unable to acquire the medical records for this victim.

- V08 was a 28-year-old male and was declared dead on the scene. He was seated in Row 4 and ejected. His final rest and injuries are unknown (see Unknown-A or Unknown-B for description).
- V09 was a 45-year-old male in the Row 1 behind the driver's seat. He was triaged with a red tag and transported to Salem Hospital by Turner Fire District Med95. He was seriously injured and demonstrated the following injuries - closed fractures of right ribs 4-7, closed fracture of left rib 1, closed fractures of the spinous process on T7-T10, closed fracture of left humeral shaft, fracture of transverse process L1-L5, sternal fracture, and a possible contusion on his liver.
- V10 was a 41-year-old male seated in Row 1 behind the passenger's seat. He was triaged with a red tag and transported to Salem Hospital by Jefferson Fire District Med60. He was seriously injured and demonstrated the following injuries - liver laceration on the right side (2.7 cm), fractures of anterior right ribs 1-7 and right posterolateral 7-10, complex fracture of the left zygomatic arch, left mandibular ramus fracture, fracture of the maxillary sinus, left pterygoid plate fracture, and left comminuted second metacarpal fracture.
- V11 was a 60-year-old female in the right front passenger seat. She was triaged with a red tag and transported to Salem Hospital by Falck Ambulance M3. She was seriously injured and demonstrated the following injuries - subarachnoid hemorrhage to the right frontal lobe, right vertebral artery occlusion, comminuted dens fracture extending into right lateral mass and transverse foramen, left C2 lamina fracture, bilateral fractures of anterior arch of C1, C3 vertebral body fracture extending to right transverse foramen, right transverse process fractures C2-T4 and T6, fracture of right scapula, fracture of right ribs 2, 6-8, and 10, bilateral pleural effusions.
- Unknown-A declared dead on scene and found next to occupant V07 in the grass near the edge of the shoulder. The victim's head was towards the shoulder with the feet pointed away and the body approximately perpendicular to the roadway. The cranial vault superior to the inferior margin of the orbit was fractured and completely separated. The right hand was amputated at the wrist. There was a laceration near the right abdomen superior to the anterior superior iliac spine, and the portions of the intestines were eviscerated. The leg was fractured in several locations and degloved, which exposed the underlying bone and tissue. The left foot was amputated near the ankle. The left wrist was fractured, and the right hand was amputated at the wrist.
- Unknown-B was declared dead on the scene and found next to occupant V06 in the grass off the shoulder in the path of the van's left tires. He was lying prone on the ground with his head pointed towards the roadway. His left leg was amputated above the knee. Nearly the entire anterior thorax, pelvis, and remaining lower extremities were degloved, exposing the internal organs. A diagonal laceration on the face started inferior to the left orbit and extended laterally along the zygomatic bone's inferior edge.

2.3 2023 Truck

The driver was the only occupant in the vehicle. He was in the driver's seat in the cab, taking a break while parked on the shoulder of I-5. A summary of his information is given in Table 4.

Table 4: 2023 Truck Occupant Information

ID	Sex	Age	Injury Severity	Ejected	Hospital
TB01	M	36	None	No	None

Injury Details

- The driver was not injured.

3.0 First Responders

3.1 Police

The OSP shift supervisor was on patrol driving north of Salem when the dispatch call came over the radio. After hearing the initial report, he headed towards the crash scene. While en route, he called the technical reconstruction investigator and instructed him to bring the equipment to document the scene. He next called the Medical Examiner's Office and informed them there were several fatalities. He arrived on the scene and noted that OSP had blocked the highway and traffic was not allowed by the crash site. The Incident Commander (IC) started by assigning troopers to each driver and coordinating with the Oregon Department of Transportation (ODAT) to close the highway further up from the accident site in both directions. Next, they cleared the scene of bystanders who did not witness the accident. Those who saw the crash were returned to their vehicles to wait for an OSP interview. OSP maintained control of the scene while the emergency services transported the patients to the hospital. Once the last patient was cleared, OSP interviewed the drivers and witnesses and assisted the medical examiner with documenting and removing the deceased. The scene was then documented using a drone-mounted camera. Finally, OSP coordinated and supervised the removal of the vehicles to two separate tow lots.

3.2 Fire Rescue and Emergency Medical Services

Jefferson Fire District (JFD) was the primary fire rescue and emergency medical services (EMS) responders. JFD covered fire and EMS services to about 86 square miles in southern Marion County and northern Linn County, including Jefferson, Talbot, and Millersburg communities. The ambulance service area covered about 94 square miles, which included a portion of the neighboring fire district of Scio. The district had three fire stations in Jefferson, Millersburg, and Talbot.

3.2.1 Computer Aided Dispatch Log

The Marion Area Multi-Agency Emergency Telecommunication Center (METCOM) provided emergency telecommunication and dispatch services. METCOM was an intergovernmental agreement agency that supported 17 fire districts, 7 law enforcement agencies, and two private ambulance services. The primary dispatch facility was in the Woodburn Police Department building. METCOM service area is shown in Figure 11.

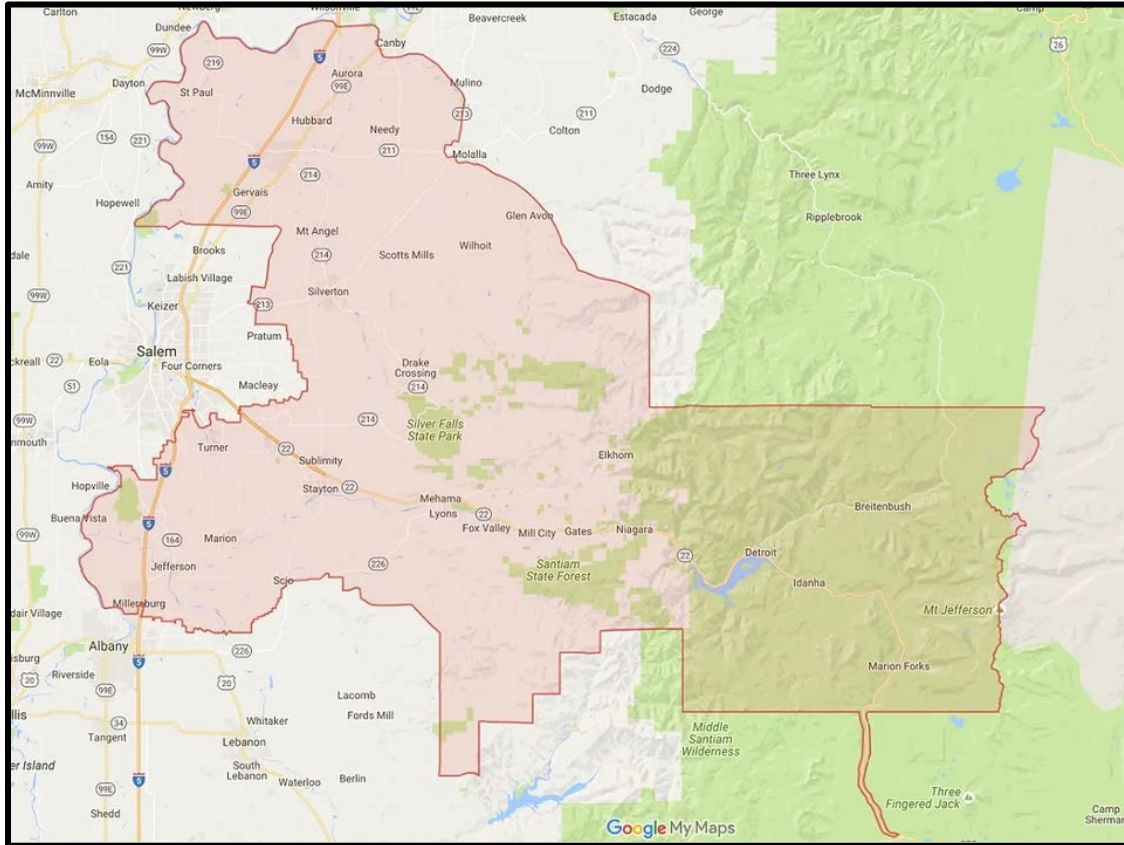


Figure 11: METCOM coverage area.
(Source METCOM)

The computer-aided dispatch (CAD) log from the event is summarized in Table 5. All times are local. The initial call was received at 2:12:13 p.m.

Table 5: Summary of CAD Logs
(all times p.m.)

Unit	Agency	Dispatched	Enroute	On Scene	To Hospital	At Hospital
E60	Jefferson FD	2:06:24		2:11:53		
R60	Jefferson FD	2:06:24	2:11:07	2:16:58		
C60	Jefferson FD	2:06:24	2:11:37	2:19:10		
MED60	Jefferson FD	2:06:24	2:08:21	2:17:52	2:40:12	2:54:37
MED95	Turner FD	2:11:16	2:13:56	2:33:33	2:40:07	2:53:39
S61	Jefferson FD	2:13:38	2:13:38	2:20:13		
MED31	Lebanon FD	2:14:03	2:58:42	3:17:02		
R965	Turner FD	2:14:45	2:17:49	2:31:47		
MED6	Rural Metro Ambulance	2:19:31	2:20:57	2:38:02	3:00:31	3:15:31
MED9	Rural Metro Ambulance	2:20:24	2:21:01	2:38:05		
LF40	Life Flight	2:14:57	2:26:40	2:35:09	2:54:08	3:03:56
E13	Albany FD	2:26:05	2:26:05	2:45:08		
MED30	Lebanon FD	2:21:38	2:22:06	2:24:11	3:19:18	3:38:59
BC11	Albany FD		2:27:57	2:45:17		

3.2.2 Summary of Response

The first units from JFD were dispatched at 2:06 p.m., and the call was a heavy vehicle accident—this first response called for the command truck, rescue truck, engine, and medic. While en route, the call was upgraded to a mass casualty incident (MCI)¹⁰ as there were reports of multiple victims and fatalities. The JFD Division Chief was one of the first units to leave the station, and he asked METCOM to check the status of area hospitals. Additional medical units were requested, and the Life Flight Network was placed on standby. The initial JFD response arrived at the crash location within thirteen minutes of dispatch. Heavy traffic was reported near the scene. Upon arrival, the Division Chief assumed the IC role. The medical unit was staffed with two paramedics, and they split roles; one took charge of the medical branch, and the other performed triage. The JFD Fire Chief arrived shortly after and assumed charge of transportation.

Initially, six victims were DOA,¹¹ four outside the van and two inside. Two patients were alive in the van. Another two patients were alive and on the ground outside the van (possible ejection). The driver of the van was not in the vehicle at the time of the crash and was uninjured. The striking truck driver was seated on the ground with his dog. The most critical occupant was V04, and he was extricated by removing one of the side doors. V04 was not breathing on arrival, but after repositioning the airway, he demonstrated agonal breathing. V04 was transported to Salem via Life

¹⁰ Mass casualties for the METCOM area are typically for calls with more than six fatalities.

¹¹ Dead on arrival

Flight helicopter at 2:54 p.m. V10 was inside the van and transported to Salem by Med60 at 2:40 p.m. V09 was found outside the vehicle (possible ejection) and transported by Med95 at 2:40 p.m. V11 was seated in the right front passenger seat, still wearing her seatbelt. She was extricated and transported to Salem Hospital by Med6 at 3:00 p.m. The last occupant transported from the scene was the driver of the van. He was transported to Salem Hospital by Med30 at 3:19 p.m.

E. DETAILS OF THE HUMAN PERFORMANCE INVESTIGATION

This report also contains information on Human Performance aspects related to the driver of the 2018 truck. Evidence was collected from the driver's interview with the Oregon State Police (OSP), witness interviews with the OSP and the NTSB, the driver's cellphone records, information from the driver's electronic logging device (ELD), and results from the driver's toxicology screening. Information on the characteristics of the roadway at the crash scene and the time of day are also presented.

1.0 Crash Location

1.1 Highway

NTSB investigators visited the crash location on May 22, 2023 (Figure 12). The scene was on the northbound side of Interstate 5 (I-5) near mile marker 241 in Marion County, OR (44.74184 degrees north latitude and 123.05193 degrees west latitude).

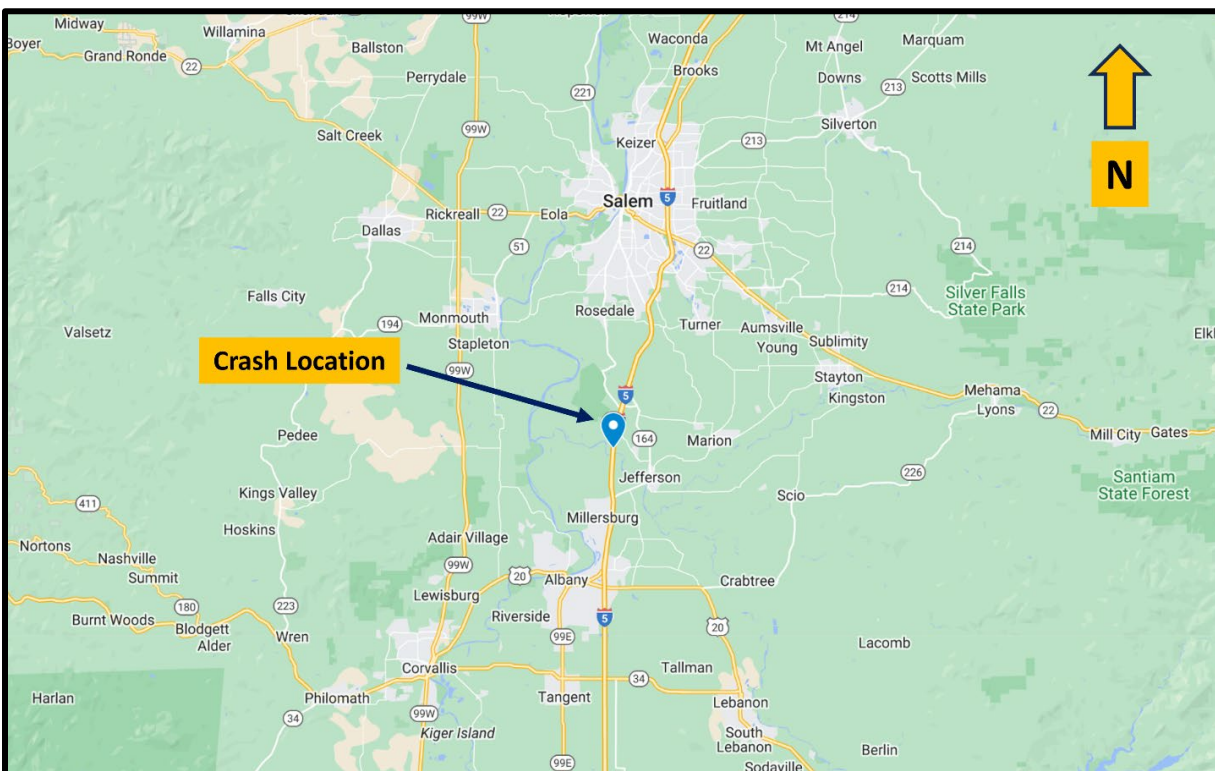


Figure 12: Crash location on I-5

(Source annotated Google Maps)

I-5 had two travel lanes in each direction, separated by an earthen median and a semi-rigid W-beam median barrier. The crash occurred north of the Santiam River Rest Area exit on an 18-foot-wide shoulder. After the gore point, the exit lane branched off the right travel lane, and the area in between transitioned to the wide shoulder (see Figure 13).

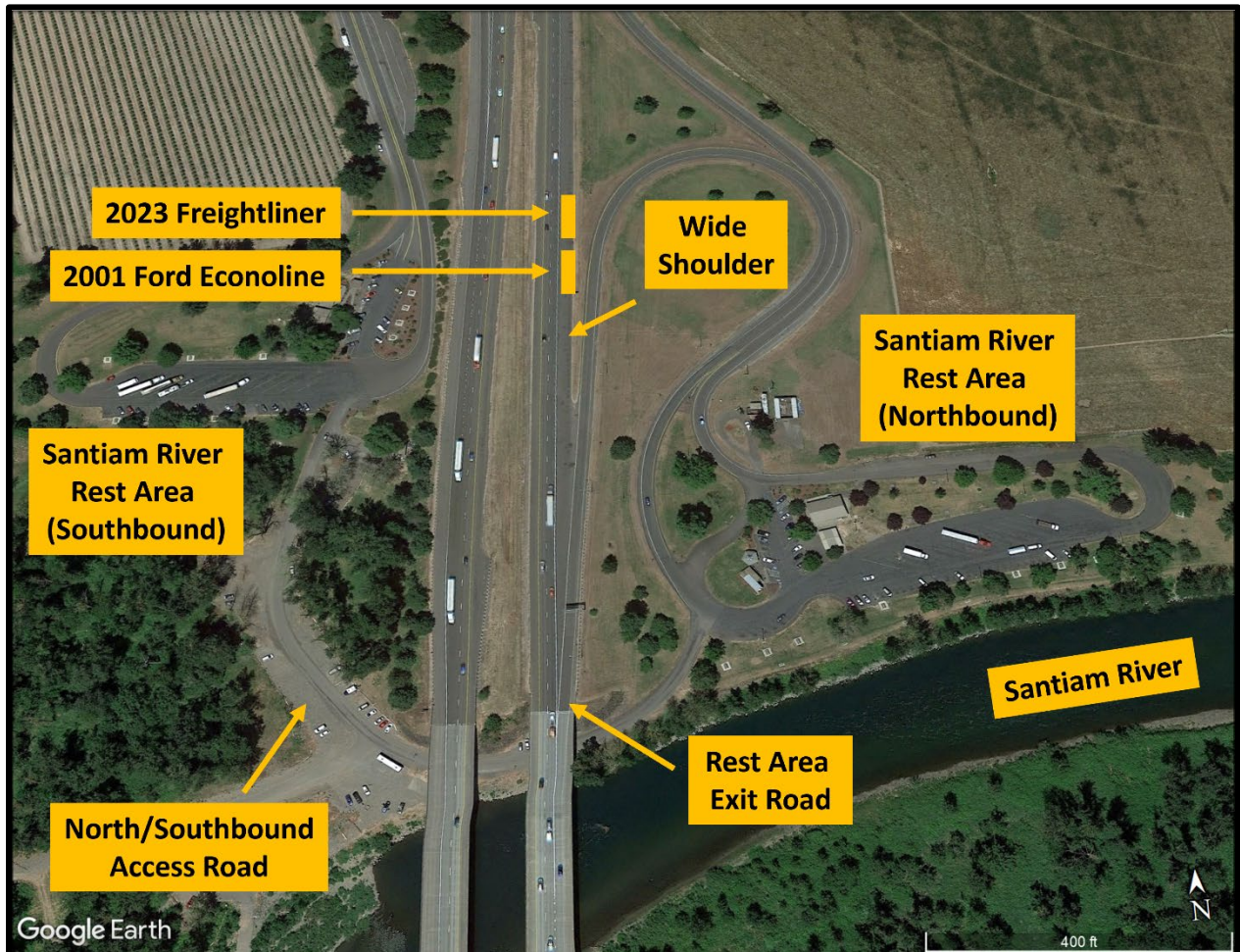


Figure 13: Santiam rest area.
(Source annotated Google Earth)

1.2 Weather

Weather history data were obtained from the Albany Municipal Airport Station (44.6387 N, 123.0594 W),¹² approximately seven miles from the crash. The data for the last observation before the crash (15 minutes) and the first observation after (10 minutes) are shown in Table 6.

¹² See [IEM :: Download ASOS/AWOS/METAR Data \(iastate.edu\)](https://www.iastate.edu/ASOS/AWOS/METAR), accessed January 15, 2024..

Table 6: Weather Observations

Parameter	1:55 p.m.	2:15 p.m.
Temperature	71.6° F	73.4° F
Dew Point	57.2° F	57.2° F
Humidity	60.40%	56.90%
Wind	280° from True North	250° from True North
Wind Speed	4 knots	6 knots
Wind Gust	10 knots	12 knots
Pressure	29.98 in.	29.98 in.
Precipitation	None	None
Sky Condition ¹³	Clear	Clear

Sun data at the crash scene just north of the Santiam River Rest Area on May 18, 2023, is given in Table 7.¹⁴

Table 7: Sun Data at Crash Scene

Parameter	Value
Begin Civil Twilight ¹⁵	5:06 a.m.
Rise ¹⁶	5:41 a.m.
Upper Transit ¹⁷	1:09 p.m.
Set	8:37 p.m.
End Civil Twilight	9:12 p.m.
Altitude ¹⁸ at 2:05 p.m. PDT	62.3
Azimuth ¹⁹ at 2:05 p.m. PDT	209.5

¹³ Sky Condition reported in clear (0-5% sky cover), few (6-25%), scattered (26-50%), broken (51-87%), and overcast (88-100%)

¹⁴ Complete Sun and Moon Data for One Day. Accessed January 15, 2024. [Complete Sun and Moon Data for One Day \(navy.mil\)](https://navy.mil).

¹⁵ Civil twilight is defined to begin in the morning and end in the evening when the center of the Sun is geometrically six degrees below the horizon. In the morning before the beginning of civil twilight and in the evening after the end of civil twilight, artificial illumination is normally required to carry on ordinary outdoor activities.

¹⁶ Sunrise and sunset conventionally refer to the times when the upper edge of the disk of the Sun is on the horizon. Atmospheric conditions are assumed to be average, and the location is in a level region on the Earth's surface.

¹⁷ The transit of the Sun is local solar (sundial) noon.

¹⁸ Altitude is the angular distance of a celestial body above or below the horizon, measured along the great circle passing through the body and the zenith.

¹⁹ Azimuth is the angular distance measured eastward along the horizon from a specified reference point (usually north). Azimuth is measured to the point where the great circle determining the altitude of an object meets the horizon.

2.0 Electronic Data

2.1 2018 Truck Driver's Cellphone Records

The NTSB obtained the 72-hour cellphone records of the 2018 truck driver from T-Mobile Legal and Emergency Response. The data was converted from Coordinated Universal Time (UTC) to Pacific Daylight Time (-7 hours).²⁰ A summary of his activities is shown in Tables 8-11. The incoming texts were excluded as they did not indicate active use by the driver.

Table 8: Driver's phone records - three days prior

Time (PDT)	Call Type	Duration(sec)
08:32:33 a.m.	Outgoing text	
08:33:12 a.m.	Outgoing text	
09:00:37 a.m.	Outgoing text	
09:00:56 a.m.	Outgoing text	
09:41:24 a.m.	Incoming call	
10:35:41 a.m.	Outgoing call	551
11:13:51 a.m.	Outgoing chat	
11:13:52 a.m.	Outgoing chat	
11:16:57 a.m.	Outgoing chat	
12:25:33 p.m.	Outgoing text	
12:28:06 p.m.	Outgoing text	
12:28:33 p.m.	Outgoing text	
12:29:10 p.m.	Outgoing text	
12:30:02 p.m.	Outgoing text	
02:43:10 p.m.	Incoming call	14
02:50:59 p.m.	Outgoing chat	
02:54:02 p.m.	Outgoing chat	
03:09:29 p.m.	Outgoing text	
07:19:44 p.m.	Outgoing text	
09:49:37 p.m.	Outgoing text	
10:09:20 p.m.	Outgoing text	
10:29:21 p.m.	Outgoing call	4
10:30:38 p.m.	Outgoing text	
10:33:12 p.m.	Outgoing text	

²⁰ PDT date and time were determined by converting the UTC date and time to a Microsoft Excel date value (DATEVALUE and TIMEVALUE functions, which yield a decimal value indicating the elapsed days from January 1, 1900, 12:00:00 a.m.), subtracting 7 hours (0.291667), and converting the corrected time and date into the appropriate string values.

Table 9: Driver's phone records - two days prior

Time (PDT)	Call Type	Duration(sec)
10:08:24 a.m.	Outgoing text	
10:09:27 a.m.	Outgoing call	26
11:38:26 a.m.	Outgoing text	
12:10:04 p.m.	Outgoing text	
02:10:27 p.m.	Outgoing call	4
02:11:47 p.m.	Outgoing call	14
02:12:26 p.m.	Incoming call	65
02:13:03 p.m.	Incoming call	
02:13:34 p.m.	Outgoing call	
05:03:52 p.m.	Outgoing call	4
05:10:51 p.m.	Outgoing call	56
05:11:49 p.m.	Incoming call	14
05:12:00 p.m.	Outgoing call	13
05:12:25 p.m.	Outgoing call	866
05:34:19 p.m.	Outgoing call	28
06:18:45 p.m.	Outgoing call	2
06:20:33 p.m.	Outgoing call	
06:20:37 p.m.	Outgoing call	
06:20:46 p.m.	Outgoing call	
06:26:59 p.m.	Outgoing call	
06:28:23 p.m.	Outgoing call	
06:42:47 p.m.	Outgoing call	20
06:44:02 p.m.	Outgoing call	9
06:46:03 p.m.	Outgoing call	
09:23:56 p.m.	Outgoing call	
09:24:05 p.m.	Outgoing call	
09:24:33 p.m.	Outgoing call	4
09:38:28 p.m.	Outgoing call	4
09:41:25 p.m.	Outgoing call	1

Table 10: Driver's phone records - one day prior

Time (PDT)	Call Type	Duration (sec)
07:10:46 a.m.	Outgoing call	38
07:20:44 a.m.	Outgoing text	
08:22:11 a.m.	Incoming call	206
08:48:32 a.m.	Outgoing text	
09:03:35 a.m.	Outgoing text	
09:07:39 a.m.	Outgoing text	
09:18:59 a.m.	Outgoing text	
09:39:10 a.m.	Outgoing text	
10:21:24 a.m.	Outgoing text	
10:26:51 a.m.	Outgoing text	
10:55:43 a.m.	Outgoing call	404
11:04:01 a.m.	Incoming call	240
12:54:00 p.m.	Outgoing call	45
12:56:11 p.m.	Outgoing call	34
01:25:51 p.m.	Outgoing call	3
02:17:36 p.m.	Outgoing call	16
03:56:32 p.m.	Outgoing text	
03:56:32 p.m.	Outgoing text	
03:56:32 p.m.	Outgoing text	
04:14:30 p.m.	Incoming call	6
04:15:01 p.m.	Outgoing call	6
04:33:19 p.m.	Outgoing text	
04:52:37 p.m.	Outgoing call	162
08:22:38 p.m.	Incoming call	9
08:23:10 p.m.	Outgoing call	9
08:57:56 p.m.	Outgoing call	353
10:11:52 p.m.	Incoming text	
11:47:28 p.m.	Outgoing text	

Table 11: Driver's phone records - day of the crash

Time (PDT)	Call Type	Duration (sec)
07:47:48 a.m.	Outgoing call	10
07:48:28 a.m.	Outgoing call	54
08:00:51 a.m.	Incoming call	572
11:33:40 a.m.	Outgoing call	42
11:59:33 a.m.	Outgoing text	
01:56:57 p.m.	Outgoing text	

The driver's last activity three days before the crash was an outgoing text at 10:33 p.m., and his first activity the next day was an outgoing text at 10:08 a.m. Two days before the crash, his last activity was an outgoing call at 9:41 p.m. (one-second duration), and his first activity the next day was an outgoing call at 7:10 a.m. that lasted 38 seconds. The day before the crash, the driver left his home for his trip to Oregon. His last activity that day was an outgoing text at 11:47 p.m. On the day of the crash, his first activity was an outgoing call at 7:47 a.m. that lasted ten seconds.

2.2 2018 Truck Electronic Logging Data

The 2018 truck ELD was analyzed for his trip from California to Oregon. The trip details for the first day (May 17) are shown in Figure 14 and Table 12 and the second day (the day of the crash) in Figure 15 and Table 13. He started driving at 3:14 a.m. on May 17th and covered 417 miles. He made eight stops, and most of the driving was completed by 7:53 p.m. On the day of the crash, he started at 7:22 a.m. and drove 135 miles until the crash at 2:05 p.m. He made six stops before the crash.

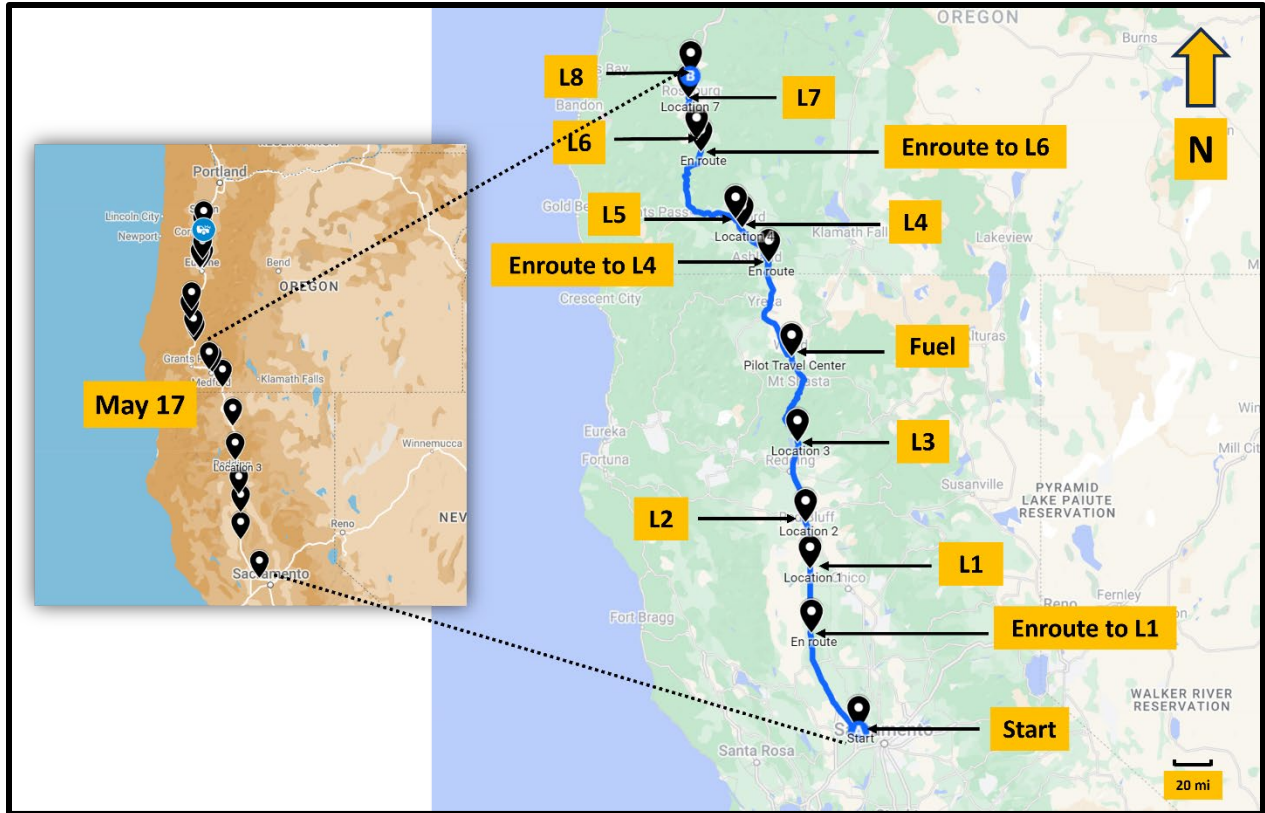


Figure 14: 2018 truck travel on the day before the crash
 (Source: annotated Google Maps)

Table 12: Travel details on the day before the crash

Location	Trip Mileage	Day Mileage	Time	Activity
Start	0	0	2:06 a.m.	Power-up
	0	0	2:16 a.m.	Driving
	0	0	2:19 a.m.	On duty, not driving
	0	0	3:07 a.m.	Logout
	0	0	3:08 a.m.	Login
	0	0	3:09 a.m.	On duty, not driving
	0	0	3:14 a.m.	Driving
En route to L1	60	60	4:14 a.m.	Intermediate log
L1	95	95	4:54 a.m.	On duty, not driving
	96	96	5:13 a.m.	Shut-down
	96	96	5:33 a.m.	Off duty
	96	96	5:37 a.m.	Power-up
	96	96	5:44 a.m.	Shut-down
	96	96	6:37 a.m.	Power-up
	96	96	7:04 a.m.	Driving
L2	119	119	7:29 a.m.	On duty, not driving
	119	119	7:29 a.m.	Shut-down
	119	119	8:09 a.m.	Power-up
	119	119	9:16 a.m.	Driving
L3	163	163	10:01 a.m.	On duty, not driving
	163	163	10:44 a.m.	Driving
Fuel	215	215	11:35 a.m.	On duty, not driving
	215	215	11:36 a.m.	Shut-down
	216	216	11:53 a.m.	Power-up
	216	216	11:59 a.m.	Driving
En route to L4	272	272	12:59 p.m.	Intermediate log
L4	295	295	1:28 p.m.	On duty, not driving
	295	295	1:31 p.m.	Shut-down
	295	295	1:47 p.m.	Power-up
	295	295	2:14 p.m.	Driving
L5	301	301	2:23 p.m.	On duty, not driving
	301	301	2:32 p.m.	Driving
Enroute to L6	360	360	3:32 p.m.	Intermediate log
L6	368	368	3:44 p.m.	On duty, not driving
	368	368	4:16 p.m.	Shut-down
	369	369	4:23 p.m.	Power-up
	369	369	4:52 p.m.	Driving

Location	Trip Mileage	Day Mileage	Time	Activity
L7	395	395	5:25 p.m.	On duty, not driving
	395	395	5:26 p.m.	Off duty
	395	395	5:27 p.m.	Shut-down
	395	395	6:16 p.m.	Power-up
	395	395	6:19 p.m.	Off duty
L8	416	416	7:53 p.m.	Undefined
	417	417	8:30 p.m.	Shut-down
	417	417	8:40 p.m.	Power-up
	417	417	10:45 p.m.	Shut-down
	417	417	10:57 p.m.	Power-up

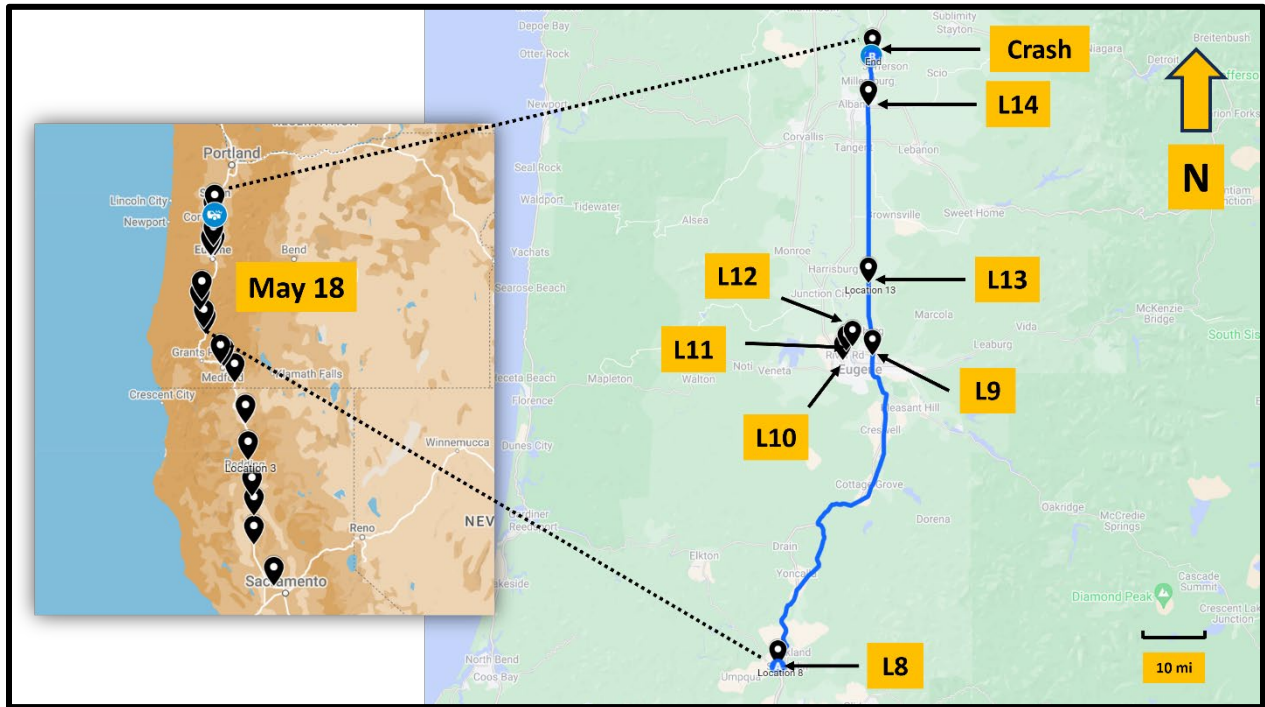


Figure 15: 2018 truck travel on the day of the crash
 (Source: annotated Google Maps)

Table 13: Travel details on the day of the crash

Location	Trip Mileage	Day Mileage	Time	Activity
L8	417	0	6:22 a.m.	Shut-down
	417	0	6:38 a.m.	Power-up
	417	0	6:39 a.m.	On duty, not driving
	417	0	6:42 a.m.	Driving
L9	477	60	7:43 a.m.	On duty, not driving
	477	60	7:50 a.m.	Shut-down
	477	60	8:55 a.m.	Power-up
	477	60	8:57 a.m.	Shut-down
	477	60	9:08 a.m.	Power-up
	477	60	9:10 a.m.	Driving
L10	493	76	9:40 a.m.	On duty, not driving
	493	76	9:41 a.m.	Shut-down
	493	76	9:58 a.m.	Power-up
	493	76	9:58 a.m.	Shut-down
	493	76	10:14 a.m.	Power-up
	493	76	10:14 a.m.	Driving
L11	498	81	10:33 a.m.	On duty, not driving
	498	81	10:40 a.m.	Shut-down
	498	81	10:57 a.m.	Power-up
	498	81	11:09 a.m.	Driving
	499	82	11:13 a.m.	On duty, not driving
L12	500	83	11:15 a.m.	Shut-down
	500	83	11:28 a.m.	Power-up
	500	83	11:32 a.m.	Driving
	501	84	11:37 a.m.	On duty, not driving
	501	84	11:37 a.m.	Shut-down
	501	84	12:02 p.m.	Power-up
	501	84	12:07 p.m.	Driving
L13	516	99	12:26 p.m.	On duty, not driving
	516	99	12:46 p.m.	Driving
L14	544	127	1:14 p.m.	On duty, not driving
	544	127	1:17 p.m.	Shut-down
	544	127	1:48 p.m.	Power-up
	544	127	1:57 p.m.	Driving
End	552	135	2:05 p.m.	Shut-down

3.0 2018 Truck Driver Toxicology Results

Please refer to the *Medical Factual Report* in the docket for this investigation.

4.0 Interviews

4.1 2018 Cascadia Driver - OSP

The driver denied NTSB requests to interview. OSP provided a summary of their interview with the driver at the accident scene and later at the hospital.

Scene interview:

The driver of the 2018 truck was found sitting on the ground with his dog next to the vehicle. He said he was driving between 50-55 mph when the crash occurred. He initially had difficulty remembering his phone number and if he was wearing his seatbelt. He later stated he was sure about wearing his seatbelt as "something held me in place." He recounted his trip to the OSP trooper and said he departed Woodland (ELD confirmed this location) around 3 or 4 a.m., but he could not recall where he went after that. After this statement, he said he felt dizzy, could not remember anything, and could not focus. OSP again asked for the trip's details, and the driver could not remember his destination city but recalled stopping the previous night in southern Oregon somewhere north of Medford (Medford is location L4 in Figure 14 and Table 12). He told the trooper that he had no alcohol or drugs for the past 24-48 hours and said, "I don't use drugs or alcohol." The trooper observed that his pupils were constricted, and his eyes were bloodshot. The driver complained of rib pain, and he thought that his ribs were broken. He was transported to Salem Hospital.

Hospital interview:

The OSP trooper continued the interview at Salem Hospital at 3:18 p.m. The driver refused a Horizontal Gaze Nystagmus test and blood sample. (The trooper requested an exigent blood draw obtained at 4:31 p.m.). The driver gave his consent to the OSP trooper to search his clothes for drugs and/or drug paraphernalia. The trooper found a small black metal cylindrical object in the driver's left front pocket. The driver said it was "speed" and confirmed he meant methamphetamine. He stated that he had used methamphetamine on the day before the crash. The trooper asked for more details about the trip, and the driver said he stopped near Sexton Pass near a large green mushroom building. (The trooper later identified this possibly was a building in Sutherlin, OR, corresponding to L8). The driver recalled little about the crash. He said something pushed him into the shoulder prior to the crash. When asked about swerving in his lane a few miles south of the accident, he said he was avoiding another car that came into his lane.

4.2 Witness 1 -NTSB and OSP

This witness said she was driving north on I-5 near MM 239 when she saw the 2018 truck swerve into the shoulder lane. She observed the truck swerve into the shoulder approximately five times and into the other travel lane multiple times. She called 911 to report the driver's behavior just as he moved into the Santiam River Rest Area exit lane. She saw the truck go past the exit onto the shoulder and hit the back of the parked van. She estimated the truck's speed to be 60 mph before the crash.

4.3 Witness 2 -NTSB and OSP

This witness was the front passenger in a vehicle traveling northbound on I-5 near MM 239. She saw the 2018 truck veer onto the shoulder rumble strip approximately 3-4 times. Her husband was driving their vehicle and slowed down to create some separation with the truck. She then observed the truck enter the Santiam River Rest Area exit lane and thought the driver was exiting to get some sleep. She said the truck never exited and continued to the shoulder of I-5, where it struck the back of a parked Ford E-350. She did not observe brake lights on the truck from when it moved into the exit lane to the crash.

F. LIST OF ATTACHMENTS

- Transcript of NTSB Interview with Jefferson Fire Department
- Transcript of NTSB Interview with Oregon State Police
- Transcript of NTSB Interview with Witness 1
- Transcript of NTSB Interview with Witness 2

Submitted by:

John Humm
Survival Factors Group Chair