WASHINGTON State FACE Program
Fatality Assessment & Control Evaluation

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1-888-66-SHARP (toll-free) or 360-902-5667

REPORT#: 52-53-2022 **REPORT DATE:** September 26, 2022

Mechanic Crushed by Rollaway Container Chassis

INCIDENT HIGHLIGHTS

DATE:
May 6, 2021

TIME:
2:35 p.m.

WORKER:
62-year-old semi-truck mechanic

INDUSTRY/NAICS CODE:
General Freight Trucking, Long Distance, Truckload, 484121

EMPLOYER:
Interstate trucking, general freight

SAFETY & TRAINING:
The employer had a written Accident Prevention Program (APP).

SCENE:
Outdoor area of maintenance shop

LOCATION:
Western Washington

EVENT TYPE:
Crush - Struck by

SUMMARY

On May 6, 2021, a 62-year-old semi-truck mechanic died when he was crushed by a rollaway container chassis. The previous day, he began repairs on the chassis, which was parked outside of the employer's maintenance shop. He disconnected the air lines to its airbrake chambers, which engaged the parking brake, and left it outdoors for the night. The next day, he coupled a yard tractor to the chassis and tried towing it indoors to avoid the rain. The chassis would not move as its parking brake was still engaged.

The mechanic stopped and exited the tractor leaving it parked on a downgrade with the engine running, parking brake released, and wheels unchocked. He told another mechanic to reconnect the chassis' air lines so its parking brake could be released. He then kneeled between the chassis' wheels and waited while the other mechanic worked. When the air lines were reconnected, the restored air pressure released the chassis' parking brake allowing gravity to pull the tractor and chassis combo downhill. The mechanic was crushed by the wheels of the rolling chassis while the other mechanic, who was still under the chassis, was almost struck by the axles.
...READ THE FULL REPORT> (p.5)

CONTRIBUTING FACTORS

Key contributing factors identified in this investigation include:

- Parking brake not engaged when necessary.
- Wheels not chocked during vehicle repair operations.
- APP lacked vehicle parking brake and wheel chocking requirements.
- APP had ineffective progressive discipline policy.
- ...LEARN MORE> (p.15)

RECOMMENDATIONS

Washington FACE investigators concluded that, to help prevent similar occurrences, employers should:

- Install electronic parking brake systems that automatically apply the parking brake when the driver has not set it before exiting the cab.
- Develop APP to include vehicle rollaway hazard identification, assessment, and prevention procedure requirements.
- Develop APP to have progressive discipline policies that effectively address vehicle safety rule violations and prevent hazardous operation.
- ...LEARN MORE> (p.15)

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DEFINITIONS

APP	Accident Prevention Program
CDL	Commercial Driver's License
CFR	Code of Federal Regulations
CSHO	Compliance Safety and Health Officer
DOSH	Division of Occupational Safety and Health
FMCSA	Federal Motor Carrier Safety Administration
GCWR	Gross Combined Vehicle Weight Rating
GVWR	Gross Vehicle Weight Rating
JHA	Job Hazard Analysis
L&I	Washington State Department of Labor and Industries
LOTO	Lockout/Tagout
NIOSH	National Institute for Occupational Safety and Health
OSHA	Occupational Safety and Health Administration
PIT	Powered Industrial Truck
PMCS	Preventive Maintenance Checks and Services
RCW	Revised Code of Washington
SHARP	Safety & Health Assessment & Research for Prevention
WA FACE	Washington State Fatality Assessment and Control Evaluation Program
WAC	Washington Administrative Code
WSP CVE	Washington State Police Commercial Vehicle Enforcement

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WASHINGTON STATE FACE PROGRAM INFORMATION

The Washington State Fatality Assessment and Control (WA FACE) program is one of many workplace health and safety programs administered by the Washington State Department of Labor & Industries' Safety & Health Assessment & Research for Prevention (SHARP) program. It is a research program designed to identify and study fatal occupational injuries. Under a cooperative agreement with the National Institute for Occupational Safety and Health (NIOSH grant# 5 U60OH008487), WA FACE collects information on occupational fatalities in WA State and targets specific types of fatalities for evaluation. WA FACE investigators evaluate information from multiple sources. Findings are summarized in narrative reports that include recommendations for preventing similar events in the future. These recommendations are distributed to employers, workers, and other organizations interested in promoting workplace safety. WA FACE does not determine fault or legal liability associated with a fatal incident. Names of employers, victims and/or witnesses are not included in written investigative reports or other databases to protect the confidentiality of those who voluntarily participate in the program.

Additional information regarding the WA FACE program can be obtained from:

WA FACE program website
PO Box 44330 Olympia, WA 98504-4330
1-888-667-4277

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INTRODUCTION

In May of 2021, the Washington State Department of Labor & Industries' (L&I) Division of Occupational Safety and Health (DOSH) notified the Washington State Fatality Assessment and Control Evaluation (WA FACE) program of the fatality of a semi-truck mechanic who was crushed by a container chassis when it rolled away.

Washington State FACE investigators reviewed the DOSH compliance safety and health officer's (CSHO) enforcement case file in lieu of interviewing the employer due to their decision not to participate. Documents reviewed during the course of this investigation included the DOSH inspection summary report, the worker's death certificate, co-worker interviews, incident scene photos, diagrams, police report, and obituary.

EMPLOYER

The employer was an interstate general freight trucking company based in the Seattle metropolitan area. In business for almost 40 years, the company was one of the largest providers of heavy container drayage, flatbed, and refrigerated and dry cargo services in and around the seaports of Seattle and Tacoma and the Pacific Northwest. The company served a customer base that included local department store and warehouse chains, seafood businesses, construction companies, produce suppliers, and freight forwarders. The company had 79 full-time employees, including around 60 truck drivers.

The employer's trucking fleet consisted of more than 100 tractors and trailers, and had over 300 container chassis of various makes and models. The fleet was maintained by a crew of seven truck mechanics in an on-site repair shop at the employer's main terminal. A second site several miles away was used mainly for truck parking. The mechanics worked Monday through Friday, with three on duty from 5 a.m. to 2 p.m., and four, including the maintenance supervisor, who worked from 2 p.m. to 10 p.m. A mechanic was on call 24 hours a day, seven days a week to assist truck drivers at any time. The supervisor had worked for the employer for over 20 years. The other mechanics had around 20 years or more of individual experience but had shorter periods of work history with the employer. Most maintenance operations took place during the second shift and typically involved preventive maintenance checks and services (PMCS) and light repairs. Complex engine and transmission overhauls were performed by external maintenance shops that specialized in repairing powertrains.

WRITTEN SAFETY PROGRAMS and TRAINING

At the time of the incident, the employer had a formal, written accident prevention program (APP) or safety program [WAC 2001]. The nine-page document consisted of brief policy statements covering employee safe conduct and behavior, employer and worker responsibilities, general workplace safety, personal safety and security procedures, back safety and proper lifting techniques, and slips, trips, and falls protection. The employer had a safety department that managed the APP and ensured its compliance with federal and state requirements. A safety committee comprised of managers, dispatch supervisors, and safety department staff held meetings and relayed information from the meetings to workers. Workers were required to attend mandatory quarterly team safety meetings.

The APP had a short subsection reserved specifically for the employer's on-site fleet maintenance shop. The section recognized the shop as an especially hazardous area and prescribed worker training, site inspections, and Personal Protective Equipment (PPE) as ways to prevent injuries to mechanics. Mechanics were required to wear safety glasses, face protection, work gloves, non-slip boots, and high visibility vests in the yard. First aid kits were available in the maintenance shop. The employer maintained training and certification records for mechanics.

The APP had a progressive discipline policy as a way to correct safety violations and hazardous behaviors. Specific disciplinary action was to be determined by the severity of the violation and could progress from verbal reprimands and written warnings to suspensions and dismissals. The APP assigned the responsibility of administering discipline to first-line supervisors.

WORKER INFORMATION

The worker who died in the incident was a 62-year-old semi-truck mechanic. His career began 43 years before as a light wheeled vehicle mechanic in the U.S. Army. He had worked for the employer for 10 years. The maintenance shop supervisor described him as the shop's most experienced mechanic. Assigned to the second shift from 2 p.m. to 10 p.m., his job duties included performing preventative maintenance checks and services (PMCS), light repairs, and operating a yard tractor. The mechanic had a Class "A" Commercial Driver's License (CDL). The knowledge, skills, and ability to use a parking brake were competencies required to obtain a CDL [DOL 2020].

EQUIPMENT

The incident involved a 1993 Ottawa Commando YT 30 4 x 2 yard tractor towing a bare 40-foot triple tri-axle container chassis (Photos 1 and 2). The yard tractor, also known as a hostler, was manufactured by Ottawa Trucks in Ottawa, Kansas. The vehicle was designed and registered for use on public roads, which made it exempt from federal and state safety regulations covering Powered Industrial Trucks (PIT) [OSHA 2011; WAC 2017a]. It was powered by a Cummins inline six-cylinder diesel engine with an Allison 4-speed automatic transmission. The tractor was equipped with a hydraulic fifth wheel to tow chassis parked in the employer's terminal yard.

Photos 1 and 2: The incident involved this 1993 Ottawa Commando YT 30 4 x 2 yard tractor. Left photo shows tractor right front side profile. Right photo shows tractor side profile with hydraulic fifth wheel. Arrow shows trailer air supply lines from tractor to gladhand couplings on chassis connected to fifth wheel.

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The container chassis, also known as an intermodal chassis, was built in 1997 by PRATT Enterprises Inc. in Summit, Illinois (Photo 3). It had a tare (empty) weight of 9,800 lbs. with a Gross Vehicle Weight Rating (GVWR) of 73,500 lbs. The tri-axle chassis was fitted with air brakes and dual sets of stud-piloted steel Budd wheels fitted with 255/70R22 commercial radial tires. The chassis passed an annual inspection in February 2021 required by Federal Motor Carrier Safety Administration (FMCSA) regulations [CFR 2021]. The chassis was used for providing drayage service at the Port of Seattle. To maintain the safe operational condition of the chassis, mechanics used a 19-item preventive maintenance inspection form to document and report any deficiencies identified during equipment inspections (Photo 4).

Photo 3: Incident yard tractor with container chassis parked in outdoor area of maintenance shop where rollaway occurred. Arrow shows the rollaway truck's downslope direction of travel.

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(√) Satisfactory (x) Repairs made (o) Repairs needed

Trailer Preventive Maintenance Inspection Report Date:_____ Trailer # _____ Mileage_____		
Grease		Brakes
Hub Oil		1R %
Tires		1L %
Tire Air Pressure		2R %
Suspension		2L %
Air System		3R %
Brake Adjustment		3L %
Parking Brakes		4R %
Lights		4L %
Sliding Sub Frame		
Twist Locks & Lock Pin		
Cross Members		
Mud Flaps		
Glad Hand Rubber Replace		
Check for Holes In Van		
Landing Legs		
Gear Boxes		
King Pins		
Drop Axle/Control Body Functionality		

Photo 4: Employer's 19-item trailer preventive maintenance inspection report form used by mechanics.

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The tractor's air brake system was critical to keeping the tractor and tractor-chassis combination from moving unexpectedly when the driver was not in the cab. The system consisted of primary and secondary air circuits that supplied air to the tractor's service brakes and parking brakes. It consisted of a series of hoses, valves, storage tanks, and couplings that distributed pressurized air from an engine-mounted gear-driven compressor to brake chambers at each wheel. The chambers had service and parking brake functions, except on the tractor's steer axle, which had single chambers for service brakes only. The service brakes were applied and released with a foot pedal located next to the accelerator on the driver's side floor of the tractor cab. The tractor's parking brake was released and applied by manually pushing and pulling a yellow air brake valve control knob on the driver's instrument panel in the cab (Photo 5).

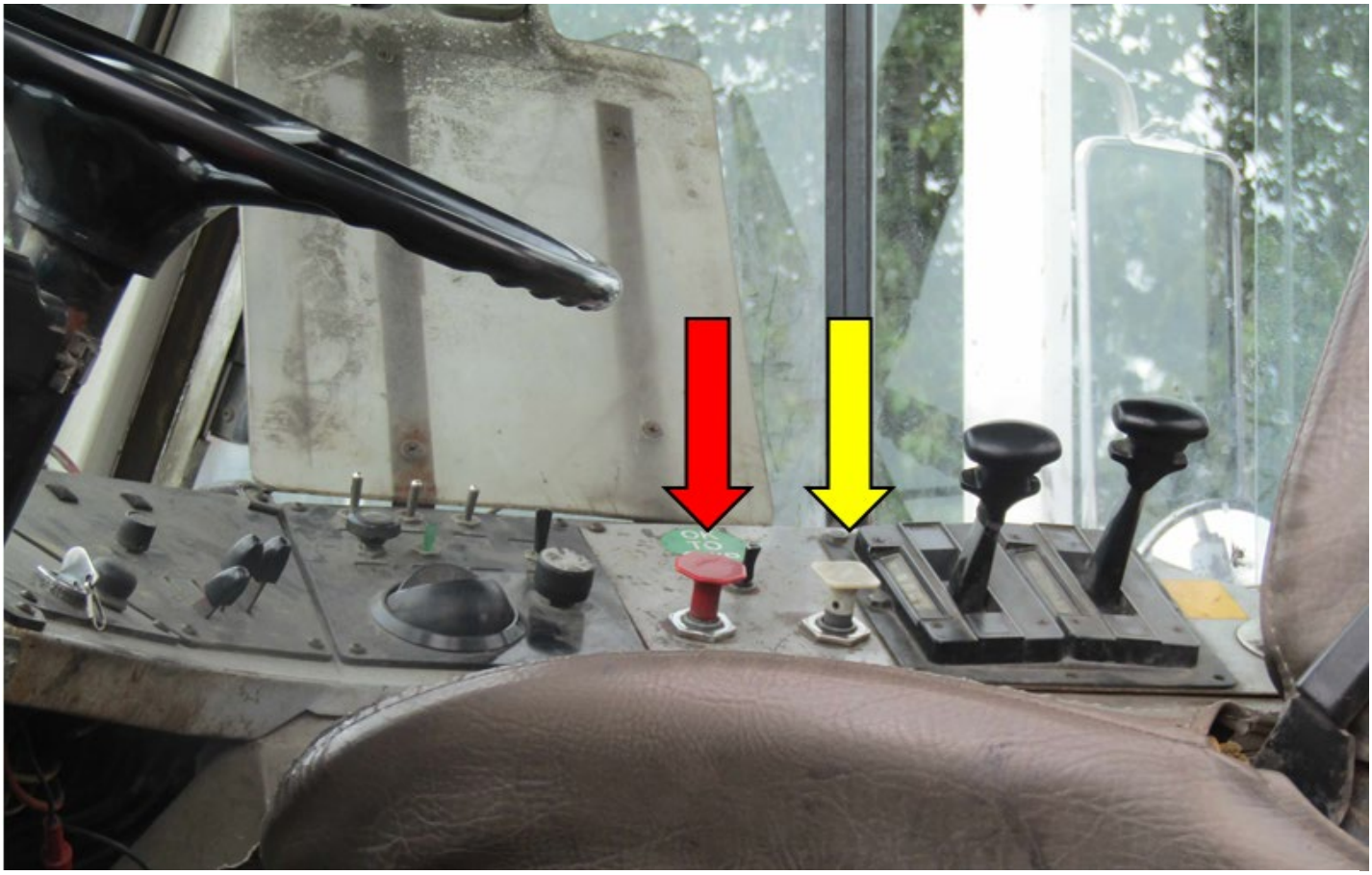

Photo 5: Industry standard manual push-pull air brake valve control knobs inside incident yard tractor driver's cab. Red arrow shows trailer air supply knob. Yellow arrow shows tractor parking brake knob.

Air supply from the tractor flowed to the chassis' air brake circuits through separate service and emergency brake gladhand couplings, also known as quick disconnects, located outside behind the cab. In a tractor-chassis combination, the red trailer air supply valve knob next to the yellow knob controlled the trailer emergency brake, which also functioned secondarily as a parking brake. Both knobs had to be pushed separately to release the tractor and chassis parking brakes, which all used springs in the chambers to engage the pushrod braking mechanism in the wheels. In applying the parking brake, pulling just the yellow knob would simultaneously set the tractor and chassis parking brakes

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and automatically make the red knob pop out. Although the chassis' emergency brakes were used for parking, the main purpose of the red knob was to help protect the tractor's air supply and braking ability if a breakaway occurred and the tractor had to be stopped. In such an event, a rapid drop in chassis air pressure to under 45 psi would activate a tractor protection valve that would cause the red knob to pop out, cease air flow to the chassis, and apply the chassis' emergency brake.

Driver pre-trip vehicle inspections required testing and checking the air brake system's mechanical performance, ability to build and hold air pressure, and warning features. Safe air pressure range in the system was from 100 to 120 psi, which was indicated by a gauge on the driver's instrument panel. When the pressure dropped to 70 psi, a low air pressure alarm would buzz in the cab, and the air compressor would cut in to recharge the system. The system would automatically activate the truck's parking brake if air pressure fell below 45 psi.

It is not known if the incident tractor had any warning alarms to indicate if the parking brake was not set when the driver exited the cab. The driver's cab had a transmission shift indicator near the instrument panel. As typical with heavy commercial trucks, the automatic transmission shifter did not have a park selection but required being put in neutral when setting the parking brake.

INCIDENT SCENE

The rollaway incident happened in an outdoor area near the southwest corner of the on-site fleet maintenance shop at the employer's main terminal (Photo 6). The asphalt terminal yard had a downgrade from the shop's south wall to the property's southern boundary. A canopied area used for welding and storage was located on the downgrade approximately 60 feet southwest of the shop. The yard had a 5 mph posted speed limit and encircled the terminal's buildings with parking slots for fleet trucks and workers' private vehicles. The employer's administrative offices were in a building adjoined to the north wall of the maintenance shop. Office and maintenance staff were present daily in the area. The yard was entirely secured from public access by a chain-link barbwire fence.

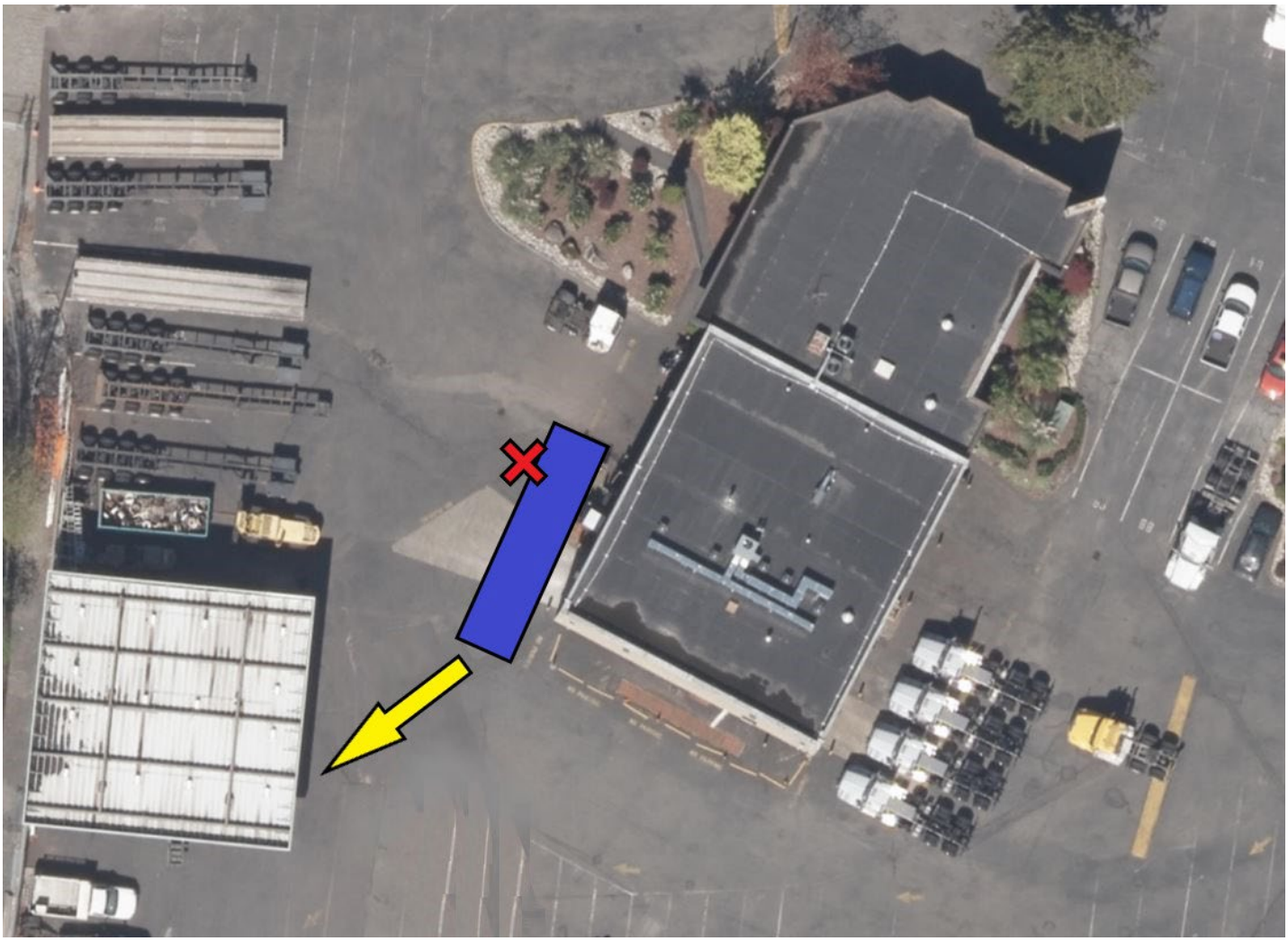

Photo 6: Incident scene. Blue rectangle indicates yard tractor and chassis parking location next to maintenance shop where rollaway began. Arrow shows downslope path of rollaway toward canopied work area on bottom left. X shows where mechanic was crushed by the chassis' wheels when rollaway occurred as a result of not setting the tractor's parking brake. Image courtesy of ESRI.

WEATHER

The incident happened around 2:35 p.m. The weather was mostly cloudy with 17 mph southwest winds and a temperature of 63 degrees. The sun set at 8:28 p.m. [Weather Underground 2022]. The weather was not a factor in this incident.

INVESTIGATION

The day before the incident, the 40-foot container chassis involved in the rollaway was towed with a yard tractor from an area in the terminal yard where out-of-service chassis were stored. The chassis was parked outside a bay door on the

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southwest side of the maintenance shop. The mechanic inspected the chassis for deficiencies and noticed a worn out bushing on a right rear torque arm of the suspension system. He reported the faulty torque arm to his supervisor who then assigned him to replace it, a task the mechanic had performed many times before. He began the task by first disconnecting the air supply lines attached to the chassis' air brake chambers, which engaged the parking brake as a safety feature to prevent the chassis from rolling away. The mechanic was not able to finish the task that day, so he left the chassis parked outside of the maintenance shop for the night.

At the start of his work shift the next day, the mechanic told co-workers that he expected rain and wanted to use the yard tractor to move the chassis inside the maintenance shop to finish replacing the torque arm. Two other mechanics were in queue to use the yard tractor ahead of him, but he was able to use it sooner. When the first mechanic was finished with the yard tractor, he went to the canopied area 60 feet downgrade from the southwest corner of the maintenance shop. The supervisor was operating a forklift in an area of the maintenance shop that was away from where the mechanics were working.

After the mechanic coupled the yard tractor to the chassis, he got back in the cab and drove forward. The chassis did not move because the air supply lines were still disconnected from the chassis brake chambers that engaged the parking brake. The mechanic stopped the tractor, exited the cab, heard air escaping from the disconnected lines, and walked to the rear of the chassis to try to grab them. When he exited the driver's cab, he left the tractor parked on the downgrade at the south side of the maintenance shop with its engine running and parking brake released (Photo 7). He did not chock any wheels when he walked the more than 40-foot distance to the rear of the chassis. When he arrived there, he told another mechanic who was assisting him to reconnect the air lines to the brake chambers so the chassis' parking brake could be released. During interviews by the Compliance Safety and Health Officer (CSHO), the mechanic who was told to reconnect the air lines stated that the mechanic appeared to be in a rush to move the chassis.

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Photo 7: View of incident yard tractor parked on downgrade from left rear of chassis. The tractor rolled away with the chassis in tow toward the canopied area on the right.

As the assisting mechanic crawled under the chassis to reconnect the air lines, the other mechanic waited kneeling between the chassis' rear right side wheels on the first and second axles (Photo 8). When the air lines were reconnected, the restored buildup of air pressure in the brake chambers released the chassis' parking brakes allowing gravity to pull the tractor and chassis combo downgrade before the mechanics could get away. The assisting mechanic, still on his back under the chassis, yelled at the mechanic kneeling between the wheels that the truck was starting to roll. The mechanic responded that his foot was trapped under the rolling chassis' wheels. As the chassis' wheels continued to roll over him, they lifted an axle moving toward the mechanic under the chassis just high enough for him to escape and avoid being crushed when the axle came back down.

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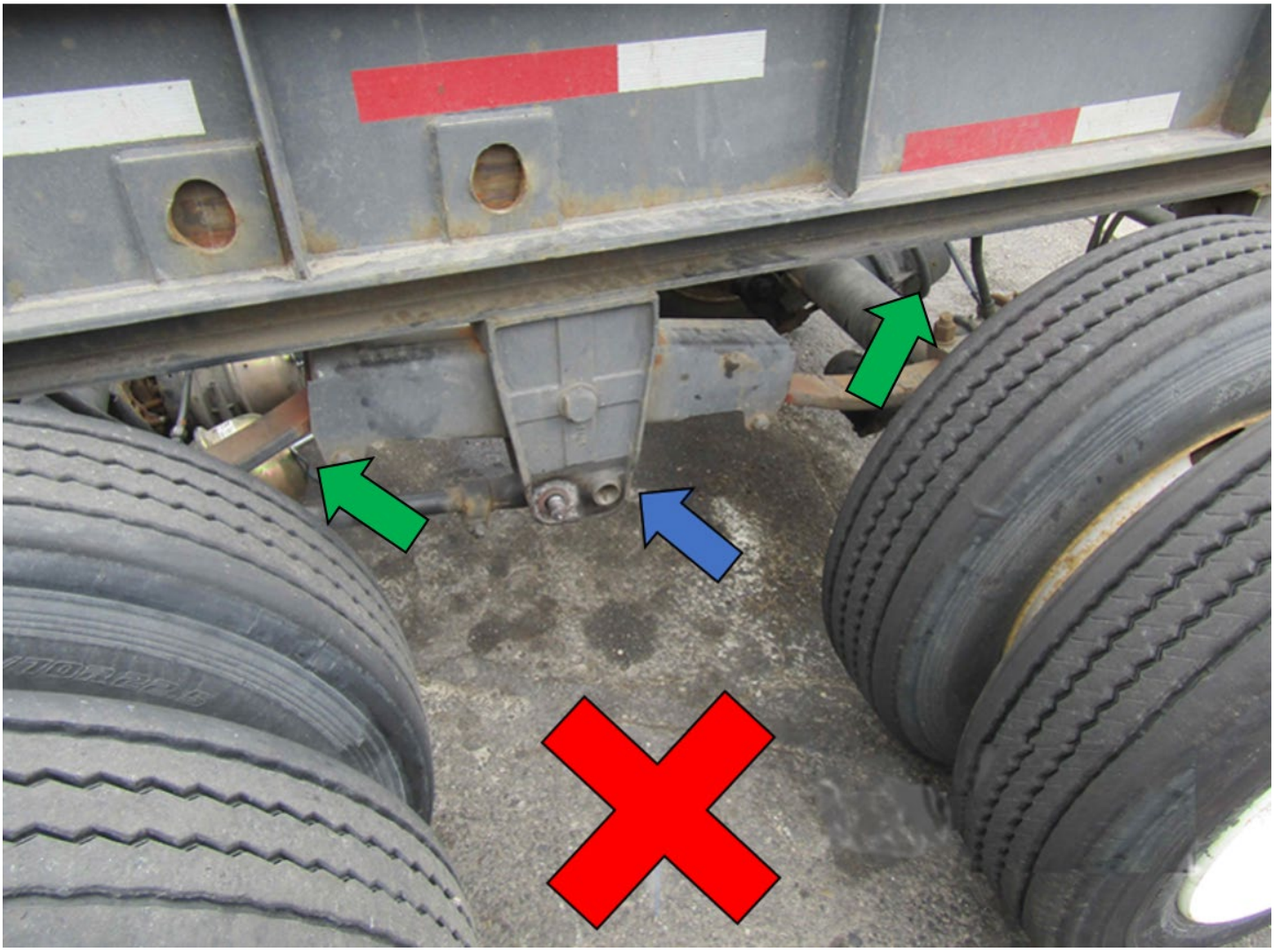

Photo 8: X shows where mechanic was trapped and crushed by the rollaway chassis' wheels. Green arrows show airbrake chambers and air supply lines. Blue arrow shows leaf spring/torque arm hanger where repair was being made.

When the assisting mechanic was able to get away from the rolling chassis, he ran to the office and told staff to call 911. Alerted by the yelling, the co-worker in the canopied area saw the tractor and chassis rolling toward his location. When it stopped after hitting the mechanic's car parked nearby, the co-worker entered the tractor, shut off the engine, set the parking brake, and returned to the injured mechanic to perform CPR. The supervisor also heard yelling and ran to the incident scene. When police came, they allowed the worker who was performing CPR to continue chest compressions. After fire department paramedics arrived, they pronounced the mechanic dead at the scene. The fatality occurred less than 30 minutes into the second shift. The incident was reported to the public on a local television news station later that afternoon.

Washington State Patrol Commercial Vehicle Enforcement (WSP CVE) troopers arrived at the scene to conduct a post-crash vehicle examination that found no violations or mechanical faults with the tractor and chassis. During interviews by the CSHO, the employer acknowledged that the rollaway could have only happened because the tractor's parking brake was released and wheels not chocked. The general manager told the CSHO that the wheels should have been chocked per company policy. A mechanic affirmed that chassis wheels were required to be chocked any time repairs were taking place. The CSHO's review of the employer's disciplinary records found that the mechanic had eight vehicle safety violations since 2014, including three for not setting vehicle parking brakes and using wheel chocks. The violations caused vehicle rollaways that damaged property and exposed other workers to serious injury. The last violation occurred less than two months before the incident. The employer applied progressive discipline that did not correct the mechanic's hazardous behavior. The CSHO also found that the employer's APP lacked a Hazardous Energy Control Program that could have included vehicle parking brake and wheel chocking requirements, training, and operator performance audits. Investigators concluded that the incident did not result from unpreventable employee misconduct based on all the considered facts.

CAUSE OF DEATH

According to the King County Medical Examiner's Office, the manner of death was multiple blunt force injuries.

CONTRIBUTING FACTORS

Occupational injuries and fatalities are often the result of one or more contributing factors or key events in a larger sequence of events that ultimately result in the injury or fatality. Washington FACE investigators identified the following recognized hazards and APP deficiencies as key contributing factors in this incident:

- *Parking brake not engaged when necessary.*
- *Wheels not chocked during vehicle repair operations.*
- *APP lacked vehicle parking brake and wheel chocking requirements.*
- *APP had ineffective progressive discipline policy.*

RECOMMENDATIONS/DISCUSSION

Recommendation #1: Employers should consider installing electronic parking brake systems that automatically apply the parking brake when the driver has not set it before exiting the cab.

Discussion: One of the best ways to prevent a vehicle rollaway is by installing an electronic parking brake system. As an engineering control, the system is designed to automatically apply the truck's parking brake if a driver has not set it before exiting the cab. Currently available systems replace the truck's parking brake and trailer air supply control valve knobs with ergonomic electronic switches wired to servos in the dashboard that apply and release the valves. Electronic interlocks automatically set the parking brake when sensors detect that a driver has left their seat or opened the cab door before setting the brake. The switches feature built-in LED indicator lights that show the status of the brake in applied or released positions. The technology can be integrated with existing fleet telematics systems to notify managers when a rollaway occurred or almost happened so they can respond appropriately. Drivers should be trained to understand that electronic parking brake systems are driver assistance systems that do not replace the need to maintain safe driving and parking practices. Drivers should also be trained not to modify or disable any such systems.

If a hazard cannot be eliminated, the hierarchy of controls prioritizes selection of engineering controls, such as electronic parking brake systems and similar safety technologies, over administrative controls, such as written APP policies and training, and PPE. The hierarchy of controls can be explained in a chapter of the APP covering hazard prevention and

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control. Providing such information in the APP can help educate workers about the different functions and relationships of hazard controls that keep their workplace safe. When APP policies aim to educate workers about hazard prevention fundamentals, such as the hierarchy of controls, they help build a strong company safety culture that makes injury risk reduction more attainable.

Recommendation #2: Employers should develop their APP to include vehicle rollaway hazard identification, assessment, and prevention procedure requirements.

Discussion: A company APP or safety program with well-organized chapters and carefully written policies and procedures can effectively help operators prevent vehicle rollaway hazards. A chapter on hazard identification and assessment can include requirements for managers and supervisors to perform a Job Hazard Analysis (JHA) for each job task, vehicle, tool, equipment type, and work environment. A JHA should be used to identify the hazards of operating yard tractors, moving and parking vehicles on uneven terrain, and preparing vehicles and equipment for maintenance and services. The JHA should assess each hazard in terms of its probability to cause injury and the severity of potential injury. Assessment results should then be used to develop solutions that eliminate or control the hazard or determine appropriate PPE use as required by state safety rules [2018a]. Rollaway hazard prevention solutions can include specific engineering controls, such as installing electronic parking brake systems, and administrative controls, such as parking brake and wheel chocking rules, training requirements, and job performance audits. Standardized JHA forms should be available to document the hazards identified during the JHA. Forms should be updated when changes to previously identified hazards reduce the effectiveness of solutions used up to that point. Completed JHA forms should be kept in a location, such as a safety manager's office, where workers can easily access and review them.

Vehicle rollaway hazard solutions can be further developed in a second APP chapter that covers hazard prevention and control. This chapter should clearly state the employer's written vehicle parking brake and wheel chocking policies and procedure requirements based on JHA results and related hazard prevention information, such as vehicle manufacturer's instructions and commercial motor vehicle safety research and regulations. At a minimum, a parking brake policy should require all vehicle operators to set the parking brake any time they park, regardless of whether or not they exit the cab. This is a safer practice than setting the brake only when they exit the cab because a truck may be parked for reasons that do not require exiting the cab, such as to do paperwork, make phone calls, take rest breaks, or perform repairs. In such situations, it is more likely for distraction to occur that can lead an operator to forget to set the parking brake if they decide to exit their cab, especially if they are fatigued or rushing. If this happens while a truck is parked on a grade, as with the yard tractor involved in the incident, then the risk of a rollaway greatly increases.

The parking brake and wheel chocking policy should also require drivers who leave their truck unattended to put their foot on the service brake, place the transmission in neutral, set the parking brake, stop the engine, lock the ignition, and remove the key and place it in their pocket. If parked on any grade, drivers must turn the truck's front wheels to the curb or side of the road and chock at least one tractor drive wheel on each side. This is also a safer practice because an unattended truck parked on a very slight grade with its parking brake disengaged can easily roll away if it is bumped by another vehicle or equipment. As a form of hazardous energy control similar to Lockout/Tagout (LOTO), such procedures are required by state safety rules for workplaces and public roads to control the sudden hazardous release of a vehicle's mechanical energy caused by unexpected vehicle movement [RCW 1980; WAC 2005; WAC 2017b]. Drivers should also be required to check their dashboard parking brake indicator, if equipped with one, before exiting their cab. The policy should plainly state that the employer will periodically check the operation of the parking brake alert system or other warning indicators installed on trucks and discipline drivers who disarm or ignore them.

A parking brake and wheel chocking policy should also state that when the air supply lines to the tractor, chassis, or trailer parking brake or spring brake are disconnected as part of repair operations, then mechanics must chock the vehicle's wheels until the lines are reconnected and the parking brake can be safely released. The tractor to trailer air supply lines should also not be reconnected before the air lines to the brake chambers are reconnected and the wheel chocks can be safely removed and parking brake released. The parking brakes should also never be manually released or caged before the wheels are chocked. If the wheels are not properly chocked in any of these cases before releasing the parking brake, the vehicle may roll away unexpectedly. If a truck's front or rear wheels are lifted or set on jack stands, then the wheels remaining on the ground must be chocked. Vehicle inspection forms used by mechanics can include instructions with checkboxes to ensure they set the parking brake before starting their inspection. Signage can also be installed in terminal yards, maintenance shops, and loading docks that reminds operators to set the parking brake, use wheel chocks, and engage trailer restraint locks if available.

A third area of the APP where the rollaway prevention strategy can be expanded is in a chapter on safety education and training. While it is important to have clearly written rollaway prevention policies, it is equally vital, and required by state safety rules, to make sure all workers who operate or repair vehicles are trained and proficient in performing the employer's parking brake and wheel chocking requirements [WAC 2018b]. An experienced, competent instructor should be designated to educate operators about vehicle rollaway hazards and the APP's parking brake and wheel chocking policies, provide hands-on training to ensure they can perform the procedures according to standards, and test their knowledge and ability to perform the procedure independently. Refresher training should be scheduled to make sure workers retain their skills and provided when they request it or demonstrate a need through observed unsafe behaviors and incident reports. Training records should be kept on file and periodically reviewed for all workers.

The last place an APP can address vehicle rollaway hazards is in a chapter on safety program monitoring and evaluation. While the rollaway prevention strategy can be developed and stated in the previously discussed chapters, it is also necessary and required by state rules to supervise an APP's effectiveness in everyday practice to identify areas for improvement [WAC 2018c]. This can be achieved with several methods of program monitoring and evaluation that include reviewing written policies, directly observing work behavior, examining hazard and injury reports, developing job safety performance checklists, performing site safety audits, interviewing supervisors and workers, and reviewing training records. The chapter should explain the purpose and methods of APP monitoring and evaluation so workers understand it as a reflection of the employer's leadership and commitment to maintaining a safe workplace.

Recommendation #3: Employers should develop their APP to have progressive discipline policies that effectively address vehicle safety rule violations and prevent hazardous operation.

Discussion: Violations of parking brake and wheel chocking requirements raise the risk of traumatic injury and death if an employer does not address them with effective corrective action, including the use of progressive discipline. Discipline should be fair and proportionate to the severity of the violation and be consistently applied and effective. Managers and supervisors should be trained to administer and reinforce discipline if assigned such responsibilities. They should be able to investigate and document the violation, plan corrective action, communicate expectations, reinforce positive behavioral change, and proceed to the next step in the disciplinary sequence when a worker repeats a violation. Managers and supervisors should assess if repeat violations occur because of inadequate job knowledge and skills, physical and mental fatigue, or tool, equipment, and environmental conditions.

If a worker continues to violate safety rules after receiving corrective retraining, then the employer should examine the training design for deficiencies in instructional methods and skill evaluation procedures. If an employer has exhausted disciplinary responses for recurring violations, then the progressive sequence should conclude with job reassignment or

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termination. Isolated violations should be addressed with individual workers discretely, but all company disciplinary records should be reviewed to identify broader patterns of recurring safety violations across the workforce to develop organization-wide interventions.

The employer's disciplinary policy and procedures can be stated in the APP's chapter on hazard prevention and control, where the parking brake and wheel chocking policy can also be located. The discipline policy should explain the employer's use of discipline as a way to address APP policy and rule violations that make the workplace unsafe. Discipline serves as an administrative control of hazards and as a form of APP enforcement, which is required by state workplace safety rules [WAC 2018c]. Not enforcing APP policies gives rise to a workplace safety culture that tolerates discrepancies between policy and practice, which diminishes hazard prevention and elevates risk of injury and death.

ADDITIONAL RESOURCES

CA/FACE [1994]. Delivery Truck Driver Dies after being Crushed by a Truck while Making a Delivery to a Local Market. Sacramento, CA: California State Fatality Assessment and Control Evaluation Program.

KY FACE [2021]. Truck Driver Killed After Vehicle Rollaway. Lexington, KY: Kentucky Fatality Assessment and Control Evaluation Program.

OSHA [2002]. Job Hazard Analysis. Washington D.C.: Occupational Safety and Health Administration.

OSHA [2016]. Recommended Practices for Safety and Health Programs. Washington D.C.: Occupational Safety and Health Administration.

TIRES [2019]. It Really Happened: Rollaways Crush Lives. Olympia, WA: Trucking Injury Prevention through Surveillance Emphasis Project.

TIRES [2021]. TIRES Trucking Safety Program Development Tool. Olympia, WA: Trucking Injury Prevention through Surveillance Emphasis Project.

WA FACE [2013]. Fatality Investigation: Truck Driver Dies after being Run Over by Propane Transport Rolling Backward at Bulk Plant. Olympia, WA: Washington State Fatality Assessment and Control Evaluation Program.

WA FACE [2019]. Trucking Fatality Narrative: Truck Driver Crushed Between Two Trailers. Olympia, WA: Washington State Fatality Assessment and Control Evaluation Program.

WA FACE [2022]. Fatality Investigation: Driver Crushed by Rollaway Woodchip Truck. Olympia, WA: Washington State Fatality Assessment and Control Evaluation Program.

WA FACE [2022]. Trucking Fatality Narrative: Mechanic Crushed When Rollaway Semi-Truck Hits Trailer. Olympia, WA: Washington State Fatality Assessment and Control Evaluation Program.

WA L&I [2021]. Create a Safety Program: Accident Prevention Program. Olympia, WA: Washington State Department of Labor & Industries.

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products. Furthermore, Washington FACE and NIOSH are not responsible for the content of these websites. All web addresses referenced in this document were accessible as of the publication date.

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WAC [2005]. WAC 296-865-30015: Semitruck brakes. Olympia, WA: Washington State Legislature.

WAC [2017a]. WAC 296-863: Forklifts and Other Powered Industrial Trucks. Olympia, WA: Washington State Legislature.

WAC [2017b]. WAC 296-803-20005: Establish a written energy control program. Olympia, WA: Washington State Legislature.

WAC [2018a]. WAC 296-800-16005: Do a hazard assessment for PPE. Olympia, WA: Washington State Legislature.

WAC [2018b]. WAC 296-800-14020: Develop, supervise, implement, and enforce safety and health training programs that are effective in practice. Olympia, WA: Washington State Legislature.

WAC [2018c]. WAC 296-800-14025: Make sure your accident prevention program is effective in practice. Olympia, WA: Washington State Legislature.

Weather Underground [2022]. May 6, 2021 SeaTac, WA Weather History. Brookhaven, GA: The Weather Company.

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