



## INCIDENT REPORT



900 South Spring Street, Springfield, IL 62704 • 217.782.9386

Note: New address 524 South 2nd St., Suite 400, Springfield, IL 62701

### INCIDENT HIGHLIGHTS

**DATE:**

February 11, 2020

**TIME:**

10:45 AM (approximate)

**VICTIM:**

60 – year old public works employee

**INDUSTRY/NAICS CODE:**

Other Support Activities for Road Transportation / 488490

**EMPLOYER:**

City Public Works Department

**SAFETY & TRAINING:**

No documented safety training for mobile equipment involved.

**SCENE:**

Public works building

**LOCATION:**

Eastern Illinois

**EVENT TYPE:**

Fatality involving mobile equipment

**INSPECTION #:** 1462559

**REPORT DATE:** April 27, 2020

## Municipal Employee Fatally Injured While Jumpstarting Mobile Equipment

### SUMMARY

On February 11th, 2020, at 12:26 PM, the Illinois Department of Labor – Division of Occupational Safety and Health (IL-OSHA) received notice of an occupationally related death of a municipal employee. IL-OSHA inspectors arrived at 3:15 PM to investigate the death of a 60-year-old male found unresponsive at approximately 10:45 AM under a trenching machine tire inside the east vehicle bay of the city public works department streets/alleys building. The employee was pronounced dead at the scene.

### CONTRIBUTING FACTORS

**Key contributing factors identified in this investigation include:**

- The parking brake on the mobile equipment involved was not functional.
- Several pieces of equipment were stored in a cramped, poorly lit vehicle bay.
- The battery of the mobile equipment involved required jumpstarting.
- The victim was working alone.

### RECOMMENDATIONS

**To help prevent similar occurrences, employers should:**

- Perform periodic inspections of mobile equipment.
- Review and follow mobile equipment operator’s manual and manufacturer’s recommendations.
- Conduct documented initial and refresher training on mobile equipment
- Additional recommendations on page 8.



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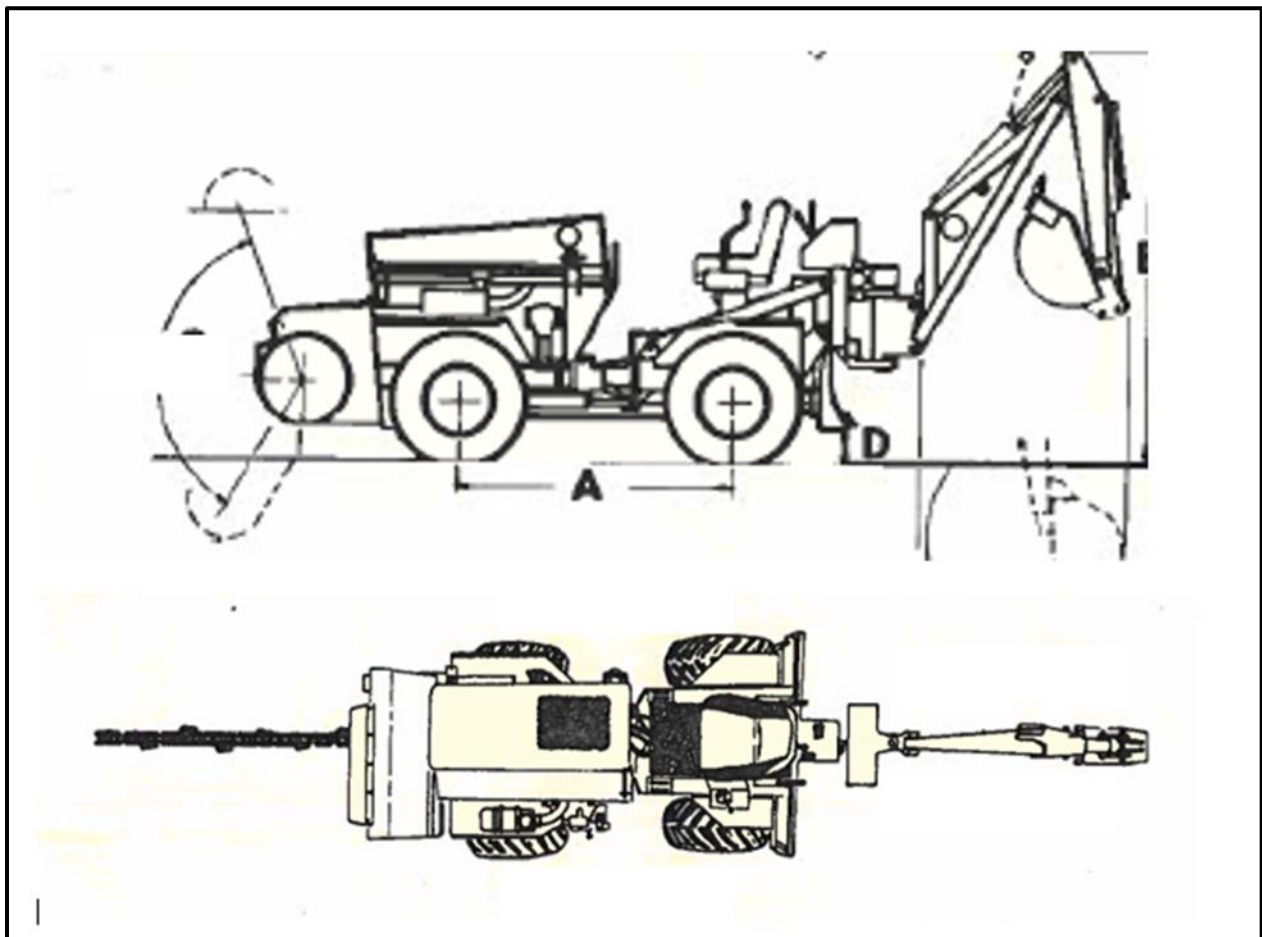


Figure 1 – Davis Fleetline 30+4 Trencher.

### BACKGROUND

The victim, a 60 year-old male approximately 6'-2" in height and 293lbs. in weight, worked for the city public works department. The victim worked part-time, averaging 32 hours per week, Monday through Thursday, 6:00 AM to 2:00 PM. The victim's typical morning work routine was to arrive as the first employee and conduct water and sewer meter readings throughout the city until approximately 7:00 AM. The victim was hired by the city in 2002 and was considered the public works department's primary equipment operator as



## INCIDENT REPORT



900 South Spring Street, Springfield, IL 62704 • 217.782.9386

well as a general laborer for miscellaneous projects.

The piece of mobile equipment involved was a Davis Fleetline 30+4 Trencher manufactured in 1976 and purchased new by the city. The trencher is used to perform earth moving by use of a trenching boom arm or backhoe attachment. The trencher is propelled by a four-wheel-drive hydrostatic transmission with two mechanisms, the creep control knob (figure 11) or the “mono-stick” (figure 9), to control forward and reverse travel and one mechanism, the “mono-stick”, to control mid-body articulation. Due to the design of the closed loop hydrostatic transmission, the trencher cannot be towed without removing two drive shafts. The operator's manual was kept separate from the trencher at the city water/sewer building. The employer was able to produce the original operator's manual within fifteen minutes of IL-OSHA's request.

The east vehicle bay of the city streets/alleys building is of post and beam construction, metal skinned, with no insulation and a 20' sliding door located on the north wall. The roof is of gable construction, with the ridge running east to west. The bay is approximately 50' long x 30' wide x 20' high (figure 2). The bay is unheated with a dirt floor. It has electricity and is illuminated with overhead lights. Illumination is poor, requiring flashlights to make out details.



*Figure 2 – City streets/alleys building.*

At the time of the incident, the trencher was co-mingled with several other pieces of equipment to include: A Case L-Series tractor with an attached finish mower, a three-point-hitch rear blade attachment, a battery charger connected to an extension cord, a Wikomi three-point-hitch cement mixer, and an Eglin street sweeper (figures 3-6). Close placement of equipment resulted in limited walking and working areas between





## INCIDENT REPORT



900 South Spring Street, Springfield, IL 62704 • 217.782.9386

equipment. No rafter-supported chain hoist or other lifting equipment was present. The battery charger was observed between the tractor and trencher (figure 3). NOTE: A floor jack was brought in to facilitate rescue operations after the incident occurred.

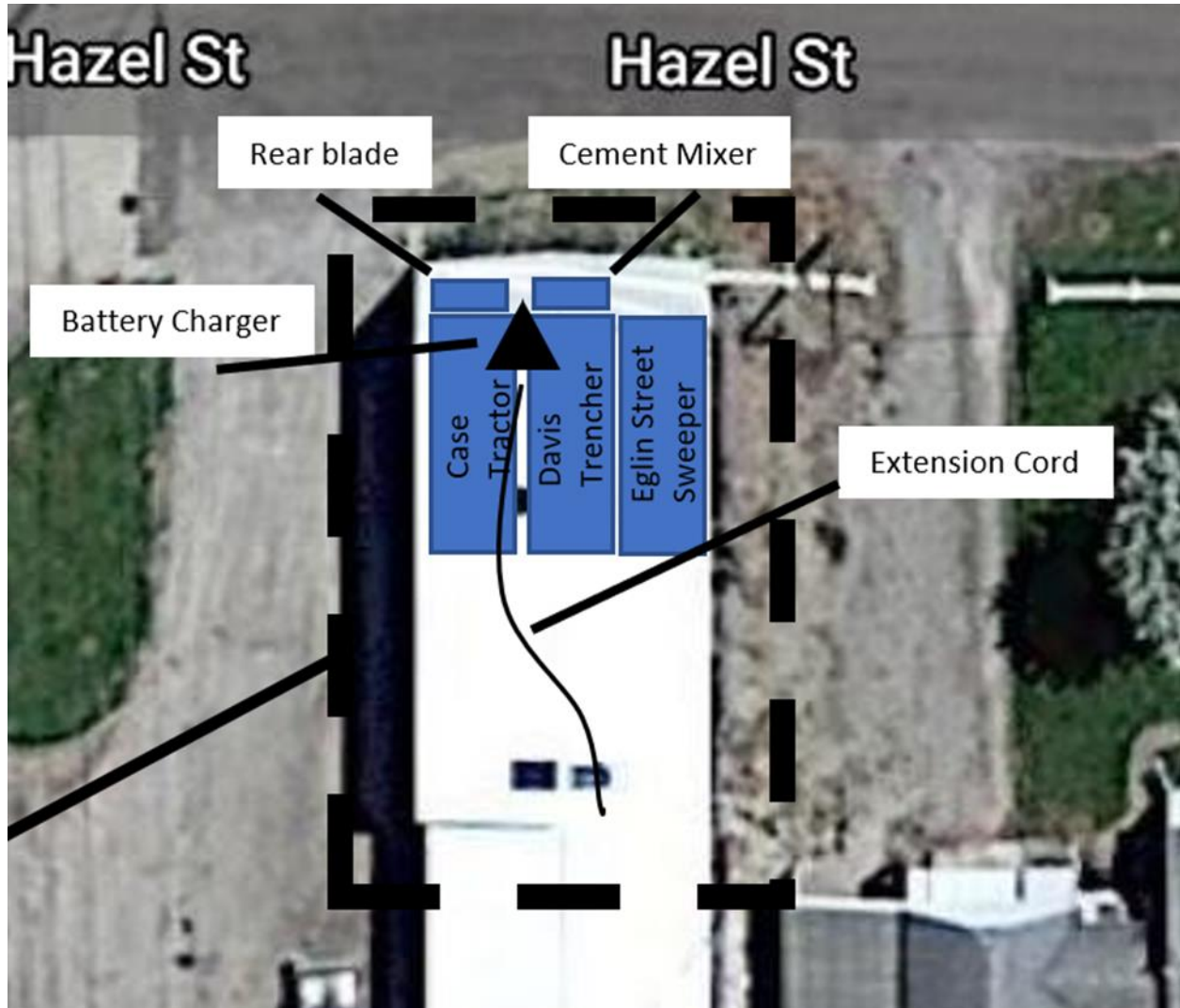


Figure 3 – East vehicle bay showing place of equipment and implements.

The city, as of 2010, had 880 citizens and encompassed less than one square mile. The city currently has 19 employees. The city has a part-time mayor who is also employed full-time in the private sector.

The public works department has three employees, two full-time and one part-time (the victim). Employees work a 7.5 hour day shift unless emergencies require additional hours. The public works department operates out of the water/sewer building and the streets/alleys building. Public works employees maintain city-owned



## INCIDENT REPORT



900 South Spring Street, Springfield, IL 62704 • 217.782.9386

infrastructure to include a sanitary treatment facility, roads, alleys, grounds (snow removal, salting, patching of potholes, landscaping), sanitary lines and water lines. Water is purchased from a third party. The streets/alleys building is used for vehicle storage, office space and storage of miscellaneous supplies.

### INCIDENT

The incident occurred on February 11<sup>th</sup>, 2020, approximately between 9:40 AM and 10:45 AM. The victim arrived late to work (time is undetermined) on February 11<sup>th</sup> due to family issues and did not perform morning meter readings. The two full-time public works department employees, the superintendent and a laborer, performed morning meter readings at 7:00 AM instead. The city had previously made plans to trade-in several pieces of equipment (including the trencher involved in the incident) for newer equipment with a local dealer. The local dealer was scheduled to pick up the equipment on February 11<sup>th</sup>.

The victim arrived to work and was working alone inside the east vehicle bay of the streets/alleys building to prepare the trencher for pick-up by the local dealer when the incident occurred. While reporting to city hall (approximately 9:00 AM), located approximately three blocks from the streets/alleys building, the two other public works employees observed the victim's vehicle at the streets/alleys building. These two employees later discovered the victim unresponsive under the equipment.

At approximately 9:20 AM and again at 9:40 AM, a public works department employee spoke to the victim via phone from city hall about the trade-in equipment. After a scheduled morning meeting, the two public works employees departed city hall and arrived at the streets/alleys building at approximately 10:45 AM. While exiting the vehicle, both employees heard what they described as a misfiring engine running at high idle. The superintendent entered the personnel door on the west end of the vehicle bay and found the victim face-down, under the northwest (left-rear) tire of the Davis trencher. The superintendent walked around and in-between equipment in the bay to turn off the trencher's engine and check for a pulse on the victim. The other public works department employee called 911 and stayed on the phone until first responders arrived.

The local fire protection district assistant fire chief arrived between 11:01 AM and 11:04 AM. He started a patient assessment and directed a public works department employee to retrieve a floor jack from another part of the building. The employee returned with a floor jack and placed it between the ground and trencher's backfill rear blade. The fire protection district fire chief and a fire protection district EMT arrived at approximately 11:04 AM. On-site responders jacked-up the trencher and pulled the victim from under the trencher's tire.

First responders performed cardiac arrest interventions in accordance with regional protocols to include: chest compressions, intubation with a supraglottic airway device and administration of advanced life support medications through an intraosseous vascular access system. Despite these efforts, the victim was pronounced dead at the scene. The county coroner arrived to take possession of the victim's body and transported it to a local funeral home.



## INCIDENT REPORT



900 South Spring Street, Springfield, IL 62704 • 217.782.9386

### INVESTIGATION BY IL-OSHA

IL-OSHA inspectors arrived at the streets/alleys building on February 11<sup>th</sup> at approximately 3:15 PM to investigate the incident. The public works superintendent confirmed that the scene of the incident had not been altered since removal of the victim's body. Observations were as follows: The battery charger was displaced by first responders and came to rest upside down on the Case tractor's southeast tire (figure 5) with the charging cables located between the tractor's south wheelbase gap. The trencher's battery was displaced outside of the battery box (figure 6) coming to rest upside down, resting on the friction clutch (driven sheave assembly). The trencher's battery sustained friction burns due to contact with a moving belt (figure 7). The trencher's creep lock lever was in the down position (see figure 8).

The trencher's parking brake was in transport mode, physically in the down position (see figures 8 & 9). The trencher's starter safety latch was flipped away from the "mono-stick" and was resting in the down position (figure 9). The trencher's warning stickers were in place and legible. Based on impressions on the dirt floor, the following measurements are approximate: The trencher's hydraulic angle backfill blade moved 12" from west to east (rear to front), the southwest (right-rear) tire moved 30" from west to east (rear to forward), the southeast (right-front) tire moved 32" from west to east (rear to front), the concrete mixer's front shoe (west end) moved 5" from north to south. Based on measurements on the concrete mixer drum, the trencher's digger boom arm teeth appeared to have contacted and scraped the mixer drum paint from west to east approximately 5".

It was determined through employee interviews that the trencher had electrical issues that required the battery to be charged to start it (jumpstarted). An electrical cord was observed running from the west wall along the floor to the battery charger. The battery charger cables were observed to be attached to the trencher's battery according to statements from on scene emergency personnel.

On February 18, 2020, IL-OSHA observed multiple tests using the trencher involved in the incident. An equipment dealer representative familiar with the operation of the trencher operated the trencher at their facility. A piece of 4"x 6" lumber approximately 3' long was used to simulate a human leg.

- Test 1. – With the trencher running, the safety start latch was placed into operational mode and the creep lever lock was placed in the down position (unlocked), the creep control lever was depressed, causing the trencher to lurch forward.
- Test 2. – An attempt was made to engage the parking brake. It could not be engaged.
- Test 3. – The piece of lumber was positioned in front of the northwest (left-rear) tire with the trencher running, when force was applied to the creep control lever, the trencher lurched forward. The trencher's movement caused the lumber to be slammed into the creep control housing coming to rest beyond the trencher's northeast (left-front) tire.
- Test 4. – The piece of lumber was laid on the ground in front of the northwest (left-rear) tire when the





## INCIDENT REPORT



900 South Spring Street, Springfield, IL 62704 • 217.782.9386

trencher's propulsion system was engaged, the trencher's tire drove over the piece of lumber.

- Test 5. - With the trencher running and the boom arm braced to deny forward (east) travel, the piece of lumber was laid on the floor that was covered in loose dirt (simulating conditions from the vehicle bay floor) in front of the northwest (left-rear) tire. Upon activating the trencher's propulsion system the tire's rotation intermittently pulled the lumber under the tire.

Based on observations, interviews and evidence, IL-OSHA presumes the following occurred: The victim was either sitting on the trencher or standing on the dirt floor in a small pocket created between the Case tractor and trencher wheelbase while jumpstarting the trencher. It is presumed the victim either lost his balance stepping off the trencher or reached for the battery charger cables while standing in the wheelbase pocket when the victim made unintentional contact with the creep control knob lever or the "mono-stick." The trencher lurched forward, caught the victim's right foot/ankle/leg under the northwest (left-rear) trencher tire and propelled him forward on to the ground as the trencher drove up his back. The northwest (left-rear) tire came to rest on the victim's back just below his T9 vertebra. The victim was pinned to the ground until discovered by employees at approximately 10:45 AM. According to the pathology report, the victim died of blunt force trauma and traumatic asphyxiation.

### FINDINGS

**Direct Cause:** The trencher's propulsion system was engaged either by the creep control knob lever or the "mono-stick." Once the trencher's propulsion system was activated, the trencher's northwest (left-rear) tire forced the victim to the ground allowing the trencher to drive up his back, trapping him under the equipment and causing severe injuries that resulted in death. Based on the trencher's tire tread pattern, the concrete mixer feet impressions on the dirt floor and the trencher's digger boom arm teeth scrape marks on the concrete mixer drum, it appears the trencher moved approximately 30" from west to east (rear to front).

#### Indirect Causes:

1. The trencher's parking brake was not functional and was not engaged at the time of the incident (see figures 8 and 9). During interviews, it was determined employees do not routinely utilize the trencher's parking brake as part of shut down procedures. The trencher's parking brake has dry friction pads that contact the driveline when engaged. A functional and engaged parking brake would have immobilized the trencher, potentially preventing the incident. The original owner's manual, provided by the employer, states in several sections and warning statements to engage the parking brake before shutting down the equipment.
2. The trencher's creep lock lever was not engaged, thereby allowing the propulsion system to function. The creep lock lever is an L-shaped bracket hinged on the creeping control lever housing that prevents creep control lever movement by a friction lock wedged rubber block (figures 11 and 12). The original owner's manual does not address using the creep lock lever to prevent forward or rear movement but



## INCIDENT REPORT



900 South Spring Street, Springfield, IL 62704 • 217.782.9386

warns that failure to disengage the creep lock lever before utilizing the “mono-stick” may damage the creep lock lever.

3. The trencher’s safety start latch was prematurely placed in a position to allow trencher movement for the work environment and task at hand. The original operator’s manual instructions outlined on page 21, as well as the trencher’s warning labels, were followed by the employee despite the outcome. The start latch acts as an interlock, ensuring the “mono-stick” is in a neutral position before engaging the starter, thereby preventing equipment from lurching during starting operations (see figure 10). Removing the start latch allows the propulsion system to function and avoids accidentally activating the starter (figure 9).
4. Close placement of equipment in the vehicle bay resulted in limited walking and working areas between equipment and could have caused the victim to unintentionally engage the creep control lever or “mono-stick” due to restricted movement. When the trencher came to rest, it left approximately 11-inches between the tractor's southeast (right-front) wheel and the trencher's northeast (left-front) wheel along a north/south axis. Based on field measurements and tire dimensions, the tractor's and trencher's tires would have aligned in a north/south axis, requiring the victim to either step over, on, or in between tires, thereby increasing the likelihood of slips, trips and falls.
5. The trencher battery required jumpstarting before use. Performing this task requires an employee to connect the battery charger cables to the battery, start the trencher, and then walk around or reach across the trencher engine to unhook the cables before the trencher can be moved. If the trencher could have simply been started, the victim could have remained seated on the trencher.
6. The victim was working alone. Two employees jumpstarting the trencher may have prevented unintentional activation of the creep control lever or “mono-stick” since one employee could remain seated on the trencher and the other could perform the battery charging activity. Additionally, if a second employee had been nearby when the trencher pinned the victim, the employee could have rendered immediate assistance, called for additional help and notified first responders.
7. Lighting was poor in the vehicle bay. Poor lighting in this environment can affect safety and lead to slips, trips or falls and the inability to properly focus on a work task.





## INCIDENT REPORT



900 South Spring Street, Springfield, IL 62704 • 217.782.9386

### CONCLUSION

The documented employee statements of not engaging the parking brake (it was also not functional) as part of the normal shut down procedures, the creep lock lever not engaged, the start latch interlock placed to allow trencher movement and the cramped work area resulted in the victim unintentionally engaging the trencher's propulsion system through either the "mono-stick" or the creep control lever. It is presumed the trencher forced the victim's right chest onto the trencher's northeast tire (left-front). The victim then came to rest with his head facing east between the Case tractor's and the trencher's wheelbase opening, which then allowed the trencher to drive onto the victim's back.

### RECOMMENDATIONS

- Perform periodic inspections of mobile equipment to ensure all components are functional. If an inspection reveals that a safety component is not functional, remove the equipment from service until it is repaired.
- Review and follow operator's manual and manufacturer's recommendations for all current and future mobile equipment owned by employer.
- Ensure employees designated to operate mobile equipment receive equipment specific initial and refresher training.
- Ensure, through direct supervision, that all employees operate mobile equipment safely and in accordance with the operator's manual.
- Identify work activities that are prohibited while working alone.
- Ensure equipment storage areas have adequate work space for employee movement and access.
- Ensure equipment storage areas have adequate lighting.
- If possible, replace older generation mobile equipment with newer generation equipment that contains features such as safety interlocks that do not require action by the user.

### CITATION(S)

One citation was issued and classified as serious.

- 29 CFR 1926.600(a)(3)(ii): Whenever the equipment is parked, the parking brake shall be set. Equipment parked on inclines shall have the wheels chocked and the parking brake set.

On and before 11FEB2020 and 18FEB2020, it was determined through site inspection and field testing that the employer did not ensure functionality and use of the parking brake of the Davis Fleetline 30+4 trencher located in employer's streets/alleys building east vehicle bay exposing employees to struck-by and crush hazards.



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REPORT



900 South Spring Street, Springfield, IL 62704 • 217.782.9386



*Figure 4 – East vehicle bay (standing west looking east).*





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900 South Spring Street, Springfield, IL 62704 • 217.782.9386



*Figure 5 – Case L-Series Tractor, southeast wheel.*





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REPORT



900 South Spring Street, Springfield, IL 62704 • 217.782.9386

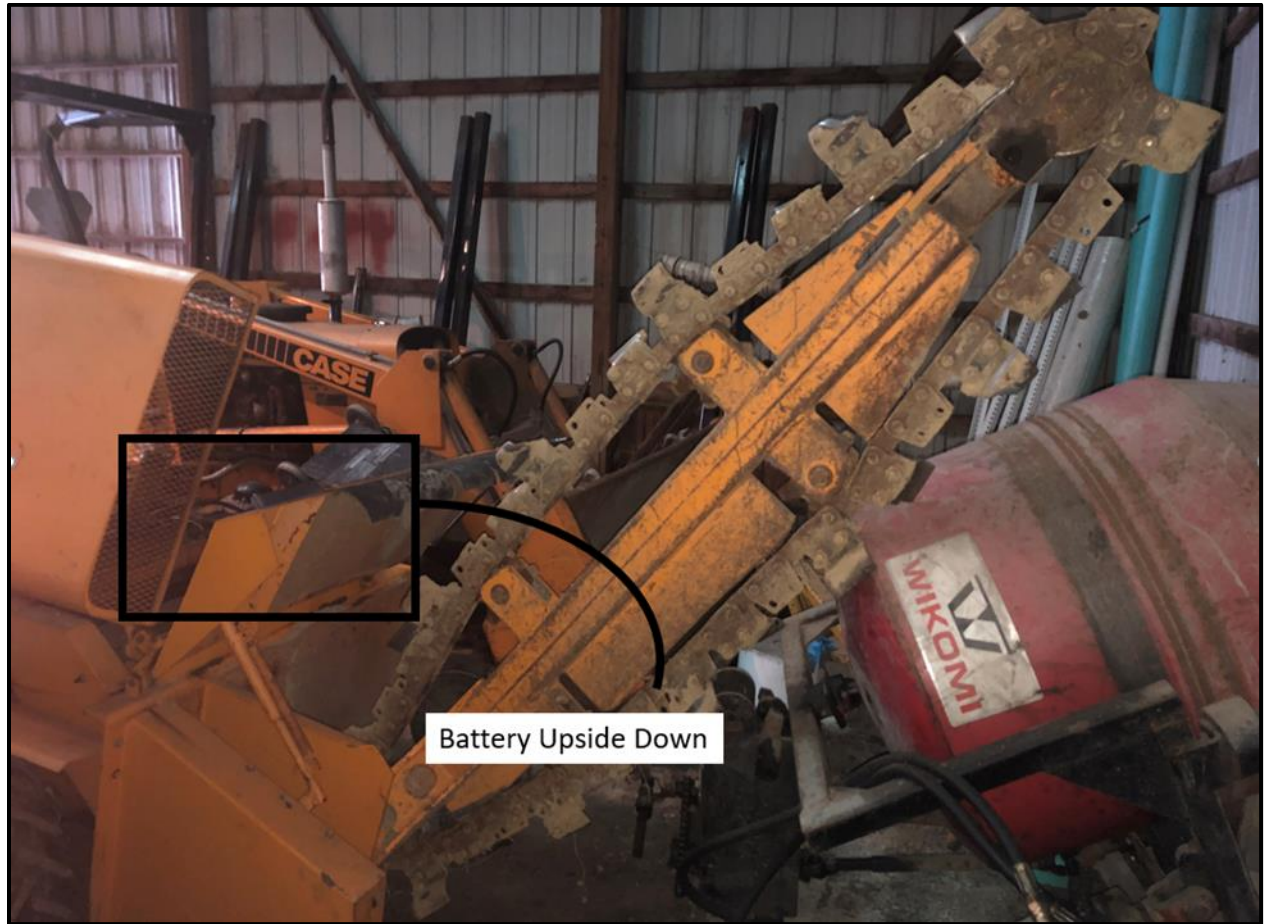


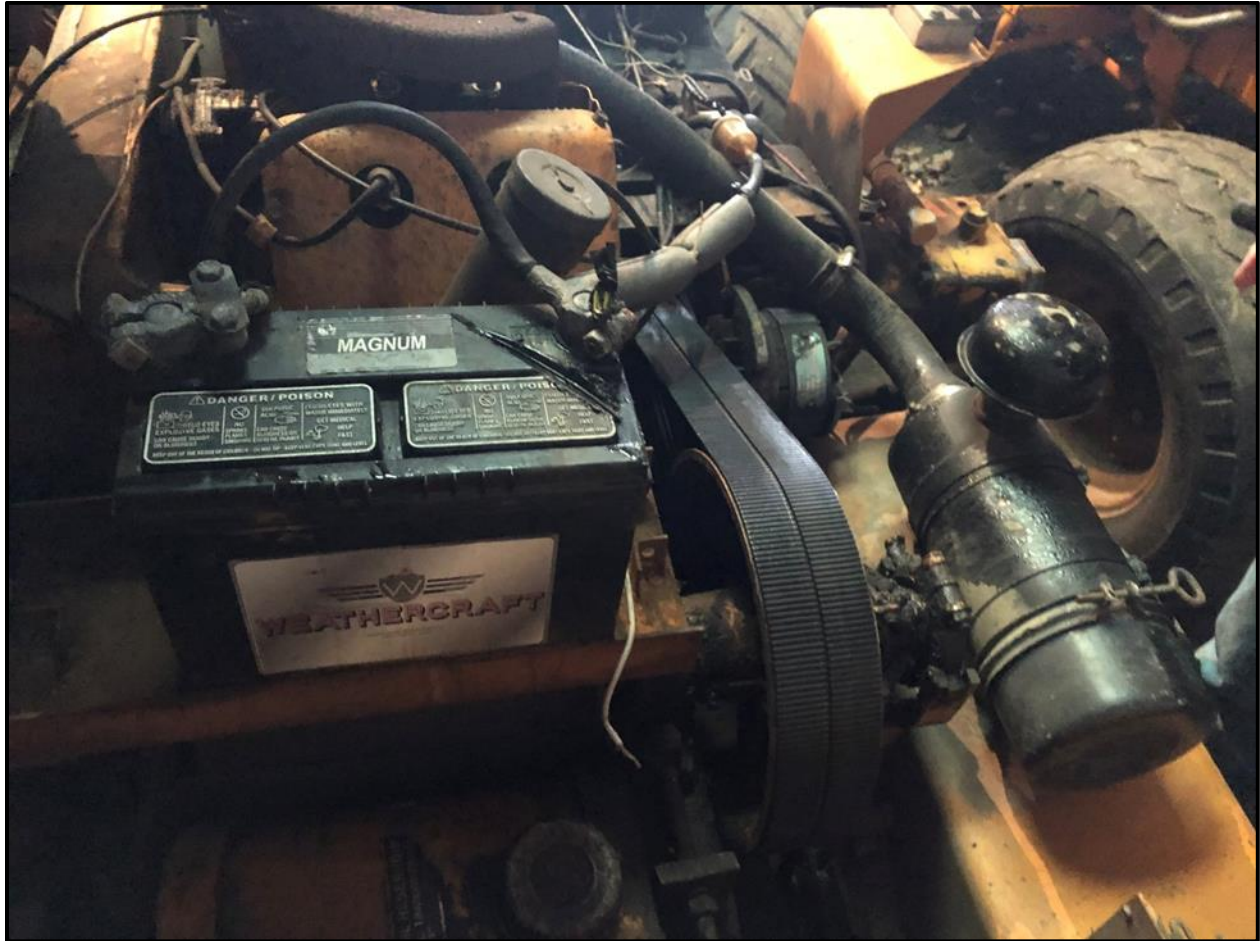
Figure 6 – Standing south of trencher (facing north).



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900 South Spring Street, Springfield, IL 62704 • 217.782.9386



*Figure 7 – Trencher battery with friction damage.*





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900 South Spring Street, Springfield, IL 62704 • 217.782.9386

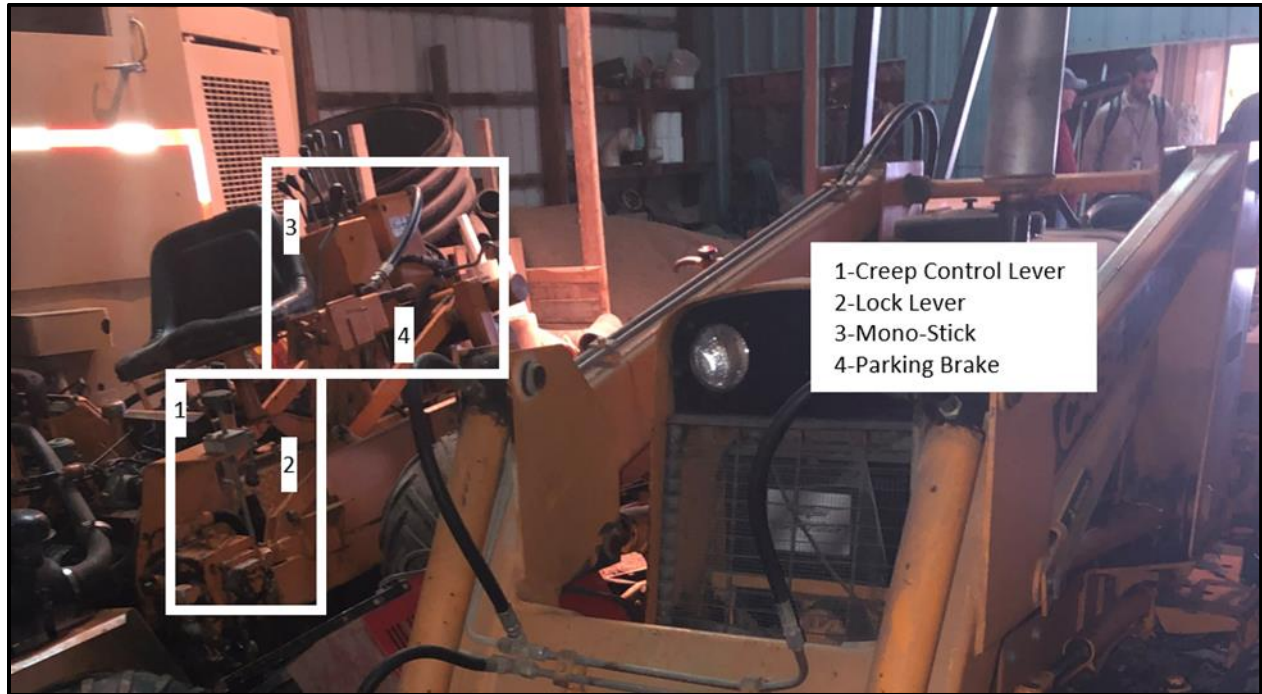


Figure 8 – Standing northwest, facing southwest (condition when IL-OSHA arrived).





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900 South Spring Street, Springfield, IL 62704 • 217.782.9386

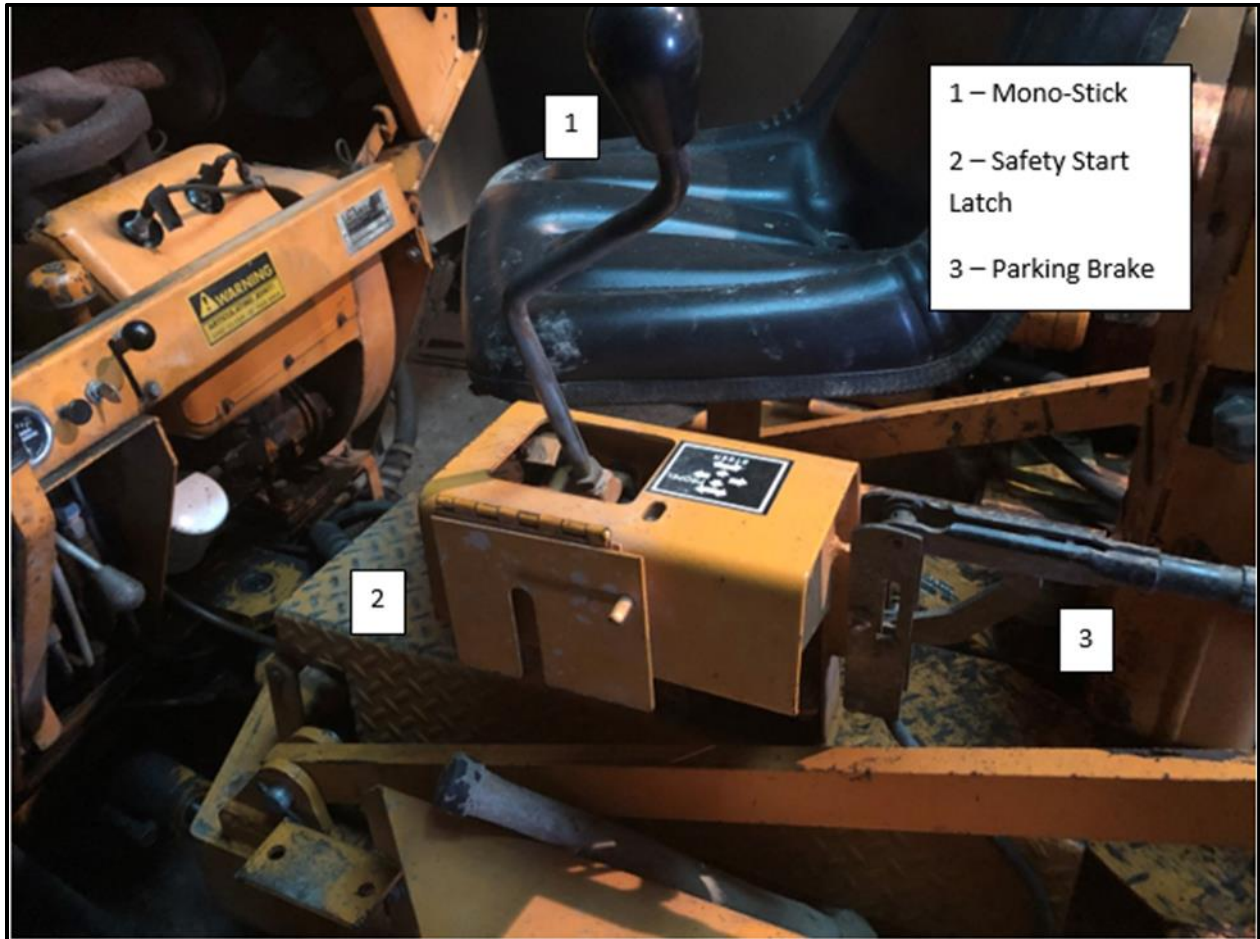


Figure 9 – "Mono -stick", safety starter latch and parking brake handle (condition when IL-OSHA arrived).



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*Figure 10 – Safety start latch in "start" mode.*

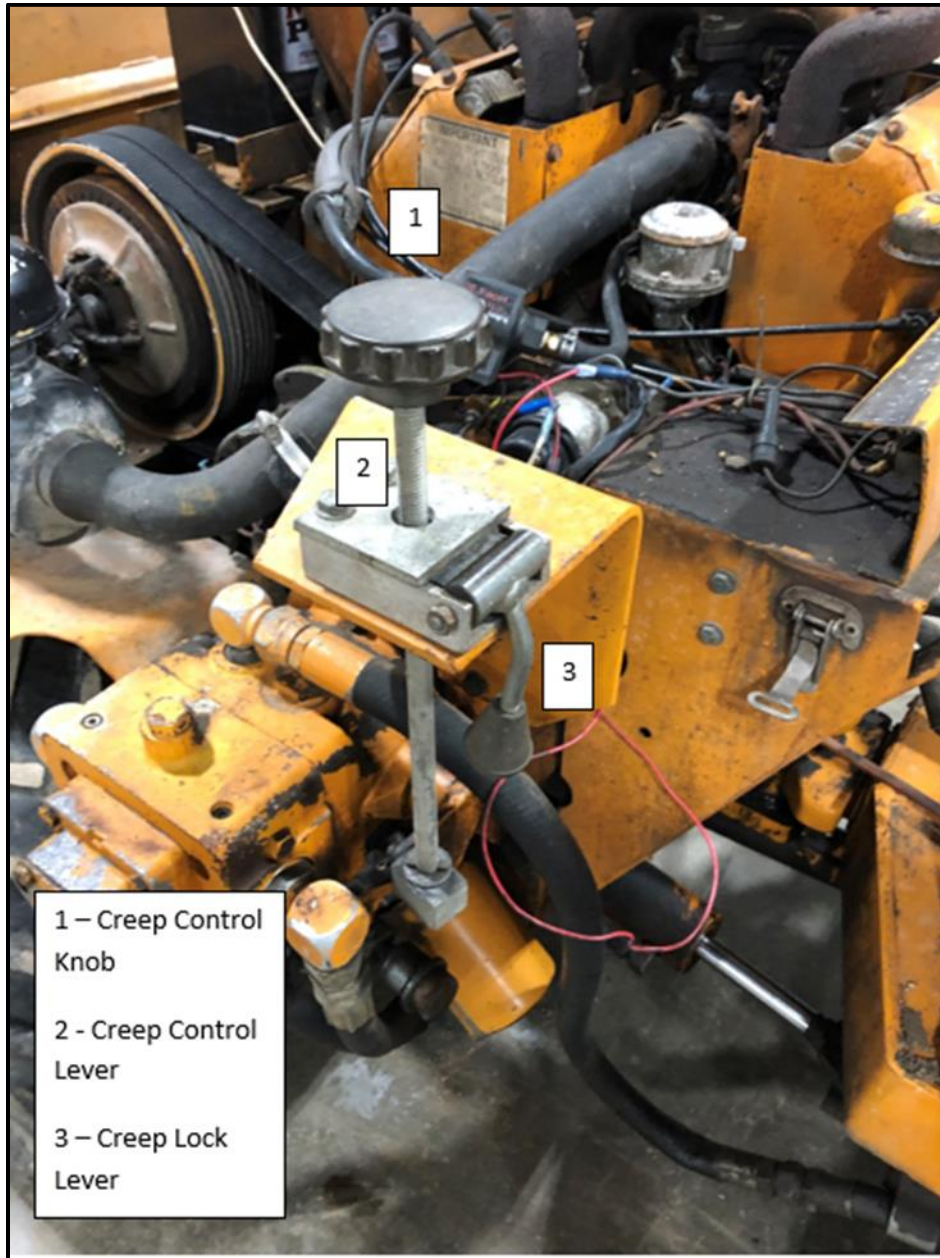




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REPORT



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- 1 – Creep Control Knob
- 2 - Creep Control Lever
- 3 – Creep Lock Lever

Figure 11 – Creep lock lever in "unlock" position.

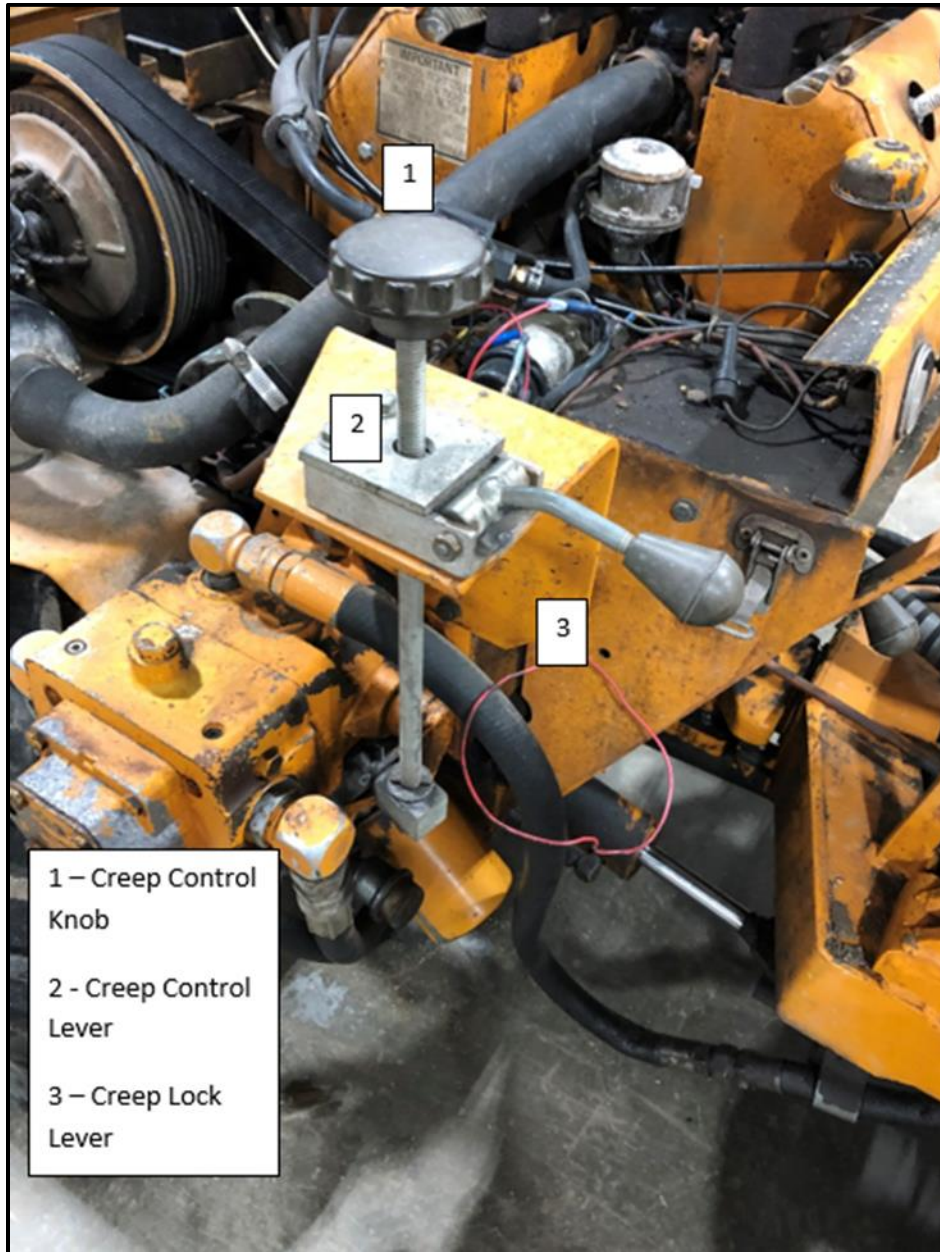




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REPORT



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- 1 – Creep Control Knob
- 2 - Creep Control Lever
- 3 – Creep Lock Lever

*Figure 12 – Creep lock lever in "lock" position.*