

Rapid Lesson Sharing

Event Type: Snapped Wheel Studs

Date: August 1, 2026

Location: U.S. Route 6 South of Castle Gate, Utah

Success Story

A Solid Maintenance Program and Sound Decision Making Prevented a Bad Outcome

From the first indication there was a problem, to the point when the right rear duals were found to be missing eight of their ten wheel studs, was less than ¼ mile.

Summary

On August 1, on the way to a fire in Oregon, a contract Type 6 engine nearly lost their right rear duals because a mechanic working for another company—who had recently rotated their tires—had failed to properly torque the rear lug nuts.

Damage was sustained to both wheels, as well as initially undetected damage to the wheel studs on the engine's left side. No damage to the rest of the engine or injuries to any of the crewmembers occurred.

Thorough preventative maintenance resulted in a smooth-riding vehicle, which in turn allowed immediate recognition that something felt wrong when all three crewmembers on board detected a slight vibration. This allowed the driver to immediately pull over into a safe turnout location before the right rear wheels could come off—avoiding a bad outcome.

The Story



Looking south toward Helper, Utah from a mesa above U.S. Route 6. Engine 323, seen parked in the turnout on U.S. Route 191, was heading north when a vibration was felt by all crewmembers, prompting the driver to pull over. The entire stretch along which the vibration was felt (less than ¼ mile) is seen in this photo.

This had already been a strange mobilization for Western Fire Resources Engine 323 (E323), based in Canadian, Texas.

On July 28 they had been ordered to the Big Grass Fire in southeastern Oregon and southwestern Idaho. But, on July 29 the engine experienced a radiator failure when a foreign object found its way between the back side of the radiator and the cooling fan—puncturing the radiator in several places. As the engine crew—composed of an Engine Captain, an Engine Operator Trainee, and Firefighter Type 1 Trainee—awaited the repair in Bernalillo, New Mexico, their resource order was cancelled.

On July 31, with the radiator repaired, Engine 323 was ordered to a different fire in Oregon, the Second Flat Fire. They got back on the road and made it into Utah that night.

At approximately 1045 hours the next day, as they were traveling north on U.S. Route 6 south of Castle Gate, Utah, the engine crew suddenly experienced a slight vibration. As they approached the traffic light at the corner of U.S. Route 6 and U.S. Route 191, a discussion began about the vibration.

The driver, an Engine Operator Trainee and qualified Type 1 Firefighter (FFT1), began to position the engine to pull over to check out the vibration that all three crewmembers had also simultaneously felt. While stopped at this red light, as they identified a turnout to the right along U.S. Route 191, another motorist pulled up to their left side and informed them that they may have a flat on one of the right rear duals. This confirmed the vibration that the engine crew had felt for the previous ¼ mile and they eased off the road to take a look.

Upon inspection, they noticed that all tires were still inflated but that the right rear duals were missing eight of their ten wheel studs. A crewmember (FFT1 Trainee), checked the torque on the remainder of the wheels and discovered that the left rear wheel was not torqued to the correct torque of 129 foot-pounds—per the specifications for Ram Heavy Duty Trucks.

Via text, the Engine Captain was able to contact one of the administrative assistants back in Canadian, Texas to get a local service truck sent to their location.

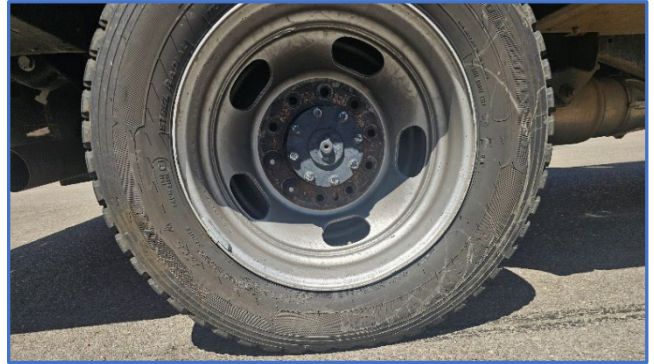
At 1125 hours, the Engine Captain was able to send a text to the Captains of Western Fire Resources engines E806 and E212—both on separate fire assignments in Colorado—directing them both to immediately torque their lug nuts, just in case. None were found to be loose.

At approximately 0200 hours in the morning, the service truck arrived from a private towing service located in Price, Utah. The mechanic was able to replace the wheel studs, but noticed that both wheels were destroyed, with six of the 10 holes on each wheel elongated.

Because this was Sunday and E323 needed to be on the fire in south central Oregon by 1800 hours on Monday, the Engine Captain talked the service truck driver out of his spare, and another spare he had back at his shop.

The engine spent 20 days on the Second Flat Fire. During this time, they needed to remove the outer left dual to remove a rock.

After reinstalling that wheel and torquing the lug nuts, one of those wheel studs snapped. Because wheel studs are sold in boxes of 12, the crew had two spares and was able to replace the broken wheel stud.



Top Photo – Taken immediately after discovering that eight of ten wheel studs were missing.

Middle Photo – Right rear hub after the remaining two lug nuts and the two right rear wheels were removed.

Bottom Photo – Elongated holes were discovered on both wheels resulting from the wheel stud failure and vibration.

During their demobilization trip back to their home base in the Texas Panhandle, one more wheel stud snapped on the left dual, indicating that failure to torque those lug nuts had also done some previously undetected damage to the left rear wheel studs.

Upon returning to their home base, all ten wheel studs on the left rear hub were immediately replaced.

Analysis

- ❖ From the first indication there was a problem, to the point when the right rear duals were found to be missing eight of their ten wheel studs, was less than ¼ mile.
- ❖ The engine crew immediately noticed the vibration and were discussing pulling over at the stoplight when another motorist confirmed an issue with the engine's right rear.
- ❖ The driver limped the vehicle over to a large turnout designed for snow chain installation, an additional 200 yards from the stoplight.
- ❖ Recent maintenance to replace a worn drag link was key in identifying the vibration, as no steering parts had any play in them that would have masked such a vibration.
- ❖ The crew successfully utilized topography to get texts out to coordinate with their home base to get wheel studs and lug nuts ordered to a local auto parts store, and a mechanic on the way who was willing to make the repair in a turnout at 0200 hours.
- ❖ The crew successfully diagnosed the most likely cause of nearly all of the wheel studs simultaneously failing to be the failure of a mechanic to properly torque the wheel studs on the most recent tire rotation, which had occurred roughly nine hundred miles before this.
- ❖ All Western Fire Resources engines were and continue to be equipped with a torque wrench and 7/8-inch deep well impact socket for torquing the lug nuts.
- ❖ A timely text was sent out to the other two Western Fire Resources engines that were currently on fires—directing them to immediately stop and torque their lug nuts.

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Lessons

- ❖ While Western Fire Resources engine crews have often made it a point to retorque lug nuts within 100 miles of the removal of a tire, this was not done on this assignment. As a standard procedure going forward, all engines will now torque all lug nuts immediately after receiving an engine back from a mechanic. And engine crews will retorque lug nuts within the first 100 miles of each mobilization.
- ❖ Elapsed time from the first noticeable vibration to the point at which all but two wheel studs had snapped off was less than 15 seconds at highway speeds. Given that only two wheel studs remained, the engine crew was very fortunate to have had a safe turnout they could reach before total failure occurred. To the crew, it felt like a flat tire on the rear duals, not that the right-side duals were about to come off.
- ❖ Once they got back on the road, it was less than one mile before they lost all cell service for approximately 30 miles. Since this incident, Western Fire Resources is planning to equip all engines with Starlink satellite wifi systems to ensure connectivity nearly anywhere.
- ❖ Because their route to the fire passed through Winnemucca, Nevada, the crew stopped at the [Denio Engine Rollover](#) fatality site to pay respects to Will Hawkins and Jacob O'Malley, the two Bureau of Land Management firefighters who were killed in an engine rollover accident after a right rear tire failure. This reinforced how fortunate this engine crew was to have not lost the rear duals and how important it is to periodically check lug nut torque.



The near miss of nearly losing a set of right rear duals caused the Engine Captain to think of the Denio Engine Rollover fatality site that was not too far off the route to their fire. The engine crew stopped at this site to pay their respects to Will Hawkins and Jacob O'Malley, who died in 2016 after their BLM engine rolled following the blowout of a right rear tire.

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