

OE-3: 2016-04

July 2016

Ladder Safety

PURPOSE

This Operating Experience Level 3 (OE-3) document provides information about a safety concern related to workers who use ladders during work at Department of Energy (DOE) facilities.

BACKGROUND

Events involving fall protection issues or injuries while workers use or descend from ladders occur on a regular basis and are reported to the Occurrence Reporting and Processing System (ORPS). ORPS ladder-related events fall into two categories: lack of fall protection when working at height, and falls while climbing or descending a ladder.

The Occupational Safety and Health Administration (OSHA) reports that falls are the leading cause of death in construction, with falls from ladders making up one-third of those deaths. Because ladders represent a significant potential danger, it is worthwhile to periodically review safety precautions.

THE EVENTS

On January 4, 2016, a worker at Thomas Jefferson National Accelerator Facility (TJNAF) tore a rotator cuff when he misjudged the distance to the ground while descending a ladder. After accessing a valve located on top of a cold box, he descended the ladder but misjudged the distance on the last step to ground and began to fall. His left hand maintained his grip on the handle of the cold box, so his left shoulder absorbed the whole impact from his body weight as he turned to avoid falling. He heard a “pop” but finished work, went home, and called his supervisor. The next morning he went to site Medical and was referred

to an offsite specialist, who diagnosed a torn rotator cuff that would require surgery. (ORPS Report SC--TJSO-JSA-AF-2016-0002)

On March 26, 2015, a worker at the Fermi National Accelerator Laboratory (Fermilab) fell and fractured a rib while descending a ladder. He had been inspecting an area above the ceiling to ensure that a clear path was available to install a camera. He had cleared the area below the ladder by moving furniture aside. Using a step ladder, he inspected a few locations, and as he descended, he missed the last step and fell. His left side contacted nearby chairs and he landed on his back. The worker packed his equipment, left his supervisor a voicemail, and went home. However, over the weekend, he experienced severe pain and went to the Emergency Room, where an x-ray revealed a broken rib. (ORPS Report SC--FSO-FNAL-FERMILAB-2015-0002)

On January 21, 2015, a worker at the Hanford Low Activity Waste Building was seen working from a step ladder above 6 feet without fall protection. While assisting a crew pulling wire through conduit, he stood on an upper rung while the foreman stabilized the ladder from below. As the wire became more restricted, he moved to a higher point, putting him 7 feet, 6 inches above the floor below. When a Field Safety Representative informed the worker that he was at risk, he immediately left the work location to obtain a suitable anchorage and fall protection system. (ORPS Report EM-RP--BNRP-RPPWTP-2015-0002)

On March 11, 2014, at the National Renewable Energy Laboratory (NREL), a subcontract worker was observed standing on a ladder on the third floor of a parking garage, working on a security camera positioned overhead. The 8-foot, four-

legged ladder was positioned only 6 inches away from a 46-inch-high fixed guardrail, on the other side of which was a 30-foot drop down to street level. The worker was standing on the third rung of the ladder. The height of the worker while standing on the ladder and the position of the ladder reduced the passive protection provided by the guardrail and exposed the worker to a potential fall of more than 30 feet. (ORPS Report EE-GO--NREL-NREL-2014-0010)

DISCUSSION

The TJNAF worker had inspected the ladder and did not identify any hazards. He performed the task without incident and began to descend the ladder. At the bottom of the ladder, he misjudged the distance to the ground. Work planning and conditions did not play a part; instead, lack of full attention to surroundings may have contributed.

The Fermilab event was caused by situations familiar in many work areas: large/multiple workloads and approaching deadlines with no additional technicians to help complete the tasks. This fact results in increased stress and fatigue, and the available workers “squeezing in” one more task. Human Performance Improvement evaluations indicate that often employees’ work ethics will push them to complete tasks before they take the weekend off, even if they have physical limitations or are fatigued. Supervisors should be aware of employees’ work habits and limitations, and assign work reasonably.

When the Hanford worker found he was unable to complete the task from the original work height, he moved higher on the ladder. He was aware that this action gave him more leverage, but he was unaware that it placed him above the 6-foot limit.

At NREL, a Safe Work Permit was in place, but had not been written to consider work on ladders in places where a worker was exposed to falls greater than the distance from ladder step to the floor (i.e., over the side of a guardrail and down to a street).

Title 10 Code of Federal Regulations (CFR) Part 851, *DOE Worker Safety and Health Program*, requires that work be planned in advance so that

hazards can be mitigated or eliminated. It also specifies that workers have the responsibility to maintain situational awareness and stop work when they notice dangers. 10 CFR Part 851 is the overarching regulation for DOE, and incorporates 29 CFR Part 1926, *Safety and Health Regulations for Construction*.

Relevant OSHA regulations can be found in 29 CFR Part 1926, Subpart M, *Fall Protection*, and Subpart X, *Stairways and Ladders*. In addition, the OSHA website provides fact sheets and “quick cards” with information to keep workers safe (see References section below). At certain heights, employers are required to install fall protection systems to arrest a fall and enable workers to keep their hands free for the job. However, ladder work does not always meet the height specifications where these requirements apply. It is incumbent on the work planners and workers/users to ensure that they perform a pre-work check that includes the steps below, at a minimum:

- Choose the right ladder for the job.
- Ensure the user is within the weight limits of the ladder.
- Inspect the ladder before use to ensure it is good, working condition.
- Keep the area clear around the base of the ladder.
- Set the legs correctly.
- Maintain 3-point contact (two hands and a foot or two feet and a hand) when climbing or descending the ladder.
- Stay near the middle of the ladder and face the ladder while climbing up/down.

Readers can find additional resource material by clicking on the links provided in the References section.

CORRECTIVE ACTIONS

After the events were reported, the sites all took corrective actions.

TJNAF distributed an all-staff email reminding workers to maintain situational awareness while completing tasks.

Fermilab supervisors were reminded to re-evaluate priorities when additional technicians are not available to help with increased workloads or when deadlines are approaching.

Hanford supervisors discussed the incident with workers, emphasizing the importance of fall protection requirements and maintaining situational awareness.

At NREL, the project manager immediately repositioned the ladder 180 degrees so that the working side of the ladder was next to a vertical structural column. This eliminated the potential fall hazard and work resumed. The applicable Safe Work Permit was revised to include safety provisions when work on ladders was performed next to guardrails.

CONCLUSION

These events serve as reminders of the need for constant awareness. If there is no schedule pressure or defective ladder or item, situational awareness may be the last or only barrier to an accident. Safe Work Permit development should include the question, "What if?" in order to include/consider off-normal conditions. It is also important for supervisors to consider whether their workers may attempt to work through fatigue or time pressures without asking for additional help. Refer to [OE Summary 2016-02, Situational Awareness: Focus Can Decrease Risk and Injuries](#), for more information on situational awareness.

REFERENCES

ORPS Report SC--TJSO-JSA-AF-2016-0002, *ENG-16-01014 Employee Injures Left Shoulder While Descending a Ladder*

ORPS Report SC--FSO-FNAL-FERMILAB-2015-0002, *Fractured Rib Resulting from Fall*

ORPS Report EM-RP--BNRP-RPPWTP-2015-0002, *Subcontract Employee Violated Project Fall Protection Requirements*

ORPS Report EE-GO--NREL-NREL-2014-0010, *Near Miss - Subcontractor Exposed to Fall Hazard While on Ladder*

Title 10 Code of Federal Regulations (CFR) Part 851, *DOE Worker Safety and Health Program*

Stairways and Ladders: A Guide to OSHA Rules 29 CFR 1926 at

<https://www.osha.gov/Publications/ladders/osha3124.html>

Occupational Safety and Health Administration (OSHA) FactSheet, *Reducing Falls in Construction: Safe Use of Stepladders* at

<https://www.osha.gov/Publications/OSHA3662.pdf>

Occupational Safety and Health Administration (OSHA) FactSheet, *Reducing Falls in Construction: Safe Use of Extension Ladders* at

<https://www.osha.gov/Publications/OSHA3660.pdf>

Operating Experience Summary, 2016-02:

Situational Awareness: Focus Can Decrease Risk and Injuries at

http://energy.gov/sites/prod/files/2016/06/f32/OES_2016-02.pdf

ADDITIONAL RESOURCES

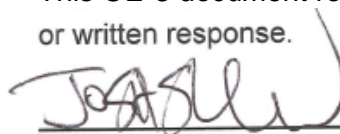
American Ladder Institute, 330 N. Wabash, Suite 2000, Chicago, Illinois 60611

<http://www.americanladderinstitute.org/>

American National Standards Institute standard: ANSI A14.1, A14.2, A14.5 - *Ladder Safety Requirements*

Questions regarding this OE-3 document can be directed to Ashley Ruocco at 301-903-7010 or ashley.ruocco@hq.doe.gov.

This OE-3 document requires no follow-up report or written response.



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