

OE-3: 2016-03

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Injuries: Recent Trend in Musculoskeletal Disorders

PURPOSE

This Operating Experience Level 3 (OE-3) document provides information that workers at Department of Energy (DOE) facilities can use to reduce the risk of musculoskeletal disorders (MSDs) and injuries. In addition, planners may find useful information for developing work packages that consider ergonomic principles.

BACKGROUND

Over the past year, the number of events reported into the DOE Occurrence Reporting and Processing System (ORPS) that involve work-related MSDs has increased. According to the Occupational Safety and Health Administration (OSHA), MSDs affect the muscles, nerves, blood vessels, ligaments and tendons. Workers in many different industries and occupations can be exposed to risk factors at work, such as lifting heavy items, bending, reaching overhead, pushing and pulling heavy loads, working in awkward body postures and performing the same or similar tasks repetitively. Exposure to these known risk factors for MSDs increases a worker's risk of injury.

According to the Bureau of Labor Statistics, disorders/injuries that affect muscles, nerves, and tendons are one of the most frequently reported causes of lost and restricted work time. MSDs can be either acute or chronic in their development. Contributory factors include high task repetition, forceful exertions, and repetitive/sustained awkward postures. Awkward postures can place excessive force on the joints and overload muscles and tendons around the affected joint.

However, risks for work-related MSDs can be minimized or mitigated with ergonomic principles, effectively designing the workplace, including work flow and movement, to fit the person performing the job. Successfully implemented and used, an ergonomic process continually identifies risk factors and puts control measures in place to reduce or eliminate those risks.

DISCUSSION: AWARENESS OF WORKPLACE ISSUES

On December 23, 2015, a hazardous waste handler (WH) at Sandia National Laboratories (SNL) sustained an injury to his abdomen (a hernia) while moving drums for loading. First, the WH attempted to position a 55-gallon drum of diesel fuel that weighed 425 pounds. Because there was room for only one person in the storage area and the drums were butted up against each other, the WH had to squeeze in and reach to grab the far lip of the drum. As he moved the drum a few inches away in order to position a dolly under it, he felt a twinge in his lower abdomen. He continued to work. After the WH and another worker slid the drums onto the transport vehicle, they went back to the storage location. There, the WH moved a 30-gallon drum containing lab trash that weighed 33 pounds off a spill pallet onto the ground. At this time the WH heard a "pop" in his abdomen and felt a lump. He was taken to SNL Medical and then to the hospital, and diagnosed with a hernia. Surgery to correct the condition was performed in January. (ORPS Report NA--SS-SNL-4000-2016-0001)

On September 16, 2015, a K-27 worker helping to load 26-pound cases of water onto a truck felt a "pop" in his upper arm. Since he felt no immediate pain he continued to work, but after 15 minutes he

did feel pain and was escorted to Health Services for evaluation. After being diagnosed with a torn bicep, he returned to work the next day with limitations but no restrictions, and had surgery to repair the injury. (ORPS Report EM-ORO--UCOR-KENVRES-2015-0004)

On April 6, 2015, at Argonne National Laboratory East (ANLE), a model fabricator tore a bicep tendon while holding an empty six-foot-long, 26-pound wire-carrying tray. As he held one end of the tray and a coworker held the other, he switched the tray from his right hand to his left with his arm extended down. At that point, he heard a "pop" inside his left elbow and felt pain. The weight was well within reason for a two-person lift. Subsequent surgery corrected the torn tendon. (ORPS Report SC--ASO-ANLE-ANLEFMS-2015-0004)

On January 22, 2015, at Savannah River Site (SRS), an Evaluator was throwing diversionary devices (smoke grenades and explosive simulators) during a training exercise, he felt a sharp pain in his right arm. He had thrown eight devices before this one, using the standard technique of tossing them underhanded, ensuring they landed approximately 15 feet away. He reported to SRS Medical, where he was initially diagnosed with shoulder strain and tissue swelling. However, when he returned for a post-check, he was diagnosed with a bicep/tendon tear, placed on restricted duty, and scheduled for surgery. The "deployment" of the devices (multiples thrown in a short time period) was determined to be the immediate and root cause for the injury, but the Formal Analysis Team did not deem it a viable option to discontinue the use of devices during training exercises. (EM-SR--WSIT-SECFOR-2015-0001)

On January 8, 2015, an employee at the National Renewable Energy Laboratory (NREL) injured his left shoulder as he pulled down on a pry bar while cleaning the internal components of a wind turbine gear box. The work had been done several times and was covered by a Safe Operating Procedure. Because they encountered difficulty in getting metal particulates cleaned out, they had to rotate the shaft by placing a 6-foot pry bar into one of the

bolt holes at approximately head height and pull down. During one point of high resistance, while the employee attempted to pull down on the pry bar, he felt a "pop" in his shoulder. He completed his shift, but on the drive home he noticed pain in his left arm, diminished strength and paresthesia in this extremity. On his next work day, January 12, he experienced increasing pain and diminished ability to lift and supinate his arm. He went to the NREL Occupational Health Clinic and was referred to an offsite orthopedic doctor who determined that shoulder surgery was necessary. (ORPS Report EE-GO--NREL-NREL-2015-0005)

CORRECTIVE ACTIONS

Managers at sites in the ORPS reports reacted quickly to raise awareness and prevent recurrence.

At SNL, communicating expectations for the staging of drums located needed improving in order to obtain the most ideal and optimal staging of drums for ease of pickup with consideration for all business needs. Corrective actions to be taken include: considering an industrial ergonomics consultant to observe work and training employees on staging drums and push and pull manipulation. A Lessons Learned will be published as well.

At K-27, because work had been performed as planned with no changed conditions, the moving/lifting techniques were evaluated against the ergonomics guidelines manual to determine if changes were warranted. Then the manual process of water flat handling was evaluated to determine if some or all of the handling could be done with a forklift. Evaluators determined that all coolers could be serviced by moving the entire pallet from cold storage with a forklift, filling the coolers, and returning the remainder of the pallet to cold storage. Some manual handling was still required but the amount was significantly reduced.

At ANLE, the incident was communicated to employees via the *Weekly Wrap* safety newsletter.

At SRS, the Information Security and Analysis Department plans to include the diversionary

device incident in a future Operating Experience publication.

At NREL, a Lesson Learned was created about knowing when to stop and re-evaluate work when faced with unexpected conditions. For example, when material handling work activity involves making choices between damaging expensive equipment or possible injury, this should be seen as requiring further examination and employees should stop work. A qualified ergonomist evaluated material handling activities surrounding gear box assembly, disassembly, and cleaning for possible alternative methods. (That evaluation indicated that the higher a person's hands are when exerting, the greater the loss in strength, such that when pushing or pulling at shoulder height one's strength is only 40% of that exerted at waist height.) The project also updated procedures to include considerations for potential ergonomic improvements.

CONCLUSION

Simple improvements can help reverse the trend of MSD injuries at DOE facilities. During work planning, managers and employees should consider performing additional walk-downs to identify lifting-pulling danger points and incorporate ergonomic principles to mitigate them. Wherever feasible, lift equipment should be used. And finally, workers should be reminded to stop and discuss work-arounds when they believe they could incur an MSD.

REFERENCES

NA--SS-SNL-4000-2016-0001, *Waste Handler Injury Due to Overexertion*

EM-ORO--UCOR-KENVRES-2015-0004, *K-27 Employee Injury during Material Handling*

SC--ASO-ANLE-ANLEFMS-2015-0004, *Left Bicep Tendon Rupture Requires Surgery to Repair*

EM-SR--WSIT-SECFOR-2015-0001, *Training Exercise Injury*

EE-GO--NREL-NREL-2015-0005, *Employee Shoulder Injury Results in Surgery*

Hernia (Enterocoele) at <https://www.nlm.nih.gov/medlineplus/hernia.html>

OSHA Ergonomics: Prevention of Musculoskeletal Disorders in the Workplace
<https://www.osha.gov/SLTC/ergonomics/>

Materials Handling: Heavy Lifting
<https://www.osha.gov/SLTC/etools/electricalcontractors/materials/heavy.html>

Pulling Cables (transcript accompanied by training video) - lifting, pulling, pushing, reaching, bending
https://www.osha.gov/dts/vtools/construction/pullinqcables_fnl_eng_web.html

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



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