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# LLNL Lessons Learned LLNL

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## Falling Objects - a Dangerous Trend

In the past year there have been two LLNL incidents involving falling objects during roofing projects that generated Occurrence Reports. In the past 17 months there have been multiple DOE Occurrence Reports resulting from various falling objects. Many of these events involved decontamination and decommissioning (D&D) activities.

In October 2003 two Savannah River workers dropped an 8-foot section of pipe when it became unbalanced. The pipe fell 13 feet, striking a radiation control technician (RCT) on the hardhat and left shoulder.

In February 2004 a Rocky Flats D&D Worker dropped a 10-pound sledgehammer, which fell two stories to the first floor, striking a worker on the back. The worker suffered minor contusions.

In March 2004 an LLNL construction subcontract worker dropped a 30 inch by 30 inch piece of plywood through a hole in the roof while pushing down on the flashing. The plywood fell 12-feet to the office area below, missing an employee by 10 feet.

In May 2004 a Rocky Flats D&D worker dropped a 6-foot piece of angle iron while using a portable band saw on a scaffold. The angle iron fell five feet, striking an RCT on the hardhat and shoulder. The RCT was not injured.

In July 2004 an Ohio West Valley Site D&D worker dislodged a 25-pound piece of temporary grating (approximately 2 foot by 3 foot). The grating fell and struck another worker's head.

In September 2004 at LLNL, a roofing subcontractor removed the hub attached to a vent pipe to install a roof jack. The 3-foot section of steel vent pipe dropped through the penetration 20 feet to the floor, landing 10 feet away from an employee at his workstation. The vent pipe had been disconnected years ago during renovation activities and had been left freestanding.

In October 2004 a small pair of side-cutter pliers fell from a Hanford worker's tool pouch, striking the hardhat of a worker standing below.

In November a Hanford worker on a scaffold dropped a 7-foot piece of angle iron, which fell 55 feet and landed on a workstation, narrowly missing a worker. Workers had become complacent about the yellow boundary tape, and routinely crossed the boundary to perform their work. Again in November a three-pound scaffold clamp fell 30 feet, missing a Hanford employee on the ground by three feet.

In November 2004 a Savannah River carpenter's scaffold wrench fell out of his pocket, landing near workers below.

In December 2004 a Hanford ironworker cut the tie-wire on a 13-foot piece of rebar weighing 59 pounds. The rebar slipped from the tieoff and fell 15 feet, landing within 1 foot of a laborer working inside the rebar wall. The safety watch had failed to stop the ironworker from working above the laborer.

In February 2005 a 3-pound drift pin (used to align holes before bolting steel components together) fell from approximately 48 feet to the decking below, missing a Hanford subcontract worker by approximately six inches.

In March 2005 an empty two-gallon plastic sprayer fell approximately 40 feet, landing within 20 feet of three Hanford employees on the ground. The sprayer fell from a five-gallon bucket that was connected in a rope/pulley configuration to raise/lower materials from the ground to the 56-foot elevation of the building.

## Analysis

- Work planning, work authorization, and work execution deficiencies were causal factors in most of these events.
- Job Hazard analyses often did not address the potential for falling objects.
- Work planners did not specify that areas below the elevated work should be cleared and roped off to protect personnel from falling objects.
- Ground-workers became complacent about yellow boundary tape and crossed the boundary to perform work.
- When elevated work is performed, the elevated workers have the primary responsibility for safety.

## Recommended Action

1. Ensure a comprehensive job hazards analysis is performed and documented when planning construction, repair, and D&D activities with elevated work areas. Emphasis should be placed on the control of falling objects and avoidance of working below other work activities.
2. Adequately secure the area below elevated work. Install barricades and post warning signs, and require all personnel to remain clear of the hazard area to protect against falling objects.
3. Review reroofing projects to determine if the building residents' access should be restricted.
4. Wear hardhats when working in areas where falling object hazards are likely to occur.
5. Maintain control of tools and materials when working at an elevation. Use wrist straps and tool tethers, toeboards, screens, and guardrails to prevent falling objects, and debris netting or canopies to catch falling objects.
6. Adequately secure equipment/tools before raising or lowering.
7. Obey posted warning signs and all boundary tape and/or barriers.
8. Remove debris and remove/secure tools from the scaffold at the end of the shift.
9. Ensure toeboards are installed on scaffolds.

## Where to Get Help or More Information

- Your ES&H Team Industrial Safety Engineer.
- Document 2.2, *Managing ES&H for LLNL Work,* in the *ES&H Manual.*
- Document 11.1, "Personal Protective Equipment," in the *ES&H Manual,* section 3.8 Head Protection.
- LLNL Lessons Learned, "Falling Objects Can Be Dangerous"  
[http://www.llnl.gov/es\\_and\\_h/lessons/e\\_falling\\_objects.htm](http://www.llnl.gov/es_and_h/lessons/e_falling_objects.htm)
- LLNL Lessons Learned, "Worker Falls Through Fiberglass Roof"  
[http://www.llnl.gov/es\\_and\\_h/lessons/fiberglass\\_e.html](http://www.llnl.gov/es_and_h/lessons/fiberglass_e.html)

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