**Material Handling Events Across DOE**

This past March, an Oak Ridge National Laboratory (ORNL) employee was severely injured when a 1,585 lb. scattering chamber on a stand with wheels overturned while it was being moved down a ramp into the bed of a box truck. The scattering chamber assembly was 65 inches tall and had a high center of gravity. The work activity was to load the scattering chamber and stand into a privately owned truck after it was sold as excess equipment at auction. Two Salvage Handlers were moving the scattering chamber – one Salvage Handler was behind the chamber as they guided it down the slightly inclined (6.25%) loading ramp and the other Salvage Handler was in the fall zone in the direction of motion. When the leading wheels reached the transition between the loading ramp and the truck bed, the scattering chamber tipped over and onto the Salvage Handler in the path of travel, pinning him underneath. Staff from within the facility responded immediately, removed the scattering chamber from the injured employee, and rendered aid. The employee sustained fractures to his lower legs, a broken right thumb, and several lacerations.

Figure 1. Scattering chamber

Figure 2. Overturned chamber in truck

The investigation identified a number of contributing causes that are applicable here at Jefferson Lab:

1. The equipment was top-heavy, but that not recognized by the workers, although it was identified on the transfer paperwork.
2. The equipment was on wheels, so the workers assumed that it was safe to roll the equipment. Therefore they chose not to use a forklift to move the equipment.
3. There had been a recent reorganization and a number of the workers and supervision were inexperienced. One worker was “matrixed” to the organization for the day. Supervision was not actively engaged.
4. There were time pressures to quickly move the equipment for the customers.
5. One of the workers had been involved in an earlier mishap with this equipment tipping, but did not share that information.

In the past few months, there have been a number of events across the DOE complex involving movement of heavy material.

- On June 5, 2014, a subcontract worker and his partner at the Hanford, Washington site, were in the process of weighing a 55-gallon satellite accumulation drum prior to transport. The worker positioned himself between the drum and the pallet, bent slightly at the waist to clear the forklift tines, grabbed, and pulled the drum towards him with his partner's assistance. As the drum began to tilt back, he slid his left foot back for stability and was abruptly stopped by the pallet. Unable to use his left foot for stability, he wound up seated on the pallet behind him, holding the drum at a 45-degree angle. The other worker, still holding onto the drum, immediately pulled the tilted drum back to its up-right position.
- On June 3, 2013, a vendor at the National Renewable Energy Laboratory (NREL) in Golden, Colorado arrived to deliver a duct lift. The duct lift was secured in the back of the vendor's pickup truck with a ratchet strap. When the ratchet strap was released, the lift rolled towards the gate of the truck, and one of its front legs struck the vendor as it pivoted and landed on the ground. The vendor fell to the ground and struck his head.

In these 3 cases, there was a failure to recognize the inherent instability of the load. This allowed a worker to place himself between the load and an obstruction – the proverbial “rock and a hard place”. All 3 cases demonstrate the need to consider “what if” in work planning – What if this equipment is top heavy? What if the load tips? What if the load shifts during transport?