



## Research note

## Heavy equipment and truck-related deaths on excavation work sites

Michael McCann \*

*The Center to Protect Workers' Rights, 8484 Georgia Avenue, Ste. 1000, Silver Spring, MD 20910, USA*

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**Abstract**

**Problem:** Contact with objects and equipment is the third leading cause of death in construction. This study examines heavy equipment- and truck-related deaths in the excavation work industry in construction. **Methods:** The Bureau of Labor Statistics Census of Fatal Occupational Injuries identified 253 heavy equipment related deaths on construction sites in the Excavation Work industry for the years 1992–2002. **Results:** Heavy equipment operators and construction laborers made up 63% of the heavy equipment- and truck-related deaths. Backhoes and trucks were involved in half the deaths. Rollovers were the main cause of death of heavy equipment operators. For workers on foot and maintenance workers, being struck by heavy equipment or trucks (especially while backing up for workers on foot), and being struck by equipment loads or parts were the major causes of death. **Discussion:** Ensuring adequate rollover protective structures for heavy equipment, requiring fastening of seat belts, adoption of a lock-out/tagout standard, establishing restricted access zones around heavy equipment, and requiring spotters for workers who must be near heavy equipment or trucks would reduce the risk of heavy equipment- and truck-related deaths in construction. **Impact on industry:** Safety of heavy equipment operators in particular is a major concern in excavation that needs to be addressed.

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**Keywords:** Construction; Heavy equipment; Trucks; Struck by; Caught in/between; ROPS; Seat belts; Surveillance**1. Problem**

There has been extensive research on deaths due to trenching, especially cave-ins (National Institute for Occupational Safety and Health, 1985; Rees, 1977; Suruda, Castillo, Helmkamp, & Pettit, 1994; Suruda, Smith, & Baker, 1988; Suruda, Whitaker, Blowski, Philips, & Sesek, 2002; Twardowski, 1997). Estimates vary, but data based on the Census of Fatal Occupational Injuries (CFOI), a United States Bureau of Labor Statistics database, for 1992–1999 identified 54 deaths per year from trenching for all industries except mining and shipbuilding (The Center to Protect Workers' Rights, 2002). Eighty percent of these were in construction. Excavation-related heavy equipment, such as backhoes, and vehicles accounted for 11% of trench-related deaths, about 6 deaths per year.

Heavy equipment- and vehicle-related deaths have been extensively studied in highway work zones (U.S. 1987 Standardized Industrial Classification (SIC) code 1611 — Highway and Street Construction), especially by the U.S. National Institute for Occupational Safety and Health (NIOSH). One study found an average of 70 work zone deaths per year, 66 of them related to vehicles or heavy equipment in work zones (Pratt, Fosbroke, & Marsh, 2001). Just over two-thirds of these heavy equipment and vehicle-related work zone deaths involved workers on foot, equally split between traffic vehicles intruding into the work zone and construction vehicles or heavy equipment (especially while backing up). The latter mainly comprised trucks (61%). One quarter of the deaths involved vehicle or equipment operators, with the primary injury source being construction heavy equipment (53%) and trucks (26%). One third of the workers operating heavy equipment were not classified in heavy equipment operating professions.

Agricultural tractors accounted for about 30% of machinery-related occupational deaths from 1980–1989, according to data from the NIOSH National Traumatic

\* Tel./fax: +1 212 481 2569.

E-mail address: michael.mccann@att.net.

Occupational Fatalities (NTOF) surveillance system (Pratt, Kisner, & Helmkamp, 1996). Forklifts, cranes, excavation machinery, and loaders each accounted for over 5% of deaths, according to the NTOF study. The large number of agricultural tractor rollovers led to the development of

rollover protective structures (ROPS) in the 1950's as a preventive measure (Myers, 2000).

In the United States, according to CFOI data, at least 90 workers have been killed because of compactor (steam rollers, road pavers) rollovers and collisions since 1993

Table 1  
FACE program reports on excavation deaths in construction

FACE # (1)	Title
<i>Equipment Operator Deaths</i>	
92AK01301	Bulldozer operator crushed by bulldozer during construction of oil exploration island — Alaska
MN9218	Excavation company owner dies after bulldozer slips over the side of a flat bed trailer
95CA02001	Truck driver run over by heavy equipment in California
FACE 9616	Equipment operator dies after scraper overturns — Virginia
96CA01001	Operator dies when his front-end loader falls into an excavation and crushes him in California
96CA012	Truck driver run over by heavy equipment in California
96MN08401	Construction worker dies after being run over by bulldozer he had been operating
97AK01901	A low bed trailer operator was crushed during a surface compactor tipover — Alaska
97CA008	Operating engineer is crushed by a backhoe attachment when it disconnects from its tractor in California
97KY032	Bulldozer operator killed in rollover
FACE 9801	Truck driver dies after crane boom strikes truck cab at construction site — Virginia
98NJ09401	Equipment operator killed after backing a forklift into an excavation
99WI041	Heavy equipment operator pinned after bulldozer slides off flatbed trailer
01MI001	Operator pinned between the hydraulic tilt cylinder housing and the frame of a skid-steer loader
01MI056	Grader operator run over by rear tire while jumpstarting grader
FACE 2002–08	Hispanic dump-truck driver dies after being caught between frame and dump body of off-road truck while performing routine lubrication — Tennessee
02CA001	A heavy equipment operator died when the dump truck he was backing slide down an embankment and then tumbled over
02KY025	Backhoe operator dies after backhoe tips over
<i>Worker on Foot Deaths</i>	
FACE 9403	Pipefitter crushed by 5,000-pound shoring plate — South Carolina
93MN008	Worker dies after being run over by a digger derrick truck
94MA06701	New Hampshire construction project manager dies when crushed by five ton concrete slab on Massachusetts construction site
94MD063	Construction foreman crushed by excavator — Maryland
97CA009	Laborer is crushed by a clam shell bucket when it disconnects from its crane in California
97MN01901	Excavation laborer dies after being run over by a caterpillar
97MN047	Worker dies after being run over by a caterpillar
97NE041	Backhoe bucket crushes workers in trench
98AK01801	Ironworker crushed between crane outrigger and back of stretch deck trailer
98AK023	Apprentice lineman killed when caught in trencher
99MN032	Laborer run over by dump truck while paving lot
99TX390	A plumber repairing a water line in a trench died when he was struck by the bucket of a backhoe
FACE 2000–26	Construction laborer dies after being struck in the head by backhoe bucket — North Carolina
00KY09601	Construction worker dies after being struck by a falling excavator bucket
00MA5501	Construction laborer killed after a backhoe slid into an excavation — Massachusetts
01AK00801	Mechanic struck by backhoe while assisting with excavator disassembly
01AK01501	Construction laborer/equipment operator crushed by skid-steer loader
02MI157	Hispanic laborer dies when dump mechanism of lift truck activates and crushes him between truck bed bulkhead and bridge beam
FACE 2003–06	Hispanic carpenter dies after being crushed between the loader bucket of a backhoe/loader and a concrete building — North Carolina
FACE 2003–12	Hispanic pipe layer dies after being struck by excavator (track hoe) bucket on construction site — South Carolina

(1) NIOSH Fatality Assessment and Control Evaluation (FACE) Programs.

FACE: NIOSH Division of Safety Research, Morgantown, WV.

AK: Alaska Department of Health and Social Services, Anchorage, AK.

CA: California Department of Health Services, Oakland, CA.

KY: Kentucky Injury Prevention and Research Center, Lexington, KY.

MA: Massachusetts Department of Public Health, Boston, MA.

MD: Maryland Division of Labor and Industry, Baltimore, MD.

MI: Michigan State University Occupational and Environmental Medicine, East Lansing, MI.

MN: Minnesota Department of Health, Minneapolis, MN.

NE: Nebraska Department of Labor, Lincoln, NE.

NJ: New Jersey Department of Health and Senior Services, Trenton, NJ.

TX: Texas Department of Health, Austin, TX.

WI: Wisconsin Division of Health, Madison, WI.

National Institute for Occupational Safety and Health. NIOSH Fatality Assessment and Control Evaluation Website. <http://www.cdc.gov/niosh/face/faceweb.html>.

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