

## O\*NET Database and Occupational Exposures in Construction

The Occupational Information Network (O\*NET), a program sponsored by the U.S. Department of Labor, Employment and Training Administration, provides detailed standardized information for about 1,000 occupations based on the Standard Occupational Classification (SOC; *see* page 25).<sup>1</sup> The exposure data are selected from O\*NET's Work Context – Physical Work Conditions, which rates various work conditions and hazards with exposure scores by occupation. A score of zero means that workers are never exposed to a given hazard, whereas a score of 100 is assigned when exposure occurs on a daily basis or continually.<sup>2</sup>

According to the O\*NET exposure scores, many construction occupations require working in high places and climbing ladders or scaffolds on a daily basis. Elevator installers, roofers, drywall installers, power-line installers, and ironworkers are exposed to heights on the job almost every day (chart 33a). Drywall installers, roofers, painters, and insulation workers spend more time climbing ladders, scaffolds, or poles than other occupations (chart 33b). Nearly 60% of workers in construction production occupations work at heights at least once a month, and many climb ladders or scaffolds during half of their work time.<sup>2</sup> Many construction occupations require workers to keep balance while working at heights, particularly drywall installers and ironworkers (chart 33c). These exposures can lead to fall-related injuries and death, especially injuries from falls to a lower level (*see* pages 43 and 44).

Construction jobs involve other hazardous conditions (e.g., electricity), equipment (e.g., cranes), and tools (e.g., nail guns). Elevator installers, power-line installers, and heating and air conditioning mechanics are exposed to hazardous conditions almost daily (chart 33d). Carpenters are exposed to dangerous equipment nearly every day.<sup>1</sup> Overall, about half of workers in construction production occupations are likely to be exposed to

hazardous equipment every week (chart 33e).<sup>2</sup> These hazards can lead to electrocutions, being struck by an object, and other types of severe injuries or death (*see* pages 43, 45, and 46).

Almost all workers in construction production occupations are frequently exposed to distracting or uncomfortable noise at construction sites,<sup>2</sup> which may cause noise-induced hearing loss (NIHL; *see* page 49). A longitudinal study found that almost three-quarters (73%) of construction workers in the study were exposed to noise levels above the recommended exposure level (REL) set by the National Institute for Occupational Safety and Health (chart 33f).<sup>3</sup> Ironworkers had the highest exposures to noise levels, with 86% above the NIOSH REL.

*Green construction* (*see* Glossary) has expanded rapidly in the United States in recent years (*see* pages 9 and 12). Green construction may increase existing risks such as falls from skylights, atriums, and solar power panels as well as exposure to lead and asbestos from renovation and weatherization.<sup>4,5</sup> Hazards often emerge with new technologies and products, such as *nanotechnology* and *nanomaterials* (*see* Glossary).<sup>6</sup> Roughly 2 million construction workers may be exposed to engineered nanomaterials in the next 15 years,<sup>7</sup> and the potential health risks to workers can be significant, though current research on health effects is scarce.<sup>8</sup>

Although the O\*NET provides an indication of risks at the occupational level, estimates are based on generalized work contexts rather than actual occupational exposure assessments. For instance, welders generally have a low exposure score for working in high places (chart 33a), but some welders in construction may be exposed to heights frequently. Given the complexity and variation of occupational exposures in construction, the data cited on this page should be used with caution for occupations employed in multiple industries.

1. U.S. Department of Labor, Employment and Training Administration. O\*NET OnLine. <http://www.onetonline.org/> (Accessed June 2012). All data on this page are from O\*NET unless otherwise specified. The O\*NET data were initially collected from occupation analysts; this information is updated annually by ongoing surveys of workers and occupation experts, capturing knowledge, skills, abilities, tasks, and work activities for these occupations.

2. In the O\*NET Work Context Questionnaires, respondents are asked about working conditions and exposures. For example, "How often does *your current job* require you to work outdoors, exposed to all weather conditions?" The question includes a five-level scale: "never," "once a year or more but not every month," "once a month or more but not every week," "once a week or more but not every day," and "every day." Exposure predictions were estimated by CPWR Data Center using O\*NET exposure scores for detailed occupations combined with the data from the 2010-2020 Employment Projections (Table 1.9: 2010-20 Industry-occupation matrix data, by industry, [ftp://ftp.bls.gov/pub/special\\_requests/ep/ind-occ.matrix/ind\\_xls/ind\\_230000.xls](ftp://ftp.bls.gov/pub/special_requests/ep/ind-occ.matrix/ind_xls/ind_230000.xls)) from the U.S. Bureau of Labor Statistics (Accessed February 2013).

3. National Institute for Occupational Safety and Health, Centers for Disease Control and Prevention. 1998. Criteria for a Recommended Standard: Occupational Noise Exposure. Cincinnati, OH: DHHS (NIOSH), Pub. 98-126.

4. Chen H. 2010. *Green and Healthy Jobs*. CPWR - The Center for Construction Research and Training. <http://www.elcosh.org/record/document/1216/d001091.pdf> (Accessed February 2013).

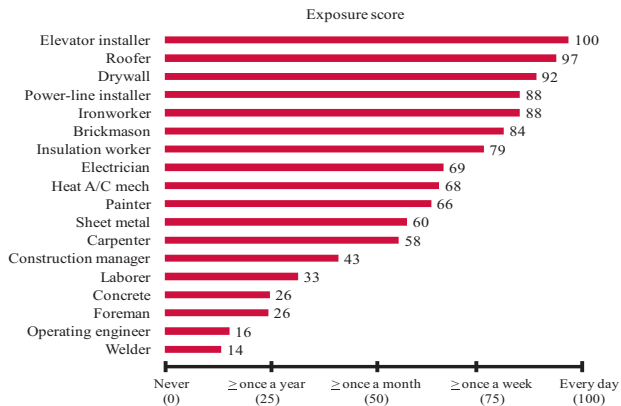
5. Fortunato BR, Hallowell MR, Behm M, & Dewlaney K. 2012. Identification of safety risks for high-performance sustainable construction projects. *Journal of Construction Engineering and Management* 138(4).

6. Rana AK, Rana SB, Kumari A, & Kiran V. 2009. Significance of nanotechnology in construction engineering. *International Journal of Recent Trends in Engineering*, 1(4):46.

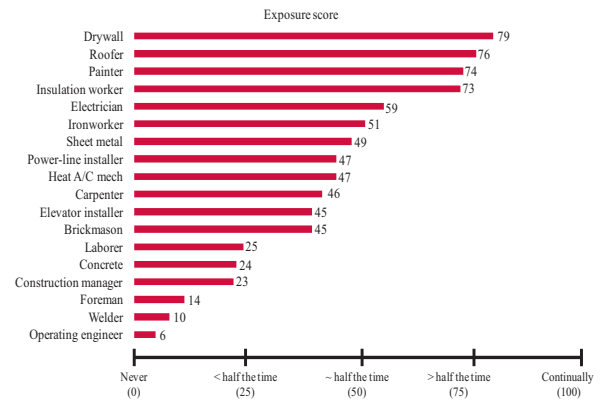
7. Ramachandran G, Ostraat M, Evans DE, Methner MM, O'Shaughnessy P, D'Arcy J, Geraci CL, Stevenson E, Maynard A, & Rickabaugh K. 2011. A strategy for assessing workplace exposures to nanomaterials. *Journal of Occupational and Environmental Hygiene*, 8(11):673-685.

8. Lee J, Mahendra S, & Alvarez PJ. 2010. Nanomaterials in the construction industry: A review of their applications and environmental health and safety considerations. *ACS Nano*, 4(7):3580-3590.

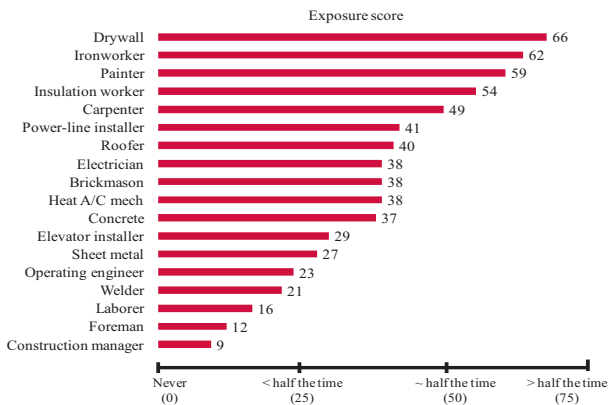
**33a. Working at heights on the job, selected occupations**



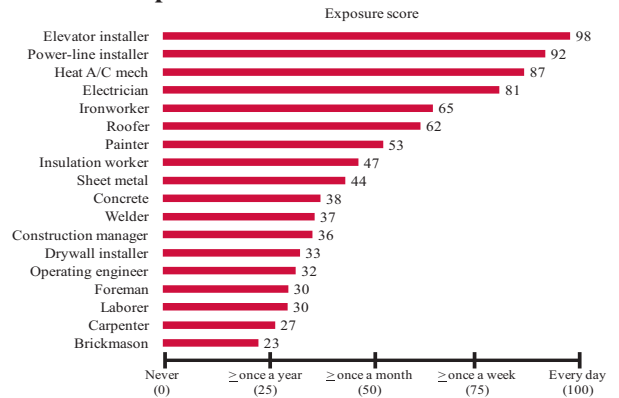
**33b. Climbing ladders, scaffolds, or poles at work, selected occupations**



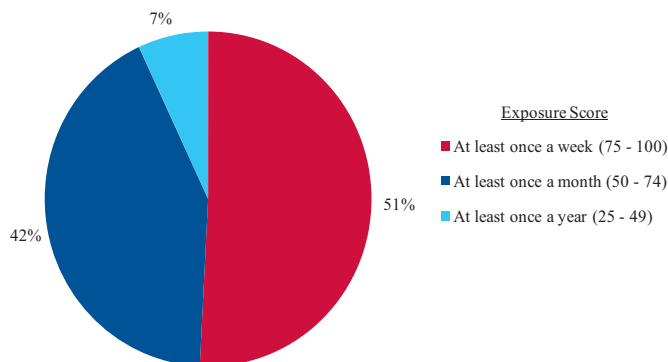
**33c. Keeping/regaining balance at work, selected occupations**



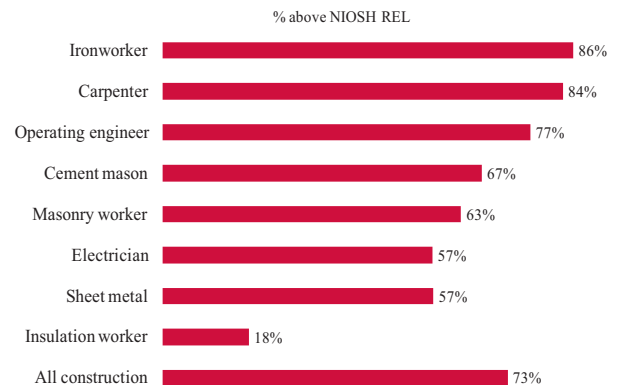
**33d. Exposure to hazardous conditions at work, selected occupations**



**33e. Percentage of construction workers exposed to hazardous equipment, by exposure level (Production workers)**



**33f. Average noise exposure levels, selected construction occupations, 1999-2009**



**Note:** Charts 33a, 33d, and 33e - Exposure scores: 0 = Never; 25 = Once a year or more but not every month; 50 = Once a month or more but not every week; 75 = Once a week or more but not every day; and 100 = Every day.  
 Charts 33b and 33c - Exposure scores: 0 = Never; 25 = Less than half the time; 50 = About half the time; 75 = More than half the time; and 100 = Continually or almost continually.

**Source:** Charts 33a-33d - O\*NET OnLine. 2010. *Work Context: Physical Work Conditions*. [http://www.onetonline.org/find/descriptor/browse/Work\\_Context/4.C.2/](http://www.onetonline.org/find/descriptor/browse/Work_Context/4.C.2/) (Accessed May 2012).  
 Charts 33e - O\*NET OnLine. 2010. *Work Context: Physical Work Conditions*. [http://www.onetonline.org/find/descriptor/browse/Work\\_Context/4.C.2/](http://www.onetonline.org/find/descriptor/browse/Work_Context/4.C.2/) (Accessed May 2012) and U.S. Bureau of Labor Statistics. 2010-2020 *Employment Projections*. (Table 1.9. 2010-20 Industry-occupation matrix data, by industry. [http://ftp.bls.gov/pub/special.requests/ep/ind-occ-matrix/ind\\_xls/ind\\_230000.xls](http://ftp.bls.gov/pub/special.requests/ep/ind-occ-matrix/ind_xls/ind_230000.xls) (Accessed February 2013). Calculations by CPWR Data Center.  
 Chart 33f - Neitzel R, Stover B, & Seixas N. 2011. Longitudinal assessment of noise exposure in a cohort of construction workers (Table 1). *Annals of Occupational Hygiene*, 55(8):906-916.