

# Job Hazards in the Waste Industry

Until recently, relatively little research has focused on hazards in the waste industry, even though refuse collection is a “high-hazard” job with a fatality rate 10 times that of all workers. This article uses special analytical techniques to delve into the hazards confronting waste industry workers.

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The waste industry is increasingly the focus of public attention as more refuse is recycled, incinerated, and buried in landfills—sometimes after being transported great distances. Yet, to date, relatively few research results have been published on the hazards affecting waste industry workers.<sup>1</sup> Because of the character of the work, hazards abound for refuse collectors, refuse truckdrivers, and other waste industry workers. In fact, during the 1992-97 period, refuse collectors were identified as holding one of the most dangerous jobs in the United States.

Two essential functions make up the waste industry: (1) Refuse collection and disposal, and (2) recycling. These two functions are spread over four Standard Industrial Classification (SIC) codes.<sup>2</sup>

These four industries accounted for 499 (1.3 percent) of the 37,875 occupational fatalities reported to the Bureau of Labor Statistics’ (BLS) Census of Fatal Occupational Injuries (CFOI) since its inception in 1992.<sup>3</sup>

Until recently, research has tended to ignore these fatalities, largely because these four SICs are so widely dispersed throughout the SIC system they were not recognized as a single

integrated economic activity.<sup>4</sup> Refuse systems and the waste industry activities in local trucking without storage can involve recycling, however, they usually involve refuse collection and disposal. Wholesale durable scrap and waste materials, and recovery of non-ferrous metals from scrap metal and dross—the waste industry aspect of secondary smelting and refining—almost exclusively involve recycling.

The following tabulation shows the distribution of fatality cases for 1992-97 within these industries.

SIC	Industry	Number of fatalities
	Total fatalities .....	499
334	Secondary smelting and refining of nonferrous metals .....	25
4212	Local trucking without storage .....	64
4953	Refuse systems .....	223
5093	Wholesale durable scrap and waste materials .....	187

## Refuse Collection and Disposal

**Local trucking without storage**  
Establishments in this industry furnish trucking or transfer services without storage in a single locale for freight generally weighing over 100 pounds. This industry includes waste industry

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functions such as local carting of debris and local collecting and hauling of refuse without disposal, as well as a wide range of functions outside the waste industry (such as baggage transfer, contract bulk mail hauling, local furniture moving without storage, log trucking, farm to market hauling, and local hauling of live animals). Local government agencies and private companies which collect refuse, but turn it over to another agency or firm for disposal, are also classified in this industry. In addition, some local trucking without storage activities—such as rental of trucks with drivers for local use—might fall within the waste industry depending upon the cargo being hauled.

**Fatal injuries.** This industry provides an analytical challenge because it covers a variety of activities, some relevant to the waste industry and some not. While it is impossible, given current data limitations, to break out the non-fatal injuries and illnesses in the waste industry, the fatality data are sufficiently detailed to support some analysis. As the following tabulation shows, from 1992-97, the 64 waste industry fatalities in local trucking without storage were distributed primarily among only a few occupations.

Occupation	Number of fatalities	Percent
Total <sup>1</sup> .....	64	100
Refuse collectors .....	39	61
Truckdrivers .....	17	27
Nonconstruction laborers .....	6	9

<sup>1</sup> There were two additional fatally injured workers in other occupations.

These 64 cases accounted for about one-tenth of the total number of fatalities in this industry. The private sector accounted for 58 of the 64 fatalities; highway vehicle incidents and workers on the ground being struck by vehicles each accounted for about one-third.

### Refuse systems

Establishments in this industry are primarily engaged in the collection

and disposal of refuse by processing or destruction, or in the operation of incinerators, waste treatment plants, landfills, or other disposal sites. Only fatality data are available for this industry.

During 1992-97, nearly three-quarters of the 223 refuse systems workers suffering fatal job injuries were either refuse collectors (69 fatalities), truckdrivers (63 fatalities), or nonconstruction laborers (30 fatalities). Truckdriver fatalities predominated in the private sector, outnumbering refuse collector fatalities 55 to 46, while the opposite was true in the public sector where refuse collector fatalities outnumbered truckdriver fatalities 23 to 8.

As the following tabulation shows, there were 149 fatalities in which refuse workers were struck by vehicles or mobile equipment, killed in crashes and other highway incidents involving vehicles they were operating, or mangled by equipment or objects.

Event	Number of fatalities	Percent
Total .....	223	100
Workers struck by vehicle, mobile equipment .....	66	30
Highway transportation crashes and other incidents .....	58	26
Caught in or compressed by equipment or objects .....	25	11
Other .....	74	33

These 149 cases comprise two-thirds of the 223 refuse systems fatalities.

### Refuse collection, a deadly occupation

Collecting refuse has long been known to be dirty, strenuous work. Less well known is that it is also among the most deadly occupations. Special analysis of this occupation using combined data from both local trucking without storage and refuse systems was conducted because 108 of the 132 fatally injured refuse collectors during 1992-97

worked in local trucking without storage (39) and in refuse systems (69).

These 108 fatally injured refuse collectors comprise 38 percent of the 286 fatal occupational injuries in these two industries. Truckdrivers suffered 80 fatalities and nonconstruction laborers 36, which, respectively, comprise 28 and 12 percent of the total.

Although the private sector employs about two-fifths of refuse collectors,<sup>5</sup> it accounts for three-quarters of all refuse collector fatalities. (See tabulation.)

Industry	Total	Private sector	Public sector
Total			
Number .....	108	81	27
Percent .....	100	75	25
Local trucking without storage			
Number ....	39	35	4
Percent ....	36	32	4
Refuse systems			
Number ....	69	46	23
Percent ....	64	43	21

As the following tabulation shows, the annual number of refuse collector fatalities in refuse collection and disposal from 1992 through 1997 ranged from a low of 14 in 1993 to a high of 24 in 1995. For refuse collectors overall, it similarly ranged from a low of 18 in 1993 to a high of 29 in 1995.

Year	Total	Refuse collection and disposal
1992-97 .....	132	108
1992 .....	20	17
1993 .....	18	14
1994 .....	23	16
1995 .....	29	24
1996 .....	21	18
1997 .....	21	19

**Risk.** During 1992-97, the number of workers annually employed as refuse collectors ranged from 43,000 to 55,000, of whom 132 suffered fatal occupational injuries. Because of annual

variability in the number of fatalities and employment, data for these 6 years were combined to mitigate the effects of these fluctuations and assure a more meaningful measure of the risk of on-the-job fatality. Using the combined data for all industries, a fatality rate of 46 deaths per 100,000 workers was computed.<sup>6</sup> This rate—10 times the overall on-the-job fatalities rate—puts this occupation among the “high-hazard” jobs identified by BLS.<sup>7,8</sup>

A fatality rate of 46 deaths per 100,000 workers means that, on average, each year during this 6-year period, 1 out of 2,189 refuse collectors suffered a fatal job injury. Stated differently, this means that there would be 20 fatal injuries per 1,000 refuse collectors over a 45-year working lifetime.<sup>9</sup>

**Event.** Refuse collection invariably involves jumping off and on trucks, carrying trash containers, and walking on streets, alleys, and parking lots. Refuse collectors often have to collect from both sides of a street; they work in close proximity to large collection vehicles that stop and start frequently. Sometimes these vehicles obscure them, which both inhibits their ability to spot approaching traffic, and blocks them from the view of approaching drivers.<sup>10</sup> Not surprisingly, vehicles inflict most fatal injuries involving refuse collectors, for example, being run over by the refuse truck or struck by a passing vehicle, sometimes after falling from the truck.

**Nonfatal injuries and illnesses.** Not all occupational injuries are fatal. The Bureau’s annual Survey of Occupational Injuries and Illnesses, which excludes government employees and self-employed individuals, estimates that an average of 2,162 refuse collectors suffered nonfatal job injuries and illnesses each year from 1992 through 1997, the most recent year for which data are available. Cuts, lacerations, punctures, bruises, and contusions—usually minor injuries requiring a median of only a few days for recov-

ery—account for 18 percent of all cases involving refuse collectors during this time span. In contrast, fractures—which account for 3 percent of such cases—usually require several weeks to recuperate before returning to work. Sprains, strains, and muscle tears account for 48 percent of cases—a proportion slightly higher than that for all private sector employment. Recuperation time for this kind of injury is close to that for all private sector employment, about 5 or 6 days. Overall, nonfatal injuries to refuse collectors require a median of 6 workdays for the worker to recover and return to work—only slightly above the 5-day median for private industry workers overall. While the nonfatal injury experience facing refuse collectors might seem surprising, given this occupation’s high fatality rate, it is one of many examples that illustrate how the characteristics of fatal injuries for a particular occupation may differ quite markedly from the corresponding nonfatal ones.<sup>11</sup>

Overexertion—predominantly in lifting—is the leading cause of nonfatal injury or illness for refuse collectors, accounting for almost a third of the cases, closely followed by being struck by, striking against, or being compressed in equipment or objects.

Due to the lifting and carrying refuse collection involves, containers are the leading source of injury or illness, accounting for about one-third of the cases. Contact with surfaces, such as streets, sidewalks, alleys, and parking lots, accounts for about one-sixth of all cases (most were the result of falls); free body movement (such as cumulative trauma from jumping on and off trucks day-after-day) for about one-eighth; and vehicles for about one-ninth of all cases.

## Recycling

### Secondary smelting and refining of nonferrous metals

Establishments are classified in secondary smelting and refining of nonferrous metals if they are primarily en-

gaged in recovering nonferrous metals and alloys from used scrap and dross or in producing alloys from purchased refined metals. No direct smelting from ore occurs in this industry. The portion of this industrial activity involved in the recovery of nonferrous metals and alloys from used scrap and dross is part of the waste industry. Producing alloys from purchased refined metals is not unless the purchased refined metals are used in combination with the used scrap or dross. Secondary smelting and refining of nonferrous metals includes waste industry functions such as detinning of cans and other scrap, recovering silver from used photographic film, and reclaiming zinc dust. Other secondary smelting and refining activities—such as aluminum ingot extrusion and brass refining—could fall within the waste industry depending upon the extent to which scrap or recovered materials are used.<sup>12</sup>

**Fatal injuries.** The secondary smelting and refining of nonferrous metals industry experienced 25 fatalities from 1992-97. Most of these fatalities were the result of workers being struck by objects or caught in equipment, being exposed to harmful substances, or from assaults and violent acts. Operators, fabricators, and laborers incur almost one-half of these fatalities; precision production, craft, and repair workers account for over one-quarter.

**Nonfatal injuries and illnesses.** In 1997, 16,200 wage and salary workers were employed in private sector secondary smelting and refining of nonferrous metals establishments. Job injuries and illnesses requiring more than first aid were sustained by 3,200 of these workers. Over one-quarter (900) of these workers were afflicted severely enough to be absent from the job for at least 1 day beyond the day of injury.

The total case incidence rate for this industry is 18.9, meaning there

were just under 19 injuries or illnesses for every 100 full-time equivalent employees. These cases include those involving lost workdays beyond the day of injury, loss of consciousness, medical treatment beyond first aid, or restriction of work or motion. This rate is 26 percent higher than the rate for the primary metal industry, almost twice that for manufacturing, and over 2½ times that for all private sector industry. The lost workday case rate for days-away-from-work cases—meaning the injury or illness was sufficiently incapacitating that the employee was absent from work for at least 1 day—is 5.4 (1½ times the corresponding rate for primary metals, 2¼ times the manufacturing rate, and over 2½ times the all private sector industry rate). This lost workday case rate (5.4) for days away from work cases means that, for every 1,000 full-time equivalent employees, there are 54 cases severe enough to require the worker to lose 1 or more days of work beyond the day the injury occurred. Similar patterns were evident in previous years.

Sprains, strains, and muscle tears comprise one-third of the lost workday cases in this industry (a smaller share than the two-fifths for the private sector), and it is the industry's largest injury or illness category. Cuts, lacerations, punctures, bruises, and contusions account for about

one-sixth of all cases, much like the rest of the private sector. However, heat burns, which comprise over one-eighth of the cases, are over seven times more prevalent than in the private sector overall.

### Wholesale trade in scrap and waste materials

Establishments in this industry are primarily engaged in the assembling, breaking up, sorting, and wholesale distributing of scrap and waste materials. This industrial activity involves recycling a wide variety of materials, such as automobiles crushed for scrap; plastic, paper, and glass recycling; scrap iron, steel, and other metals; and rags and other textile waste.

**Fatal injuries.** Only fatality data are available for this industry. During 1992-97, 187 workers died of occupational injuries in this industry, all but a few of whom were in the private sector where wholesale trade employment is concentrated. The 62 nonconstruction laborer fatalities account for one-third of the total fatalities in this industry, and the 22 sales supervisor and proprietor fatalities account for about one-ninth.

Workers in this industry confront a wider range of deadly hazards than other waste industry workers. The following tabulation shows the events that caused the greatest number of fatalities.

Event	Number of fatalities	Percent
Total <sup>1</sup> .....	187	100
Struck by object .....	42	22
Caught in equipment or objects .....	36	19
Fires and explosions ...	24	13
Worker struck by vehicle, mobile equipment .....	19	10
Homicides .....	16	9

<sup>1</sup> There were 50 additional cases distributed among other events.

Targeting safety efforts may be difficult because of the variety of materials handled by the workers in this industry and the wide range of hazards they face.

## Conclusion

Although data limitations pose challenges to research into occupational hazards in the waste industry, close inspection of existing data might assist industry safety specialists in designing initiatives to prevent injuries and decrease hazards. Combining data for many years, moreover, may yield surprising results as occupations, such as refuse collector, whose hazardousness might otherwise be overlooked, emerge as "high-hazard" occupations worthy of safety professionals' attention. ■

<sup>1</sup> James D. Englehardt, Huren An, Judy A. Bean, and Laura E. Fleming, Florida Center for Solid and Hazardous Waste Management, *Solid Waste Management Health and Safety Risks: Epidemiology and Assessment to Support Risk Reduction* (Gainesville, FL: Florida Center for Solid and Hazardous Waste Research, March 31, 1999), p. xiv.

<sup>2</sup> *Standard Industrial Classification (SIC) Manual 1987* (Washington, DC: Office of Management and Budget).

<sup>3</sup> Data for this article are drawn from two primary sources: The Bureau of Labor Statistics' annual Census of Fatal Occupational Injuries (CFOI), which covers all occupational injury fatalities in the United States, and the Bureau's annual Survey of Occupational Injuries and Illnesses (SOII), which covers nonfatal injuries and illnesses in the private sector, except for the self-employed.

Data for fatal occupational illnesses are not available from the CFOI. Data for nonfatal occupational injuries and illnesses are not available at the 4-digit industry level from SOII for local trucking without storage, refuse systems, and wholesale trade in scrap metal and waste materials. Fatality data for local trucking without storage include only those cases associated with the waste industry.

<sup>4</sup> The industries which constitute the waste industry are taken from a trade magazine special report: Ruhan Memishi, "Safety Doesn't Always Come First in Waste," *Waste News*, (Akron, OH: Crain Communications, Inc.; Volume 4, Issue 17, September 7, 1998), pp. 1, 13-25.

<sup>5</sup> Employment data are derived from the Current Population Survey (CPS). According to CPS data for 1992-97, the public sector accounts for three-fifths of refuse collector employment, nearly all in local government. The private sector accounts for the remaining two-fifths, with self-em-

ployed refuse collectors about one-tenth of the private sector total. Refuse collecting is a male-dominated field, with women accounting for only a few percent of total employment. Whites account for about three-fifths of refuse collectors, and blacks account for almost all of the remaining two-fifths. Hispanics, who may be of any race, account for about one-tenth of refuse collectors.

<sup>6</sup> The fatality rate represents the number of fatal occupational injuries per 100,000 employed workers and is calculated as follows:

$(N/W) \times 100,000$  where

N = the number of fatal work injuries, and  
W = the number of employed workers, based on annual average estimates of employed civilians 16 years of age and older, CPS, 1992-97.

<sup>7</sup> Other high risk occupations include fishers, timber cutting and logging workers, airplane pilots and navigators, structural metal workers, extractive workers, water transportation workers, public transportation attendants such as flight attendants, construction laborers, and taxicab drivers. For a discussion on calculating occupational fatality rates, see Guy A. Toscano and Janice A. Windau, "Profile of Fatal Work Injuries in 1996," *Compensation and Working Conditions*, Spring 1998, pp. 37-44.

<sup>8</sup> A special study of refuse collectors in Florida during 1993-97, using workers' compensation data, reached conclusions broadly consistent with the Bureau's. This study, for example, also found Florida refuse collectors have a very high fatality rate. See Englehardt, An, Bean, and Fleming, *Solid Waste Management Health and Safety Risks*, p. xvii.

<sup>9</sup> The lifetime risk for a specific industry or occupation is calculated using the following equation proposed by the Occupational Safety and Health Administration in 1995:

$WLTR = [1 - (1 - R)^y] \times 1,000$  where

WLTR = working lifetime risk

R = probability of a worker having a work-related fatal injury in a given year, and

y = years of exposure (for purposes of this study, 45 years)

Because of labor turnover and other factors, the risk should be expressed on a per 1,000 worker basis. Therefore, to derive the number of fatal occupational injuries per 1,000 workers the formula is multiplied by 1,000. Refuse collectors' annual fatality rate of 46 per 100,000 employment was inserted into the formula as follows:

$[1 - (1 - 0.00046)^{45}] \times 1,000 = 20$  fatalities per 1,000 employment over a 45-year working lifetime.

For more thorough explanations of the methodology used to derive this statistic, see David E. Fosbroke, Suzanne M. Kisner, and John R. Myers, "Working Lifetime Risk of Occupational Fatal Injury," *American Journal of Industrial Medicine* (Vol. 31, 1997), pp. 460-61; Dino Drudi, "Fishing for a Living Is Dangerous Work," *Compensation and Working Conditions*, Summer 1998, pp. 6-7; and Eric Sygnatur, "Logging Is Perilous Work," *Compensation and Working Conditions*, Winter 1998, pp. 8-9.

<sup>10</sup> Englehardt, An, Bean, and Fleming, *Solid Waste Management Health and Safety Risks*, p. xvii.

<sup>11</sup> For a fuller discussion of this phenomenon, see Katharine G. Abraham, William L. Weber, and Martin E. Personick, "Improvements in the BLS Safety and Health Statistical System," *Monthly Labor Review*, April 1996, pp. 3-12.

<sup>12</sup> Other metal industries, such as SIC 3312, Steel Works, Blast Furnaces, and Rolling Mills, also use recycled metal, although in a more incidental fashion than in secondary nonferrous metals.