

FINAL REPORT | 23 July 2008

TO Debbie Stearns, ACC Injury Prevention
FROM Mark Johnson, Noel Raggett, Research New Zealand
SUBJECT Solid Waste and Recoverable Resources Industry Injury Causation (#3726)

This memorandum details the final results from the Solid Waste and Recoverable Resources Industry Injury Causation study, a survey of injuries sustained by workers in the Solid Waste and Recoverable Resources Industry in the 2007 calendar year.

The purpose of this survey was to identify the frequency and severity of injuries in the Solid Waste and Recoverable Resources sector that can be attributed to different collection methods.

The report consists of a number of sections describing the background to the research, the data collection process, some key findings and supporting tables generated from the collected data. It also includes a taxonomy analysis of the results.

Background

ACC's levy payer database has a significant number of companies and contractors listed in Solid Waste and Recoverable Resources sector. However it is believed that many additional companies and contractors may, in fact, be listed under another industry classification, such as general haulage/cartage. As such, it is difficult for ACC to ascertain which claims and related costs can truly be attributed to the sector.

The objective of this research was to provide ACC with information about the types and causes of accidents and injuries that workers in the Solid Waste and Recoverable Resources sector had suffered in the year 2007 in order to help establish the human, social and financial cost of workplace injuries for the Solid Waste and Recoverable Resources industry in New Zealand.

Methodology

After initial consultation with ACC and their clients it was decided that Research New Zealand would set up a central data collection database that could be accessed via the Internet in order to collect the data. This database was hosted on Research New Zealand's secure website to ensure the security of the data and the confidentiality of respondents.

Each company approached to participate was provided with a unique login and password, which allowed them to access the 'survey' and provide their information on an anonymous and confidential basis. That is, only Research New Zealand knows which companies were allocated a specific login and password and participated in the study. Participating companies had the option of entering the information in as many separate sessions as they found convenient, as well as reviewing and correcting the information they provided as needed.

In total four of the largest companies in the Solid Waste and Recoverable Resources Industry provided Research NZ with information relating to the frequency, causes and severity of injuries suffered by their employees during 2007. These four enterprises comprise 75 percent of the workforce of the industry.

Survey Findings

The Solid Waste and Recoverable Resources companies that participated in this survey recorded 2,273,595 working hours¹ for their employees in the year 2007. In total one fatality and 743 non-fatal accidents were reported to have occurred during this period.

These incidents have been categorised according to the collection method being employed at the time of the accident. The four different collection methods used for the purpose of this survey were:

- ◆ Automated Bin Collection (side arm) – estimated to comprise 46 percent of the total collections of those companies that participated in the survey
- ◆ Bag Collection – estimated to comprise 32 percent of the total collections of those companies that participated in the survey
- ◆ Bin Collection (non-automated) – estimated to comprise 13 percent of the total collections of those companies that participated in the survey
- ◆ Loose Collection (in-organics, paper, cardboard, green waste etc.) – estimated to comprise 9 percent of the total collections of those companies that participated in the survey.

The non-fatal incidents have been categorised further according to the severity of the injuries suffered as a result of the accident and the treatment that was required. These categories are:

- ◆ Lost Time Injuries²
- ◆ Injuries requiring Medical Treatment Only³
- ◆ Injuries requiring First Aid Treatment Only.

¹ 1,000,000 working hours is the equivalent of 500 full-time employees working 42 hours per week of 48 weeks of the year

² A Lost-time Injury (LTI), is an injury suffered in the workplace that results in the employee being unable to work their next rostered shift.

³ Medical Treatment is defined as treatment provided at a medical facility where the treatment can only be provided by a registered medical practitioner, i.e. excludes First Aid

Severity of Solid Waste and Recoverable Resources Sector Injuries

Fatalities in the Solid Waste and Recoverable Resources Sector in 2007

As shown in Table 1, one employee lost their life while working on Bag Collections during the calendar year of 2007. In contrast, no fatalities were recorded for workers using the other three collection methods.

Table 1: Total Fatalities and Injuries per Collection Method

	Total	Automated Bin Collection Injuries	Bag Collection Injuries	Bin Collection (non-automated) Injuries	Loose Collection Injuries
Total Fatalities and Injuries	n=744	n=37	n=270	n=129	n=308
Fatalities	1	0	1	0	0
Lost Time Injury	63	8	22	8	25
Medical Treatment Injury Only	375	19	136	65	155
First Aid Treatment Only	305	10	111	56	128

Severity of non-fatal injuries sustained

As can be seen in Table 2 overleaf, of the 743 non-fatal incidents reported in 2007, half (50 percent) resulted in the injured party requiring medical treatment. Relatedly, medical treatment only injuries incurred during Loose Collections accounted for 21 percent of all non-fatal injuries, while medical treatment only injuries incurred during Bag Collections account for a further 18 percent of all injuries.

In contrast, Bin Collection injuries requiring medical treatment only accounted for nine percent of all non-fatal injuries, and Automated Bin injuries requiring medical treatment accounted for just three percent.

Forty-two percent (n=305) of non-fatal injuries resulted in the employee requiring First Aid treatment only, however, due to the less serious nature of these incidents this figure may be an underestimation due to under-reporting. When broken down by collection method type:

- ◆ Loose Collection incidents that resulted in the employee requiring First Aid treatment only accounted for 17 percent of all non-fatal injuries in 2007.
- ◆ Bag Collection injuries requiring First Aid treatment only comprised 15 percent of all non-fatal injuries.
- ◆ Non-automated Bin Collection accidents that required First Aid treatment only accounted for 8 percent of all injuries in 2007.

- ◆ Automated Bin Collection incidents that required First Aid only account for only 1 percent of all non-fatal injuries in 2007.

As shown by Table 2, just eight percent (n=63) of all incidents resulted in a Lost Time Injury (i.e. the employee being unable to return to work for their next rostered shift). However, those employers who were surveyed estimated that in total 1,217 productivity hours were lost as a result of such injuries. This equates to an average of roughly 19 hours lost per Lost Time Injury.

Table 2: Injuries per Collection Method

	Total n=743	Automated Bin Collection Injuries n=37	Bag Collection Injuries n=269	Bin Collection (non-automated) Injuries n=129	Loose Collection Injuries n=308
Lost Time Injury	8%	1%	3%	1%	3%
Medical Treatment Injury Only	50%	3%	18%	9%	21%
First Aid Treatment Only	42%	1%	15%	8%	17%
Total Injuries	100%	5%	36%	17%	41%

Total may not sum to 100% due to rounding.

As noted above, Loose Collection methods resulted in the most non-fatal injuries in 2007 (n=308), with 41 percent of all injuries sustained as a result of this method, and Bag Collection methods resulted in 36 percent (n=269) of all non-fatal injuries in 2007. Whereas, Non-automated Bin Collections accounted for 17 percent and Automated Bin Collections just five percent of all non-fatal injuries in 2007.

Severity of injuries per Collection Method

Of those injuries that relate to Loose Collection methods, 50 percent required medical treatment for the employee with a further 8 percent of employees suffering Lost Time Injuries and the remaining 42 percent needing First Aid Treatment only.

More than half (51 percent) of Bag Collection incidents resulted in the employee seeking Medical Treatment, whereas, 41 percent of employees injured during Bag Collections needed First Aid, while 8 percent of the incidents left the employee unable to work their next rostered shift.

While Automated Bin Collection methods were the least likely causes of injuries, it appears that where such incidents occurred they were more likely to result in a Lost Time injury (22 percent) when compared with the other collection methods.

Table 3: Severity of Injuries per Collection Method

	Total n=743	Automated Bin Collection Injuries n=37	Bag Collection Injuries n=269	Bin Collection (non-automated) Injuries n=129	Loose Collection Injuries n=308
Lost Time Injury	8%	22%	8%	6%	8%
Medical Treatment Injury Only	50%	51%	51%	51%	50%
First Aid Treatment Only	42%	27%	41%	43%	42%
Total Injuries	100%	100%	100%	100%	100%

Total may not sum to 100% due to rounding.

Serious Harm Injuries

In total, only two percent (n=13) of all injuries reported were classified as resulting in “Serious Harm” under the HSE Act and as such were reportable to OSH. Four of these injuries occurred during Bag Collections, four during Non-automated Bin Collections, three as a result of Loose Collections, and two during Automated Bin Collections.

Injuries incurred during Automated Bin Collections may be more likely to result in a Serious Harm Injury (2 out of 37 injuries), perhaps reflecting the fact that, when compared with other collection methods, an Automated Bin Collection related injury was more likely to result in ‘Lost Time’.

Whereas, three percent of Non-Automated injuries were classified as “Serious Harm” in 2007 (4 out of 129 injuries), and only one percent of Loose Collection and Bag Collection injuries were severe enough to be classified as Serious Harm injuries under the HSE Act (3 out of 269 injuries and 4 out of 308 injuries, respectively).

Medical Terminations

One percent (n=5) of all non-fatal injuries sustained by employees in the Solid Waste and Recoverable Resources Industry in 2007 resulted in the injured party being forced to quit their job.

Of these Medical Terminations, four were the result of Bag Collection methods while the remaining case was the result of an incident while the employee was using Automated Bin Collection methods.

Proportion of injuries per collection method

The four Solid Waste and Recoverable Resources companies that participated in the survey provided further details regarding the proportion of their collections carried out using each collection method. The following section takes a more in-depth look at the frequencies of injuries sustained by the employees of these companies, in relation to the proportion of collections that are accounted for by the four different collection methods.

As shown by Table 4 Automated Bin Collection accounted for 46 percent of all collections for the four companies in question but only accounted for five percent of the injuries.

Bag Collection was the second most common collection method with 32 percent of collections, resulting in 36 percent of the total injuries sustained. Loose Collection and Non-automated Bin Collection accounted for 9 and 13 percent of collections and 41 and 17 percent of injuries respectively.

Table 4: Overall usage of each method

	Usage of this method	Total Injuries for this method
Automated Bin Collection Methods	46%	5%
Bag Collection Methods	32%	36%
Non-automated Bin Collection Methods	13%	17%
Loose Collection Methods	9%	41%
Total	100%	100%

Sub-sample based on providers whose usage of each method was known.

Table 5 provides more detail regarding the usage of each collection method by the individual providers.

Table 5: Usage of each method by provider

	Automated Collection Usage	Automated Collection Injuries	Bag Collection Usage	Bag Collection Injuries	Bin Collection Usage	Bin Collection Injuries	Loose Collection Usage	Loose Collection Injuries
Provider A	39%	4%	30%	27%	27%	19%	4%	50%
Provider B	51%	3%	37%	57%	11%	23%	1%	17%
Provider C	24%	13%	49%	58%	1%	1%	26%	28%
Provider D	70%	-	12.5%	80%	12.5%	20%	5%	-
Industry Total	46%	5%	32%	36%	13%	17%	9%	41%

Sub-sample based on providers whose usage of each method was known.

The number of injuries that occurred for each collection method is compared to the number of man-hours for that particular collection method. From these comparisons an estimate of how frequently an employee is likely to suffer an injury while using each specific collection method is calculated.

Table 6 below shows the total number of hours worked for each collection method in 2007. The total number of hours was calculated by taking the providers' total number of man-hours worked in 2007 and dividing that by the proportion of all collections carried out for each collection method. Also detailed is the number of injuries reported for each collection method in the same period.

Overall for the four providers in question there was one injury for every 3,060 man-hours worked. Most frequently these injuries occurred while using Loose Collection Methods (1 injury every 384 hours). Injuries were less frequent where Bag Collection methods (1 every 2,719 hours) and Non-automated Bin Collection methods (1 every 3,992 hours) were being employed.

By far the least frequent method being used when accidents occurred was Automated Collection methods, with only 1 accident for every 24,565 hours worked in 2007.

Table 6: Number of injuries per hours worked

	Hours Worked in 2007	Total Injuries in 2007
Automated Bin Collection Methods	908,895	37
Bag Collection Methods	731,408	269
Non-automated Bin Collection Methods	514,940	129
Loose Collection Methods	118,352	308
Total	2,273,595	743

Sub-sample based on providers whose usage of each method was known.

According to the figures gathered from these four providers, for every one million-man hours worked with each collection method, you can expect the following number of injuries to occur:

Table 7: Injury Frequency

	Estimated Hours	Estimated Injuries
Automated Bin Collection Methods	1,000,000	41
Bag Collection Methods	1,000,000	368
Non-automated Bin Collection Methods	1,000,000	251
Loose Collection Methods	1,000,000	2602

Sub-sample based on providers whose usage of each method was known.

Conclusion

Overall, when the frequency of injuries sustained in the Solid Waste and Recoverable Resources sector is examined by the number of hours worked in that sector, we find that employees using Automated Bin Collection methods are much less likely to suffer an injury. Therefore, increased usage of Automated Bin Collection methods to replace other collection methods is likely to result in a significant reduction in the number of injuries in the sector.

However, given the data that was collected, it is not possible to comment on whether increased usage of Automated Collection methods by the sector will result in a reduction in any specific type of injury (e.g. the number of fractures in relation to their relative proportion of all injuries) or a reduction in the severity of injuries sustained.

The taxonomy on the following pages provides a pictorial examination of the types of injuries and the body parts most commonly affected for each of the four collection methods and also details the total injury statistics for the entire Solid Waste and Recoverable Resources sector.

Appendix A: Taxonomy of Solid Waste and Recoverable Resources Injuries

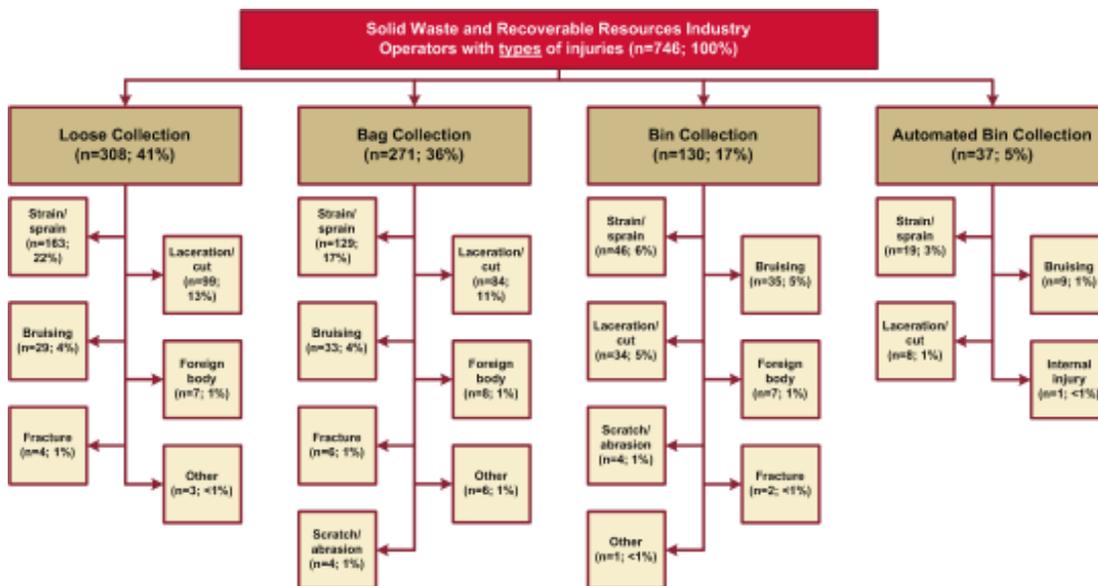
Types of Injury

Figure 1 below indicates the frequency of injuries for each of the four collection methods identified in this survey.

As detailed in Figure 1, three injury types accounted for 91 percent of all non-fatal injuries in 2007:

- ◆ Strain / Sprain (47 percent)
 - ◆ Strain / Sprain was identified as the most common type of injury suffered by employees regardless of the collection method employed at the time of injury
- ◆ Laceration / Cut (30 percent)
- ◆ Bruising (14 percent).

Figure 1: Injury Types by Collection Method



Body Parts Affected

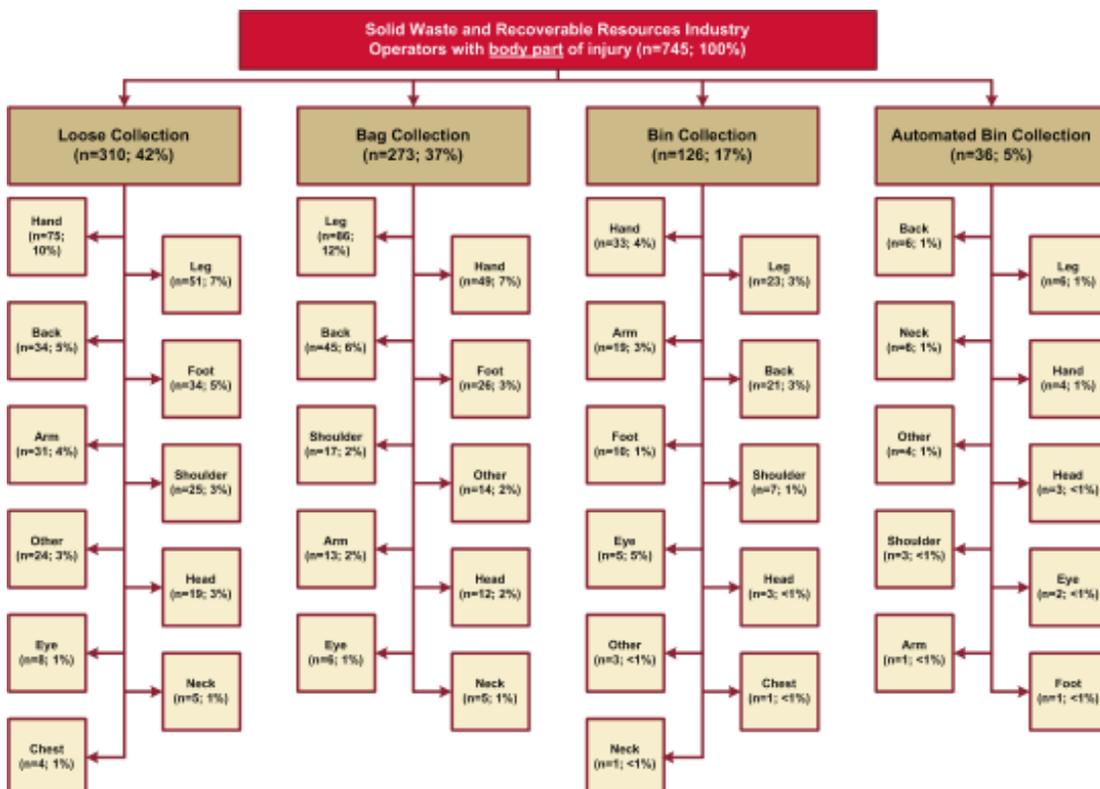
Figure 2 indicates the frequency of injuries for each of the four collection methods identified in this survey. Each collection method is further broken down by the body part affected in the accident.

As shown in Figure 2, the most frequently affected body parts were:

- ◆ Leg (22 percent)
- ◆ Hand (22 percent)
- ◆ Back (14 percent)
- ◆ Foot (9 percent)
- ◆ Arm (8 percent).

Neck injuries, while only accounting for two percent of the overall total, accounted for 17 percent of injuries sustained as a result of Automated Bin Collection methods.

Figure 2: All Injuries by Body Part Affected



Statistics for Loose Collection injuries

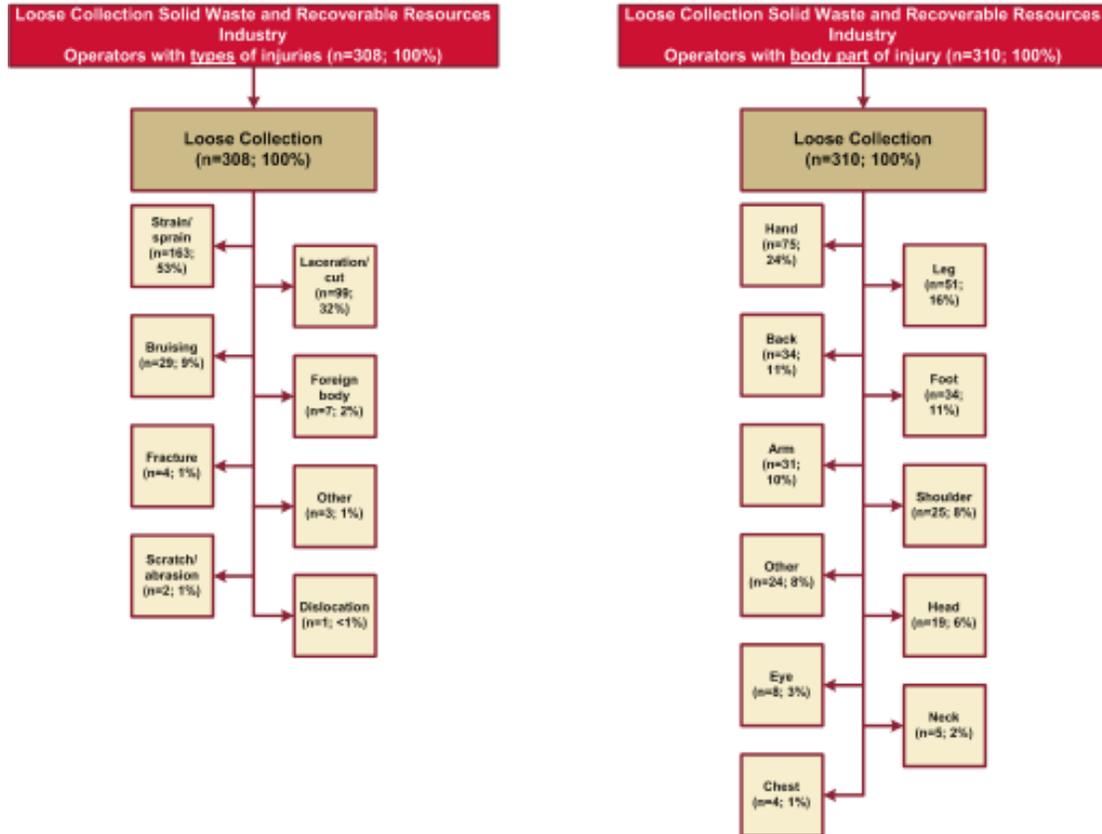
As detailed previously in Table 1, there were 308 accidents in 2007 resulting from the use of Loose Collection methods.

- ◆ No fatalities were recorded in this area in 2007.
- ◆ Three of the incidents were classified as Serious Harm under the HSE Act.
- ◆ None of the incidents related to Loose Collection methods resulted in a Medical Termination.

Of the 308 non-fatal accidents attributed to Loose Collections in 2007:

- ◆ Fifty percent (n=155) of injuries sustained as a result of Loose Collection methods resulted in the employee requiring medical treatment.
- ◆ Forty-two percent required First Aid Treatment only while eight percent of incidents resulted in Lost Time.
- ◆ As detailed in Figure 3, the most common injuries sustained while using Loose Collection methods were:
 - ◆ Strain / Sprain (53 percent)
 - ◆ Laceration / Cut (32 percent)
 - ◆ Bruising (9 percent).
- ◆ The most frequently affected body parts were:
 - ◆ Hand and/or Arm (34 percent)
 - ◆ Leg and/or Foot (27 percent)
 - ◆ Back and/or Shoulder (19 percent).

Figure 3: Injuries associated with Loose Collection methods⁴



⁴ The number of body parts affected by may differ from the total injures reported above due to some respondents' failure to report fully, or multiple body parts being affected by the same injury (e.g. arm and hand).

Statistics for Bag Collection injuries

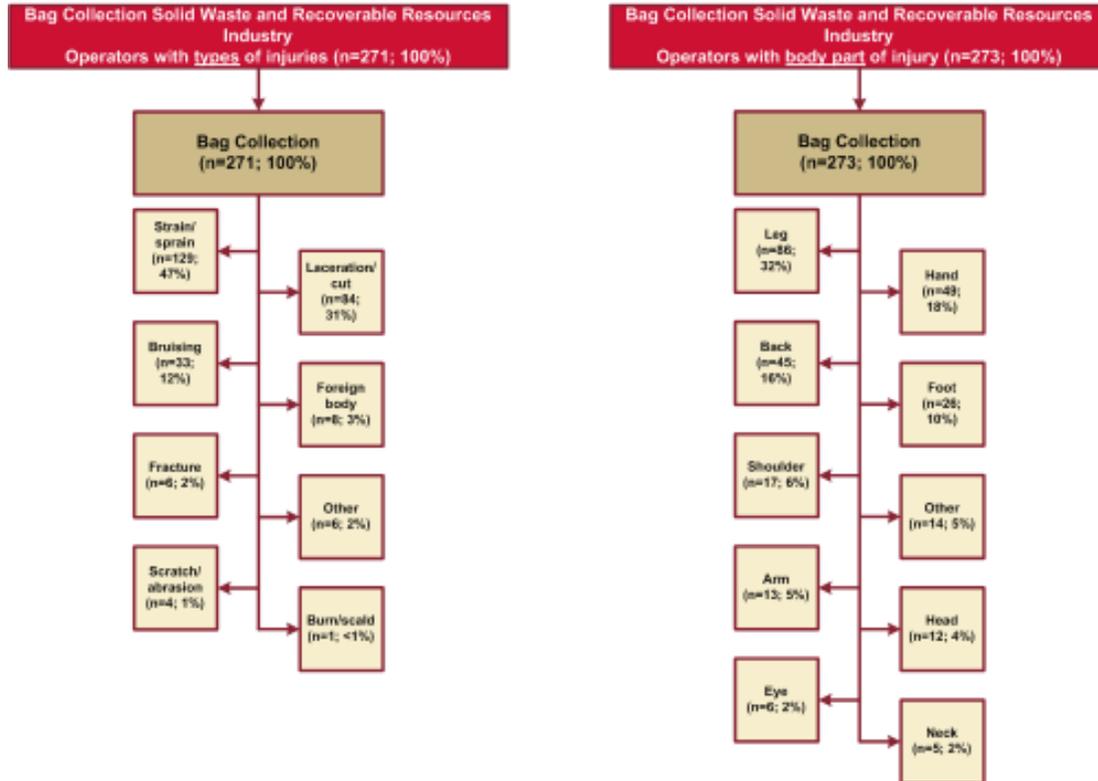
In the 2007 calendar year 270 accidents were recorded while employees were using Bag Collection methods.

- ◆ In 2007, one employee had a fatal accident whilst working on Bag Collections.
- ◆ Another four incidents were classified as Serious Harm.
- ◆ Four collection employees were unable to return to work as a result of injuries sustained.

Of the 269 non-fatal incidents that were attributed to Bag Collections in 2007:

- ◆ More than half (51 percent) of employees injured while working with Bag Collection required medical treatment.
- ◆ Forty-one percent required First Aid treatment only, while eight percent of incidents resulted in Lost Time.
- ◆ As detailed in Figure 4, the most common injuries sustained while using Bag Collection methods were:
 - ◆ Strain / Sprain (47 percent)
 - ◆ Laceration / cut (31 percent)
 - ◆ Bruising (12 percent).
- ◆ The most frequently affected body parts were:
 - ◆ Leg and/or foot (41 percent)
 - ◆ Hand and/or arm (23 percent)
 - ◆ Back and/or shoulder (23 percent).

Figure 4: Injuries associated with Bag Collection methods⁵



⁵ The number of body parts affected by may differ from the total injures reported above due to some respondents' failure to report fully, or multiple body parts being affected by the same injury (e.g. arm and hand).

Statistics for Bin Collection (non-automated) injuries

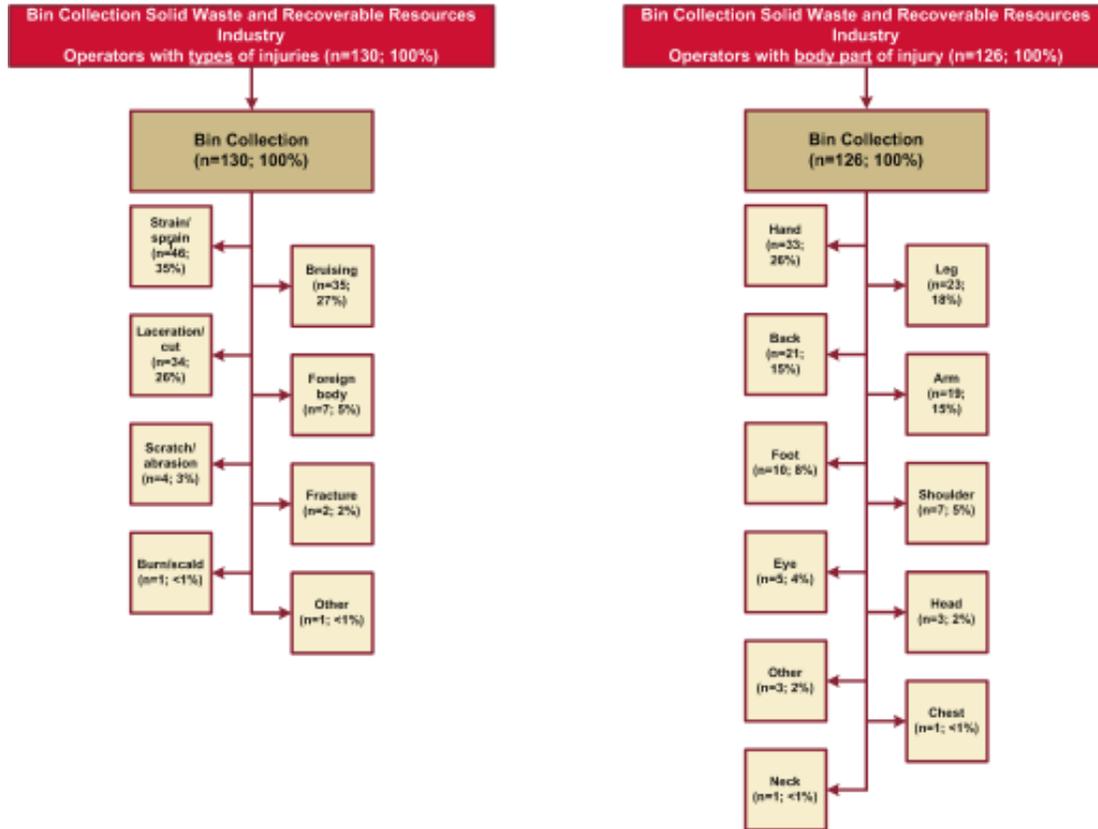
In total, there were 129 accidents in 2007 resulting from the use of Non-Automated Bin Collection methods.

- ◆ No fatalities were recorded in this area in 2007.
- ◆ Four incidents were classified as Serious Harm under the HSE Act.
- ◆ None of the incidents related to Non-Automated Bin Collection methods resulted in a Medical Termination.

Of the 129 non-fatal accidents attributed to Bin Collections (non-automated) in 2007:

- ◆ Half (50 percent) of injuries sustained while working with Non-Automated Bin Collection methods required medical treatment.
- ◆ Forty-three percent (n=56) required First Aid Treatment only while six percent of incidents resulted in Lost Time.
- ◆ As shown in Figure 5, the most common injuries sustained were:
 - ◆ Strain / Sprain (35 percent)
 - ◆ Laceration / Cut (27 percent)
 - ◆ Bruising (26 percent).
- ◆ The most frequently affected body parts were:
 - ◆ Hand and/or arm (41 percent)
 - ◆ Leg and/or foot (26 percent)
 - ◆ Back and/or shoulder (21 percent).

Figure 5: Injuries associated with Bin Collection methods⁶



⁶ The number of body parts affected by may differ from the total injures reported above due to some respondents' failure to report fully, or multiple body parts being affected by the same injury (e.g. arm and hand).

Statistics for Automated Bin (side arm) Collection injuries

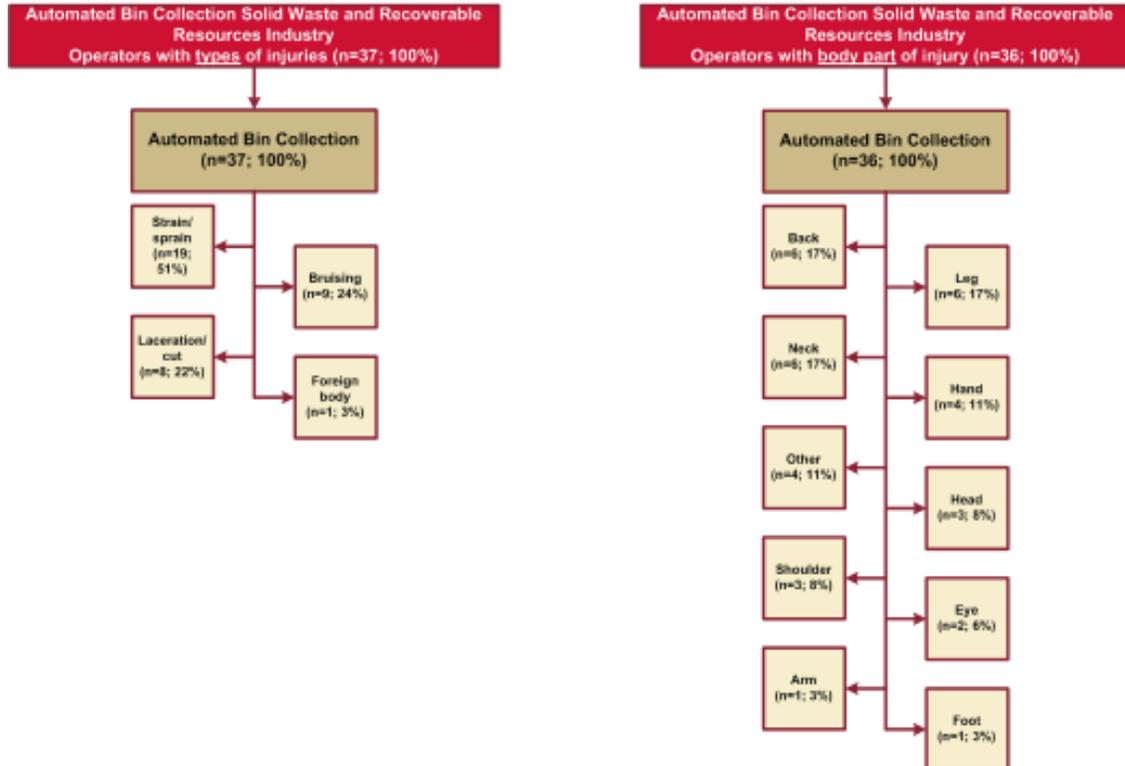
In the 2007 calendar year 37 accidents were recorded while employees were using Automated Bin Collection methods.

- ◆ No employees had a fatal accident whilst working on Automated Bin Collections in 2007.
- ◆ Two incidents were classified as Serious Harm under the HSE Act.
- ◆ One employee was unable to return to work as a result of the injuries sustained.

Of the 37 non-fatal accidents attributed to Automated Bin Collections in 2007:

- ◆ More than half (51 percent) of employees injured while working with Automated Bin Collection required medical treatment.
- ◆ Twenty-seven percent needed First Aid, while a further 22 percent of incidents resulted in Lost Time.
- ◆ As detailed in Figure 6, the most frequently occurring types of injuries were:
 - ◆ Strain / Sprain (51 percent)
 - ◆ Bruising (24 percent)
 - ◆ Laceration / Cut (22 percent).
- ◆ The most frequently affected body parts were:
 - ◆ Back or neck (34 percent)
 - ◆ Leg (17 percent)
 - ◆ Hand (11 percent)
 - ◆ Other (11 percent).

Figure 6: Injuries associated with Automated Bin Collection methods⁷



⁷ The number of body parts affected by may differ from the total injures reported above due to some respondents' failure to report fully, or multiple body parts being affected by the same injury (e.g. arm and hand).