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**An Investigation of Trends in Under-reporting of
Major and Over-3-Day Injuries in the
Manufacturing Sector: First Survey**

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EXECUTIVE SUMMARY

OBJECTIVES

The Health and Safety Laboratory (HSL), the research agency of the Health and Safety Executive (HSE), was commissioned by HSE to gather data from a sample of British manufacturing companies concerning major and over-3-day injuries occurring at their sites over a four-year period (April 1999 – March 2003). The data was required to allow comparison with injury reports made officially to HSE under RIDDOR, to offer insight into the level of accident reporting within this sector, as a means of potentially explaining the recent pattern of increased RIDDOR reportable major injuries post 2001, particularly when compared with over-3-day injuries. This report details the findings of this exploratory study to investigate reporting trends within a range of sub-sectors in the manufacturing industry, whilst highlighting limitations and offering recommendations for further reporting surveys in other industry sectors.

MAIN FINDINGS

- In total, 3,021 injury reporting questionnaires were distributed in total. 496 responses were received that were suitable for further analysis, giving a response rate of 16%. The 496 business units incorporated a working population of approximately 50,000 people. This sample is considered sufficient to provide a reasonably robust indication of the level of reporting accuracy within the sub-sectors of the manufacturing industry that were targeted, and may provide a useful point of comparison for further studies.
- The majority of the sample (n = 290, 59%) reported the same number of accidents to both HSE and the HSL project team. This is assumed to be accurate reporting. 145 (29%) of the companies sampled reported fewer accidents to HSE than they reported to have occurred at their site through the questionnaire, hence are assumed to be under-reporting.
- In total 900 (32%) injuries were under-reported to HSE: 236 (47%) major injuries and 664 (29%) over-3-day injuries were not reported to HSE yet they were recorded on the questionnaires.
- This translates to an overall reporting level of 68%: with a reporting level of 53% for major injury and a reporting level of 71% for over-3-day injury.
- A total of 375 (76%) companies in the current sample had not reported any injuries to HSE. 294 (59%) companies did not report any injuries at all on the questionnaire.
- The present results suggest that the reporting level of all injuries combined (i.e. major plus over-3-day) has fallen across the four-year period. Similarly, using the LFS rate of reportable injury, HSE estimate that the level of reporting of non-fatal injuries in manufacturing has fallen (i.e. deteriorated) steadily from 1999-2000 to 2002/03 (HSE/HSE, 2003).
- The results of this preliminary study suggest that there has been a decrease in the level of reporting of major injuries to HSE over recent years. Specifically, the level of reporting was higher in 1999-2000 than in 2001/02 and 2002/03. Official HSE figures say that the number of reported major injuries in manufacturing declined between 1999-2000 and 2002/03. This finding may therefore suggest that major injury has actually deteriorated in real terms.

- Analysis of the data from this survey suggest that yearly reporting levels of over-3-day injury have remained constant, as no significant variations were found. Annual statistics published by HSE estimates the number of reported over-3-day injuries in manufacturing to have fallen steadily between 1999-2000 and 2002/03. This study therefore suggests that this improvement is a real change and not an artefact of worsening reporting levels.
- In summary, the present study shows that the level of reporting of major injuries across the sample showed a statistically significant decrease over the four-year period studied. This is a surprising finding and suggests that the Revitalising Health and Safety programme has not raised awareness amongst stakeholders within manufacturing industry regarding their legal reporting duties. However, a number of potential limitations of the data have been highlighted, the presence of which necessitates a degree of caution in interpreting the results.

RECOMMENDATIONS

- To provide a clearer picture of reporting accuracy, there is potential to conduct a similar study using a larger and more diverse sample of companies within the manufacturing and other industries. Application of a longitudinal study design over a greater period of time may perhaps offer further insight into ongoing variability in reporting trends, which might ostensibly relate to the presence of safety / reporting / awareness initiatives. However, the fiscal cost and high potential burden to industry of such a survey should be acknowledged.
 - Suggested revisions to questionnaire:
 - major injury classification
 - employment levels over time
 - guidance on n/a vs. zero.
- There appears to exist further potential to raise awareness amongst stakeholders of their legal duty to report accidents to HSE. The results of the present study have not generally led to the identification of types of companies that are more likely to under-report, either with respect to size nor type of manufacturing process. Therefore, on the basis of these results, an overarching approach to stakeholder awareness raising may be more useful than targeting specific industry groups.

1 INTRODUCTION

1.1 BACKGROUND

In June 2000, the Health and Safety Commission (HSC), in collaboration with the Government, launched the Revitalising Health and Safety Strategy¹ (Revitalising Health and Safety: Strategy Statement, June 2000). This 10-year strategy sought to make significant progress in enhancing workplace health and safety by setting challenging targets aimed at reducing the incidence of work-related ill health, fatal and major injuries, and working days lost through injuries and ill health. One of the primary performance indicators used to evaluate ongoing progress against the Revitalising targets has been accident figures compiled by the Health and Safety Executive (HSE) under the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR, 1995). Under RIDDOR, all fatalities, major injuries and over-3-day injuries related to work activities must be reported to HSE.

Reportable major injuries include: amputation; fracture (other than to fingers, thumbs and toes); dislocation of the shoulder, hip, knee or spine; eye injuries resulting from chemical, hot metal burn or penetration of eyeball, including loss of sight (temporary or permanent); any other injury requiring admittance to hospital for more than 24 hours, or that leads to unconsciousness, or requires resuscitation. Reportable over-3-day injuries are those that do not fall in the categories listed in major injury but result in the person being either off work, or at work but unable to carry out their normal work for more than three consecutive whole days.

According to RIDDOR data, there has been a recent change in the pattern of major injuries reported to HSE between 2001 and 2003. Prior to 2001, the reported incidence rate of both major and over-3-day injuries for the UK workforce as a whole was decreasing. Post 2001, however, the incidence of reported major injuries has risen by 2.5%, whilst the over-3-day injury rate has continued to fall (HSC/HSE, 2003). Given HSE's continuing strategy to improve workplace health and safety standards and the improvement in accident rates witnessed in previous years, the recent rising trend in reported major injuries is unexpected. This unanticipated trend might potentially be attributable to a range of factors, one of which may be considered to be a change in the level of reporting to HSE, i.e. increased stakeholder awareness of reporting duties may be manifest in improved reporting of major injury, explaining the observed rise in the figures.

In recognition of this potential latent influence, HSE's Corporate Science and Analytical Services Directorate (CoSAS) commissioned the Health & Safety Laboratory (HSL) to explore trends in the reporting of major and over-3-day injuries over the four-year period since the launch of the Revitalising programme. This report details the findings of an exploratory study to investigate reporting trends within a range of sub-sectors in the manufacturing industry.

1.2 OBJECTIVES

The aim of the project was to explore accident reporting trends in the manufacturing industry through completion of the following objectives:

- Gather data from a sample of British manufacturing companies concerning major and over-3-day injuries occurring at their sites over a four-year period (April 1999 – March 2003).

¹ For more details, visit www.hse.gov.uk/revitalising/

- Develop a survey instrument to determine incidence of major and over-3-day injuries within sample organisations. Distribute a questionnaire to a sample of companies within five sub-sectors of the manufacturing industry.
- Compare data gained from the questionnaire with that officially reported to HSE under RIDDOR to offer some insight into the level of accident reporting within the manufacturing sector. Analysis of reporting levels by type of injury (major or over-3-day), manufacturing sub-sector, size of company, and each year of interest.
- Provide a written report on the analysis and interpretation of the results arising from the survey, highlighting limitations and offering recommendations for future projects.

2 METHODOLOGY

2.1 QUESTIONNAIRE DEVELOPMENT

The project aimed to establish whether the trends in reported accident rates over the past four years might be attributable to a change in the degree of reporting, rather than an actual change in accident rates. To achieve this aim, a questionnaire was devised to primarily elicit information regarding the number of major and over-3-day injuries occurring on site within manufacturing companies over a four-year period, since the start of the Revitalising programme. This data could then be directly compared with accident information reported under RIDDOR, as held in the Field Operations Computer System (FOCUS), to give an indication of reporting accuracy. FOCUS is the HSE database that contains accident data reported under the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR, 1995).

The questionnaire adopted the descriptive severity categorisation of injury outcomes resulting from work accidents used to describe injuries under RIDDOR, i.e. fatality, major injury and over-3-day injury (see Appendices A and B for copy of questionnaire). The major injury category was split into a further six sub-sections, mirroring the full range of injury outcomes defined by RIDDOR.

Respondents were invited to complete a table of injury outcomes for each of four years from April 1999 to March 2003, with each year running from April to March of the following year, reflecting the financial year. In order to fill in the questionnaire, respondents were asked to consult their company accident book to gain the correct accident information (namely date of injury and specific injury outcome). In addition, the questionnaire also sought demographic information concerning number of employees at each site and type of goods manufactured, to allow comparisons to be made between manufacturing sub-sectors.

The questionnaire used in this study was adapted from one piloted in an HSL study of reporting levels within the clothing industry (Collins & Bottomley, 2001) to ensure suitability for respondents in the manufacturing industry. Due to time constraints on the current project, a further pilot study was not deemed necessary before formal questionnaire distribution.

2.2 SAMPLE

Following consultation with the customer, it was agreed that the sample should be drawn from companies from five separate Standard Industry Code (SIC) groupings within the manufacturing industry, as outlined below. These five groups were primarily targeted for investigation because they were seen to represent a cross-section of the industry as a whole. Companies manufacturing pulp and paper products and those manufacturing basic and fabricated metals had shown a sizeable ratio of change in major and over-3-day injury reports (16.2% and 9.3% respectively) to HSE in recent years, whereas the others had not.

- Food & Beverages (SIC 15 – 16)
- Paper & Pulp (SIC 21)
- Rubber & Plastic (SIC 25)
- Basic & Fabricated Metals (SIC 27 – 28)
- Electrical & Optical (SIC 30 – 33)

In order for the sample to accurately reflect the actual number of companies falling within each of the five SIC groupings, the number of questionnaires distributed to each grouping was weighted (see Appendix C for sample strategy detailed in table of weightings). Furthermore, because of interest in establishing potential differences in reporting levels between companies of different sizes (as defined by number of employees), the questionnaires distributed to each SIC grouping were also weighted by size of company. Therefore, the sampling strategy paralleled the actual proportion of companies in each industry sub-sector by company size. The European Union definition was used to classify size of company. Small < 50 employees; Medium > 50 and < 250 employees; and Large \geq 250 employees (European Commission, 2003). (In this study, Micro (< 10 employees) and Small (< 50 employees) enterprises were combined into one single category. Self-employed individuals have been categorised as working in a small sized business).

2.3 PROCEDURE

In order to maximise the response rate (and ensure statistically valid tests could be performed on data gained), the questionnaire was distributed by two methods, as detailed below.

2.3.1 Postal questionnaire

A paper copy of the questionnaire was distributed to 1,357 companies in total. A similar study conducted previously by HSL (Collins & Bottomley, 2001) established that telephoning companies in advance did not enhance response ratings, hence it was decided that unsolicited questionnaires would be dispatched. The company details used for distribution were obtained from a business database company (Experian Limited) who randomly selected the contacts from the appropriate SIC groupings, following the weightings outlined in Appendix C. The questionnaires were addressed to the person responsible for health and safety at each company, as it was considered that this individual would have access to the accident book, and therefore be most able to accurately fill in the questionnaire. Respondents were asked to verify that the address supplied on the questionnaire was correct, to allow records to be accurately crosschecked with reports on FOCUS (which utilises an address-based search option).

Each questionnaire was accompanied by a Freepost envelope, to maximise the likelihood of gaining a response. Also included was a covering letter that explained the research, and offered assurance that any information received would be held in the strictest of confidence, with no further action taken by HSE regardless of the responses given (see Appendix D).

2.3.2 Telephone-based questionnaire

In order to supplement responses gained from the postal survey, HSL subcontracted the services of a market research company, Wirthlin Europe, to engage a further 300 companies to complete the questionnaire. Wirthlin Europe was furnished with a list of 3000 contacts, who they contacted to gain co-operation to participate in the study. If willing, respondents were either faxed or emailed a copy of the questionnaire, which they were asked to fill in appropriately after consulting the company accident book, and return to Wirthlin Europe. If responses were not received, Wirthlin made a series of (up to three) follow-up calls to improve levels of response to the questionnaire. Data from completed questionnaires were collated into separate data files for each industry sector, before being passed on to HSL.

2.3.3 Comparison between questionnaire responses and FOCUS database

The data from the questionnaires received from industry were input into SPSS 12.0.1 for Windows. In addition, injury reports made to HSE from those companies that responded to the questionnaire were identified on the FOCUS system, and these data were also input into SPSS to allow statistical analysis to be performed (see Appendices E and F for a copy of the FOCUS matching procedure guidelines and recording table). This allowed a direct comparison of the reported injuries for each of the four years of interest to be made, through the following calculation:

$$\text{Questionnaire reported injuries} - \text{FOCUS reported injuries} = \text{Difference in reporting level}$$

NOTE: Reporting injuries includes zero reported injuries

Therefore, the results of this calculation provided an indication of reporting accuracy, whereby:

- **Positive reporting difference = Under-reporting**
- **Negative reporting difference = Over-reporting**

Therefore the *assumption* of this calculation is that differences between injuries reported on the questionnaire and those listed on FOCUS offer a true indication of reporting accuracy. This assumption falters immediately as a negative reporting difference is not thought to represent actual over-reporting to HSE; rather it is assumed to reflect accurate reporting to HSE but inaccurate company accident record keeping. Data from companies found to be over-reporting might be considered to be incorrect, as it is unlikely that a company will have experienced fewer injuries than they have reported to HSE. See section 4.4 and Appendix G for further details.

Using the above calculation reporting levels were also analysed by type of injury (major or over-3-day), manufacturing sub-sector, size of company, and each year of interest.

In order to appreciate this document it is important to note that official HSE publications convey under-reporting in terms of 'reporting levels' / 'level of reporting' (e.g. 'reporting levels = 60%' rather than 'under-reporting = 40%'). This document employs the standard HSE term.

NOTE: Although fatality figures were requested from respondents in the questionnaire, these were excluded from analysis due to the fact that there is little, if any, under-reporting of fatal injuries, hence they are not discussed in this report.

3 RESULTS

3.1 SAMPLE

3.1.1 Response rate

In total, 3,021 companies were contacted to participate in the study. Of these, 568 questionnaires were completed and returned to HSL. 1,357 paper questionnaires were distributed by post in total, of which 257 were returned (giving a response rate of 19%). The majority of the postal questionnaires were returned two to three weeks after distribution, usually with large companies replying last. 1,664 businesses were contacted by telephone, 311 telephone questionnaires were completed, with a response rate of 19%. The telephone interviews were completed within a four-week period.

Table 1 below provides the usable response rate by manufacturing type, and size of company (see Table H1, Appendix H, for raw data). Tables H2 and H3 (Appendix H) display the number of usable returns by company size and industry sector for both the postal and telephone surveys. All respondents were thanked for their participation; see Appendix I for a copy of the letter.

3.1.2 Removal of unusable questionnaires

Although the company contacts were selected from the Experian database because of their categorisation within specific SIC codes, due to inaccuracies within the database, 44 (17%) of the postal questionnaires were returned from non-manufacturing companies, or from companies that did not manufacture goods in any of the SIC categories of interest. These misclassified questionnaires were not included in the analysis. 13 of these 44 non-manufacturing questionnaires were incomplete. Table J1 (Appendix J) outlines the total injury figures for major and over-3-day injuries for the useable non-manufacturing questionnaires (n = 31).

An additional 25 paper-based questionnaires were returned incomplete (either the company had not been trading for the four-year period of interest, or the data for the number of employees was absent), and were also excluded from analysis. Examination of the data set revealed a further 3 (telephone) questionnaires with highly anomalous data, such that it was considered that they had been filled in incorrectly. These outliers were also excluded. This brought the total number of questionnaires usable for analysis to 496 (308 telephone questionnaires and 188 paper-based questionnaires).

Table 1: Overall response rate (percentage) - usable sample (N = 496)				
Manufacturing Type	Size of Company			Total
	Small	Medium	Large	
Food & Beverages	15%	20%	11%	15%
Paper & Pulp	15%	54%	14%	19%
Rubber & Plastic	18%	15%	29%	19%
Basic & Fabricated Metals	16%	22%	26%	17%
Electrical & Optical	12%	22%	22%	15%
Total	15%	22%	21%	16%

NB. 3,021 companies contacted via telephone and post; 496 usable questionnaires completed

3.1.3 Sample breakdown

Table 2 below provides a breakdown of the total sample gained in terms of manufacturing type, and size of company. The data covers 496 responses, from a combined workforce of 50,431 employees. For a further breakdown by postal and telephone see Appendix H, Tables H2 & H3.

Table 2. Breakdown of sample (N = 496)				
Manufacturing Type	Size of Company			Total
	Small	Medium	Large	
Food & Beverages	42	13	6	61
Paper & Pulp	13	7	2	22
Rubber & Plastic	39	9	12	60
Basic & Fabricated Metals	169	51	20	240
Electrical & Optical	65	24	24	113
Total	328	104	64	496

3.2 GENERAL ACCIDENT REPORTING LEVELS FOR SAMPLE AS A WHOLE OVER FOUR-YEAR PERIOD

Of the 496 questionnaires suitable for analysis, 290 (59%) companies reported the same number of accidents on the questionnaires as those found on the FOCUS database over the four-year period. In total, 145 (29%) companies recorded a greater number of accidents overall on the questionnaire than were registered in FOCUS, hence were observed to under-report to HSE.

Of the respondents, 61 (12%) actually reported fewer accidents on the questionnaire than had been entered into FOCUS for the four-year period. It has been assumed that these companies have accurately reported their accidents to HSE but have inaccurate company accident record keeping; as stated previously data from these companies might be considered to be incorrect. Regarding the phenomenon of ‘over-reporting’ see section 4.4 for possible explanations.

Table 3 below shows the total number of companies under-reporting in each year, and also the percentage of the total sample that has therefore under-reported for each of the years. The data covers 496 companies, with a combined workforce of 50,431 employees.

Note: Data for the ‘Whole Sample’ refers to ‘number of companies under-reporting on the whole’ (i.e. majors + over-3-day). A single company may be over-reporting for one injury type, yet under-reporting for another in any single year, therefore only those that are under-reporting overall have been listed.

Table 3. Number of companies under-reporting injury rates for each reporting year (N = 496)					
		April 99 - March 00	April 00 - March 01	April 01 - March 02	April 02 - March 03
Whole Sample (based on both major & over-3-day injuries)	Number of companies under-reporting on the whole for each year	81	90	102	113
	Percentage of total sample under-reporting	16%	18%	21%	23%
Major Injury	Number of companies under-reporting	30	40	54	58
	Percentage of total sample under-reporting	6%	8%	11%	12%
Over-3-day Injury	Number of companies under-reporting	75	81	88	95
	Percentage of total sample under-reporting	15%	16%	18%	19%

Table 4 below refers to companies under-reporting in total across all four years of interest (i.e. '99 + '00 + '01 + '02). Therefore, a company may over-report in some years, but as long as it has under-reported to a greater extent in the other years, thus is under-reporting on the whole, it is included in this table.

Table 4. Companies under-reporting <i>on the whole</i> across ALL 4 years		
		Companies under-reporting <i>on the whole</i> across ALL 4 years
Major Injury	Number of companies	93
	Percentage of total sample	19%
Over-3-day Injury	Number of companies	115
	Percentage of total sample	23%

Table 5 below outlines the total injury figures for major and over-3-day injuries for each of the four years (both questionnaire and FOCUS reported), and the difference between these figures. The table also describes fluctuations in percentage difference between reporting levels for the four-year period. Paired samples *t* tests² were used to test for the presence of statistical significance in the differences between questionnaire data and FOCUS reports (please refer to Appendix K for further details regarding the statistics rationale). This analysis was carried out for: each individual year; for all years combined; for major injury; over-3-day injury and all injuries combined. The data covers 496 companies, with a combined workforce of 50,431 employees.

		April 99 - March 00	April 00 - March 01	April 01 - March 02	April 02 - March 03	Total
Major & Over-3-day Injury	Questionnaire Total	652	770	727	630	2,779
	FOCUS Total	488	507	469	415	1,879
	Difference	164*	263**	258**	215**	900**
	Level of reporting	75%	66%	64%	66%	68%
Major Injury	Questionnaire Total	108	128	132	135	503
	FOCUS Total	82	62	62	61	267
	Difference	26	66*	70**	74**	236**
	Level of reporting	76%	48%	47%	45%	53%
Over-3-day Injury	Questionnaire Total	544	642	595	495	2276
	FOCUS Total	406	445	407	354	1,612
	Difference	138*	197*	188**	141**	664**
	Level of reporting	75%	69%	68%	71%	71%

Paired samples *t* test (statistical difference between questionnaire & FOCUS injuries for each reporting year)

*=Difference is significant at the 0.05 level

**= Difference is highly significant at the 0.01 level

The paired samples *t* tests performed above indicate that the differences between the questionnaire returns and the RIDDOR data held in FOCUS are not due to chance (excluding major injury 1999-2000). Therefore, if this study's assumption - that differences between injuries reported on the questionnaire and those listed on FOCUS offer a true indication of

² Injuries are not normally distributed, however the sample was assumed be drawn from a normally distributed population due to the large number of participants obtained.

An alpha level of .05 was used for all statistical tests. However, where the significance level is less than .01 it has been documented as such.

Due to nature of the document the exact probability formulations for the statistical results have not been reported.

reporting accuracy - is upheld once the numerous limitations have been considered, these differences can be regarded as evidence of under-reporting to HSE. However, it should be noted that the present study experienced a number of shortcomings, see section 4.4.

Table 6 below describes the ratios of major to over-3-day injuries reported by the questionnaire and FOCUS sample for manufacturing companies.

Table 6. Ratio of major to over-3-day injury reported on the questionnaire and to ICC: Overall sample				
	April 00 – March 01	April 01 – March 02	April 02 – March 03	April 03 – March 04
Ratio of major to over-3-day injury per 100,000 employees (from questionnaire sample)	0.20	0.20	0.22	0.27
Ratio of reported major to over-3-day injury per 100,000 employees (from FOCUS sample)	0.20	0.14	0.15	0.17

Table 6 shows that the ratio of major to over-3-day injuries reported on the questionnaire increased from 0.20 to 0.27 between April 2000 and March 2004. Meanwhile the ratio of major to over-3-day injuries reported to FOCUS decreased overall from 0.20 to 0.17 over the four years.

Figure 1 graphically represents the level of reporting across the four-year period for major injury to help illustrate the trend.

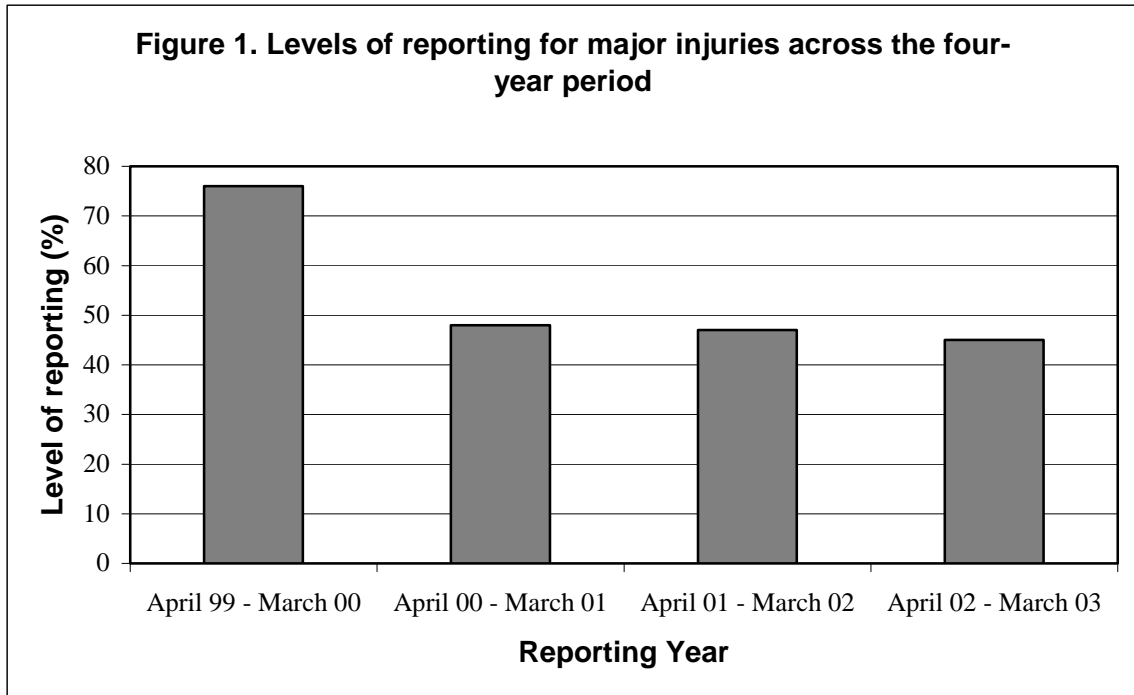
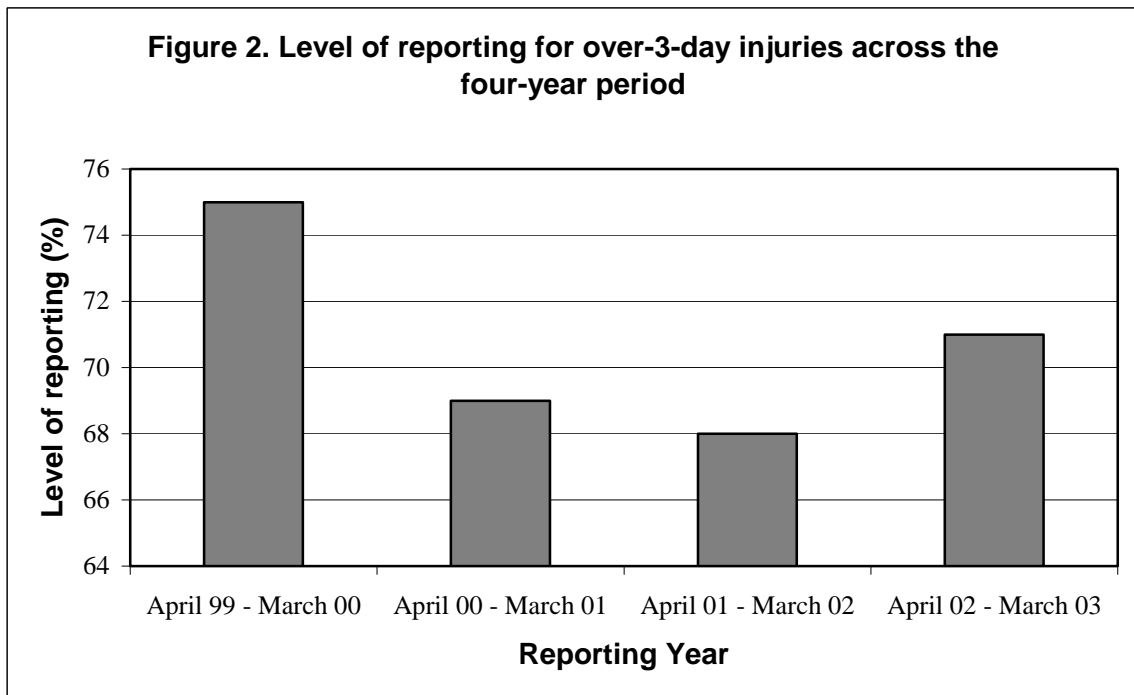


Figure 2 graphically represents the level of reporting across the four-year period for over-3-day injury to help illustrate the trend.



3.2.1 Reporting patterns across the four-year period

The 496 questionnaires suitable for analysis reported a total of 2,779 accidents ($M = 5.60$, $SD = 16.86$) (503 major injuries, 2,276 over-3-day injuries) over the four years. In total, the same companies reported 1,879 accidents ($M = 3.79$, $SD = 13.80$) to HSE on the FOCUS system, over the same time period (267 major injuries, 1,612 over-3-day injuries). Therefore, the overall difference between the total numbers of accidents reported on the questionnaires and those reported to HSE for the four-year period was 900, a statistically significant difference of 32% ($p < 0.01$) (see Table 5). This would indicate an overall level of reporting of 68%.

It should be noted that, 294 (59%) companies did not report any accidents at all on the questionnaire. Accident reports were not found on the FOCUS database for 375 (76%) of the companies in the current sample.

Repeated measures ANOVAs³ were used to test for the presence of differences between yearly levels of reporting, from both the questionnaire and to the FOCUS system (under RIDDOR), during the four years of interest. Results revealed the presence of significant differences for major injury under-reporting but not for over-3-day injury under-reporting. This means that the level of reporting of major injuries to HSE decreased significantly over the 4-year period ($p < 0.05$). Paired samples t tests were used to discover where these differences lay. This showed that the reporting of major injuries in 1999-2000 was significantly higher than in 2001/02 and 2002/03 ($p < 0.05$). No other differences were found.

3.2.2 Reporting patterns for each individual year

Paired samples t tests were used to formally test for the presence of significant differences in major and over-3-day injury reporting levels between questionnaire data and FOCUS reports, for each individual year.

3.2.2.1 2002/2003

Between April 2002 and March 2003, 135 major and 495 over-3-day injuries were reported on the questionnaire. When comparing each company with their reports to HSE, only 61 major and 354 over-3-day injuries were recorded in the FOCUS database. A paired samples t test revealed that major injuries were reported significantly less to HSE than on the questionnaire over this time period ($p < 0.01$). A further t test also revealed significantly less reporting of 3-day injuries to HSE than on the questionnaire ($p < 0.01$).

3.2.2.2 2001/2002

62 major and 407 over-3-day injuries were reported to HSE. In contrast, 132 major and 595 over-3-day injuries were reported on the questionnaire. A paired samples t test revealed highly significant under-reporting of major injuries to HSE than on the questionnaire during this year ($p < 0.01$). In addition, over-3-day injuries were reported significantly less to HSE than on the questionnaire ($p < 0.01$).

³ The sample was assumed to be drawn from a normally distributed population due to the large number of participants obtained. The assumption of sphericity was tested for and if violated the more conservative estimate Greenhouse-Geisser was used.

3.2.2.3 2000/2001

128 major and 642 over-3-day injuries were reported on the questionnaire. However, 62 major and 445 over-3-day injuries were reported to HSE in 2000/01. Both major injuries and over-3-day injuries were reported significantly less to HSE than on the questionnaire ($p < 0.05$).

3.2.2.4 1999/2000

Between April 1999 and March 2000, 108 major and 544 over-3-day injuries were reported on the questionnaire in comparison to 82 major and 406 over-3-day injuries reported to HSE on the FOCUS database. There were no significant differences in the reports of major injuries to HSE than on the questionnaire. Over-3-day injuries were significantly under-reported over this time period ($p < 0.05$).

3.2.3 Comparison between number of injuries reported to HSE by current sample (located on FOCUS) and number of injuries reported nationally to HSE

To provide an indication of the representativeness of the current sample, comparisons may be drawn between the number of injuries reported to HSE (as located on FOCUS) for the current, manufacturing sample and those reported to HSE by the whole of manufacturing sector and by the whole of the UK industry.

The major injury data reported to HSE, and hence recorded on FOCUS, for the present manufacturing sample fell between the year 1999-2000 and 2000/01 and was then followed by a three-year plateau. In comparison, HSE has detailed a fall in the number of reported major injuries since 1996/97 and then a rise since 2000/01 throughout all industry (HSC/HSE, 2003).

Over-3-day injuries were also considered. The injury data reported to HSE by the current manufacturing sample (as located in FOCUS) show a rise from 1999-2000 to 2000/01. Since 2000/01 the number of over-3-day injuries reported by the current sample on FOCUS have fallen. Meanwhile HSE has witnessed a general downward trend in the number over-3-day injuries reported under RIDDOR since 1997/98 (HSC/HSE, 2003).

3.3 REPORTING LEVELS BY SIZE OF COMPANY

Table 7 describes the number of reported injuries by company size and by injury type, both on the questionnaire and on FOCUS. The data covers 496 companies, with a total workforce of 50431 employees over the four-year period.

		Company Size			
		Small	Medium	Large	Total
Sample Size	Number of Companies	328	104	64	496
	Number of Employees	3,767	12,731	33,933	50,431
Major Injury	Questionnaire Total	71	234	198	503
	FOCUS Total	28	82	157	267
	Difference	43*	152*	41	236**
	Level of reporting	39%	35%	79%	53%
Over-3-day Injury	Questionnaire Total	97	650	1,529	2,276
	FOCUS Total	54	441	1,117	1,612
	Difference	43	209	412**	664**
	Level of reporting	56%	68%	73%	71%

Paired samples *t* test (statistical difference between questionnaire & FOCUS injuries)

*=Difference is significant at the 0.05 level

**= Difference is highly significant at the 0.01 level

Repeated measures ANOVAs were used to investigate the variation year-on-year, or four-year trend, in the difference between injuries reported on the questionnaire, and those reported to HSE under RIDDOR for small, medium and large companies.

Results revealed no significant differences between reporting levels of major injuries for small and medium companies in the year-on-year variation. Of the 64 large companies that responded to the questionnaire, a repeated measures ANOVA revealed a significant trend ($p < 0.05$) in levels of reporting in the year-on-year variation. This implies the level of reporting has changed significantly across (some of the) four years. The trend was linear signifying a chronological change in levels of reporting levels across the time period.

There were no significant differences in the year-on-year variation in the reporting of over-3-day injuries by company size.

Table 8 below describes the ratios of major to over-3-day injuries reported by small, medium and large companies on the questionnaire and to FOCUS.

	Small sized companies	Medium sized companies	Large sized companies
Ratio of major to over-3-day injury per 100,000 employees (from questionnaire sample)	0.73	0.36	0.13
Ratio of reported major to over-3-day injury per 100,000 employees (from FOCUS sample)	0.52	0.19	0.14

Table 9 shows that for small companies, the ratio of major to over-3-day injuries reported on the questionnaire was 0.73 for the questionnaire, and 0.52 to FOCUS. For medium companies the ratios were 0.36 for the questionnaire and 0.19 for FOCUS, whilst large companies showed ratios of 0.13 for the questionnaire and 0.14 for FOCUS. See Table 9 below for a more detailed breakdown.

Company Size		April 00 – March 01	April 01 – March 02	April 02 – March 03	April 03 – March 04
Small	Ratio of major to over-3-day injury per 100,000 employees (from questionnaire sample)	0.94	0.68	0.85	0.57
	Ratio of reported major to over-3-day injury per 100,000 employees (from FOCUS sample)	0.33	0.71	0.63	0.50
Medium	Ratio of major to over-3-day injury per 100,000 employees (from questionnaire sample)	0.33	0.31	0.37	0.47
	Ratio of reported major to over-3-day injury per 100,000 employees (from FOCUS sample)	0.19	0.17	0.16	0.24
Large	Ratio of major to over-3-day injury per 100,000 employees (from questionnaire sample)	0.11	0.12	0.12	0.17
	Ratio of reported major to over-3-day injury per 100,000 employees (from FOCUS sample)	0.20	0.11	0.13	0.13

3.3.1 Small companies (< 50 employees)

Table 10 describes the reported injury rates for small companies over the four-year period, both on the questionnaire and on FOCUS. The data covers 328 companies, from a combined workforce of 3,767 employees.

Table 10. Reported injury rates for small companies						
		April 99 - March 00	April 00 - March 01	April 01 - March 02	April 02 - March 03	Total
Major Injury	Questionnaire Total	16	13	22	20	71
	FOCUS Total	5	5	10	8	28
	Difference	11	8	12	12	43*
	Level of reporting	31%	38%	45%	40%	39%
Over-3-day Injury	Questionnaire Total	17	19	26	35	97
	FOCUS Total	15	7	16	16	54
	Difference	2	12*	10	19*	43
	Level of reporting	88%	37%	61%	46%	56%

Paired samples *t* test (statistical difference between questionnaire & FOCUS injuries for each reporting year)

*=Difference is significant at the 0.05 level

**= Difference is highly significant at the 0.01 level

As reported earlier (see section 3.3), repeated measures ANOVAs revealed no significant differences in the year-on-year variation for both major and over-3-day injuries between reports to HSE and on the questionnaire.

Small companies reported a total of 71 major injuries on the questionnaire yet only 28 to HSE; *t* tests show that this difference is statistically significant ($p < 0.05$). No significant differences were found for major injuries in any of the individual years.

Small companies reported 97 over-3-day injuries on the questionnaire, in contrast to a reported total of 54 over-3-day injuries to HSE when comparing their reports on FOCUS. Paired samples *t* tests revealed significant under-reporting of over-3-day injuries for 2002/03 and 2000/01 only ($p < 0.05$). No differences were found for over-3-day injuries in the other two years.

3.3.2 Medium companies (50 - 249 employees)

Table 11 shows the reported injury rates for medium companies over the four-year period, both on the questionnaire and to FOCUS. The data covers 104 companies, from a combined workforce of 12,731 employees.

Table 11. Reported injury rates for medium companies						
		April 99 - March 00	April 00 - March 01	April 01 - March 02	April 02 - March 03	Total
Major Injury	Questionnaire Total	52	64	63	55	234
	FOCUS Total	24	22	16	20	82
	Difference	28	42*	47*	35*	152*
	Level of reporting	46%	34%	25%	36%	35%
Over-3-day Injury	Questionnaire Total	156	206	172	116	650
	FOCUS Total	128	128	103	82	441
	Difference	28	78	69*	34*	209
	Level of reporting	82%	62%	60%	71%	68%

Paired samples *t* test (statistical difference between questionnaire & FOCUS injuries for each reporting year)

*=Difference is significant at the 0.05 level

**= Difference is highly significant at the 0.01 level

As reported earlier (see section 3.3), repeated measures ANOVAs revealed no significant differences in the year-on-year variation for both major and over-3-day injuries between reports to HSE and on the questionnaire.

Medium sized companies reported a total of 234 major injuries on the questionnaire, yet the same companies only reported a total of 82 major injuries to HSE. Paired samples *t* tests revealed significant under-reporting of major injuries for each of the years 2002/03, 2001/02 and 2000/01 ($p < 0.05$). No significant differences were found for major injuries in 1999-2000.

In total, 650 over-3-day injuries were reported on the questionnaire compared to 441 reported to HSE. Over-3-day injuries were reported significantly less to HSE in 2002/03 and in 2001/002 ($p < 0.05$). No significant differences were found for over-3-day injuries in 1999-2000 and 2000/01.

3.3.3 Large companies (≥ 250 employees)

Table 12 shows the reported injury rates for large companies over the four-year period, both on the questionnaire and on FOCUS. The data covers 64 companies, with a combined workforce of 33,933 employees.

Table 12. Reported injury rates for large companies						
		April 99 - March 00	April 00 - March 01	April 01 - March 02	April 02 - March 03	Total
Major Injury	Questionnaire Total	40	51	47	60	198
	FOCUS Total	53	35	36	33	157
	Difference	-13	16	11	27*	41
	Level of reporting	133%	69%	77%	55%	79%
Over-3-day Injury	Questionnaire Total	371	417	397	344	1,529
	FOCUS Total	263	310	288	256	1,117
	Difference	108*	107*	109**	88**	412**
	Level of reporting	71%	74%	72%	74%	73%

Paired samples *t* test (statistical difference between questionnaire & FOCUS injuries for each reporting year)

*=Difference is significant at the 0.05 level

**= Difference is highly significant at the 0.01 level

As reported earlier (see section 3.3), an ANOVA revealed a significant decrease in the level of reporting of major injuries across the time period. Paired samples *t* tests showed that the differences lie between the reporting of majors in 1999-2000 ($M=-0.20$) and 2001/02 ($M=0.17$, $p<0.05$); and 1999-2000 and 2002/03 ($M=0.42$, $p<0.01$). There were no significant differences in the year-on-year variation between the years for over-3-day injuries.

Large companies reported a total of 198 major injuries on the questionnaire, while on FOCUS the same companies reported 157 major injuries. Paired samples *t* tests revealed significantly less reporting of major injuries to HSE than on the questionnaire in 2002/03. No significant differences were found for major injuries in 1999-2000; 2000/01 and 2001/02.

In total, 1,529 over-3-day injuries were reported on the questionnaire, 1,117 of which were found on the FOCUS system. Paired samples *t* tests revealed that the level of under-reporting observed was statistically significant in each of the four years ($p<0.05$).

3.4 REPORTING LEVELS BY MANUFACTURING TYPE

The paired samples *t* tests performed in this section investigate the differences between the questionnaire returns and the RIDDOR data held in FOCUS by examining each industry sector. It should be noted that some of the sectors returned only a small number of questionnaires and this can affect the validity of the statistical analysis performed. Please also see section 4.4, which reports on the number of shortcomings experienced in the present study.

3.4.1 Food and Beverages

Table 13 describes the number of injuries reported by Food and Beverage companies over the four-year period, both on the questionnaire and in FOCUS. The data covers 61 responses, from a combined workforce of 3,767 employees.

Table 13. Reported injury rates for Food & Beverage companies						
		April 99 - March 00	April 00 - March 01	April 01 - March 02	April 02 - March 03	Total
Major Injury	Questionnaire Total	23	31	28	25	107
	FOCUS Total	20	12	20	11	63
	Difference	3	19	8	14	44
	Level of reporting	87%	39%	71%	44%	59%
Over-3-day Injury	Questionnaire Total	75	81	87	64	307
	FOCUS Total	78	98	84	57	317
	Difference	-3	-17	3	7	-10
	Level of reporting	104%	121%	96%	89%	103%

Paired samples *t* test (statistical difference between questionnaire & FOCUS injuries for each reporting year)

*=Difference is significant at the 0.05 level

**= Difference is highly significant at the 0.01 level

It should be noted that the low numbers of responses gained for this manufacturing type limit the validity of statistical tests that can be performed on the data. However, of those performed none proved significant.

Repeated measures ANOVAs revealed no significant differences in the year-on-year variation for major and over-3-day injuries.

Food and Beverage companies reported a total of 107 major injuries in the questionnaire, yet only 44 major injuries were reported to HSE over the same period.

In total, 307 over 3-day injuries were recorded on the questionnaire in comparison to 317 over 3-day injuries on the FOCUS system. This negative difference suggests possible 'over-reporting' of over-3-day injuries - see section 4.4 for likely explanations.

3.4.2 Paper and Pulp

Only 22 usable questionnaires were received from companies within the Paper and Pulp industry. As such, although Table 14 describes the number of injuries reported by Paper and Pulp companies over the four-year period, both on the questionnaire and in FOCUS, valid statistical tests of differences cannot be performed on this data, due to low numbers gained in each cell. The data covers 22 responses, from a combined workforce of 1,855 employees.

Table 14. Reported injury rates for Paper & Pulp companies						
		April 99 - March 00	April 00 - March 01	April 01 - March 02	April 02 - March 03	Total
Major Injury	Questionnaire Total	6	2	3	1	12
	FOCUS Total	5	3	3	3	14
	Difference	1	-1	0	-2	-2
	Level of reporting	83%	150%	100%	300%	117%
Over-3-day Injury	Questionnaire Total	15	12	12	10	49
	FOCUS Total	13	16	20	8	57
	Difference	2	-4	-8	2	-8
	Level of reporting	87%	133%	167%	80%	116%

Paired samples *t* test (statistical difference between questionnaire & FOCUS injuries for each reporting year)

*=Difference is significant at the 0.05 level

**= Difference is highly significant at the 0.01 level

Since 1999-2000, Paper and Pulp companies recorded a total of 12 major injuries on the questionnaires, whereas FOCUS has 14 reports for these companies during this time period, indicating over-reporting to HSE.

This sub-sector reported 49 over-3-day injuries on the questionnaire yet more (57) over-3-day injury reports were found on FOCUS.

3.4.3 Rubber and Plastic

Table 15 describes the number of injuries reported by Rubber and Plastics companies over the four-year period, both on the questionnaire and in FOCUS. The data covers 60 responses, from a combined workforce of 7,683 employees.

Table 15. Reported injury rates for Rubber & Plastics companies						
		April 99 - March 00	April 00 - March 01	April 01 - March 02	April 02 - March 03	Total
Major Injury	Questionnaire Total	13	20	25	20	78
	FOCUS Total	14	8	15	8	45
	Difference	-1	12*	10	12	33
	Level of reporting	108%	40%	60%	40%	58%
Over-3-day Injury	Questionnaire Total	166	163	153	153	635
	FOCUS Total	86	101	96	109	392
	Difference	80*	62	57**	44*	243*
	Level of reporting	52%	62%	63%	71%	62%

Paired samples *t* test (statistical difference between questionnaire & FOCUS injuries for each reporting year)

*=Difference is significant at the 0.05 level

**= Difference is highly significant at the 0.01 level

Repeated measures ANOVAs revealed no significant differences in the year-on-year variation for major and over-3-day injuries.

Companies within the Rubber and Plastic sector reported a total of 78 major injuries on the questionnaire, 45 were found in FOCUS. Major injuries were significantly under-reported in 2000/01 ($p < 0.05$). No other significant differences were found for major injuries.

635 over-3-day injuries were reported in the questionnaire in comparison to 392 FOCUS reports for the same time period. Paired samples *t* tests revealed that under-reporting levels were significant in 1999-2000 ($p < 0.05$), 2002/03 ($p < 0.05$) and 2001/02 ($p < 0.01$). No significant differences were found for over-3-day injuries in 2000/01.

3.4.4 Basic and Fabricated Metals

Table 16 illustrates the number of injuries reported by Basic and Fabricated Metal companies over the four-year period, both on the questionnaire and in FOCUS. The data covers 240 responses, from a combined workforce of 15,414 employees.

Table 16. Reported injury rates for Basic and Fabricated Metal companies						
		April 99 - March 00	April 00 - March 01	April 01 - March 02	April 02 - March 03	Total
Major Injury	Questionnaire Total	51	57	52	67	227
	FOCUS Total	29	26	21	32	108
	Difference	22	31	31	35*	119
	Level of reporting	57%	46%	40%	48%	48%
Over-3-day Injury	Questionnaire Total	190	254	228	165	837
	FOCUS Total	158	155	145	118	576
	Difference	32	99	83*	47*	261*
	Level of reporting	83%	61%	64%	71%	69%

Paired samples *t* test (statistical difference between questionnaire & FOCUS injuries for each reporting year)

*=Difference is significant at the 0.05 level

**= Difference is highly significant at the 0.01 level

Repeated measures ANOVAs revealed no significant differences in the year-on-year variation for major and over-3-day injuries.

The Basic and Fabricated Metals sub-sector reported a total of 227 major injuries on the questionnaire, and 108 major injuries on FOCUS. Paired samples *t* test revealed a significant difference in reporting levels for the year 2002/03 ($p < 0.05$) but not for the other three years.

In total, 837 over-3-day injuries were reported in the questionnaire, yet only 576 were registered on FOCUS. Paired samples *t* tests revealed that under-reporting was statistically significant in 2002/03 ($p < 0.05$) and 2001/02 ($p < 0.05$). No differences were found for over-3-day injuries in 1999-2000 or 2000/01.

3.4.5 Electrical and Optical

Table 17 shows the number of injuries reported by Electrical and Optical companies over the four-year period, both on the questionnaire and in FOCUS. The data covers 133 responses, with a combined workforce of 19,673 employees.

Table 17. Reported injury rates for Electrical & Optical companies						
		April 99 - March 00	April 00 - March 01	April 01 - March 02	April 02 - March 03	Total
Major Injury	Questionnaire Total	15	18	24	22	79
	FOCUS Total	14	13	3	7	37
	Difference	1	5	21*	15*	42
	Level of reporting	93%	72%	12%	32%	47%
Over-3-day Injury	Questionnaire Total	98	132	115	103	448
	FOCUS Total	71	75	62	62	270
	Difference	27	57*	53**	41*	178*
	Level of reporting	72%	57%	54%	60%	60%

Paired samples *t* test (statistical difference between questionnaire & FOCUS injuries for each reporting year)

*=Difference is significant at the 0.05 level

**= Difference is highly significant at the 0.01 level

Across the four-year period of investigation, there is a linear fall in the level of reporting of major injuries to HSE (exposed by a repeated measures ANOVA ($p < 0.05$), which is statistically significant (*t* tests) between the years of 1999/00 and 2001/02 ($p < 0.01$), as well as between 2000/01 and 2001/02 ($p < 0.01$).

The Electrical and Optical sector reported a total of 79 major injuries and only 37 to HSE. Differences in major injuries were significant for 2002/03 ($p < 0.05$) and 2001/02 ($p < 0.05$) but not for the other two years.

Electrical and Optical companies reported 448 over-3-day injuries through the questionnaire, in comparison to only 270 to HSE (as found on FOCUS). Paired samples *t* tests revealed that under-reporting was significant in 2002/03 ($p < 0.05$), 2000/01 ($p < 0.05$) and 2001/02 ($p < 0.01$). No significant difference was found in 1999-2000.

3.5 NATURE OF INJURY FOR SELF-REPORTED MAJOR INJURIES

The categorisation used to describe type of major injury on the questionnaire allowed the data to be analysed by specific injury outcome for each of the four years (see Table 18 below). The data is for 188 companies, with a total combined workforce of 27,453 employees.

On the FOCUS system, all major injuries are classified simply as number '2'. Therefore, in order to discover the exact nature of major injury, each individual RIDDOR injury record must be investigated, which is a time consuming process. Consequently, direct comparisons between this data (nature of injury as recorded on the questionnaires) and the FOCUS reports have not been made in this pilot study due to constraints on time, personnel and financial resources.

The most frequently occurring major injury outcome reported on the questionnaire was damage to the eye, with a total 274 injuries for the four-year period. The least prevalent injury type reported were those that led to unconsciousness or required resuscitation.

Injury Outcome	April 99 - March 00	April 00 - March 01	April 01 - March 02	April 02 - March 03	Total
Amputation: loss of all/part of limb, fingers, toes (excluding loss of fleshy tips, loss of nail)	5	6	8	5	24
Fracture (excluding fingers, thumbs, toes, and broken noses)	35	24	28	36	123
Dislocation of shoulder, hip, knee or spine (excluding dislocation of ankles, wrists, elbows)	1	4	1	7	13
Eye injuries resulting from chemical, hot metal burn or penetration of eyeball, including loss of sight (excluding damage to eye sockets/surrounds)	56	78	77	63	274
Any other injury that required admittance to hospital for more than 24 hours	10	14	18	21	63
Any other injury that led to unconsciousness or required resuscitation	1	2	0	3	6
TOTAL	108	128	132	135	503

The data above appears to be 'out of line' with major injury data collected under RIDDOR. For example, in 2002/03 HSE (HSE/HSC, 2003) stated that only 4% of major injuries were eye injuries; this is compared to 47% recorded on the current questionnaires. Similarly, the questionnaire data suggests that in 2002/03 27% of the major injuries were fractures; whereas HSE recorded fractures as 71% of all reported major injuries. Appendix L details further investigation into the apparent anomalous number of eye-injuries reported by respondents. Also see section 4.4 which highlights further limitations of the study.

4 DISCUSSION

4.1 REPORTING ACCURACY LEVELS ACROSS THE WHOLE SAMPLE

Across the whole UK workforce, the injury reporting figures for both major and over-3-day injuries have been noted to fall between 1996/97 and 2000/01. Since then, rates of major injuries reported to HSE have increased whilst over-3-day injury figures have continued to decline (HSC/HSE, 2003). The Revitalising Health and Safety programme was launched in June 2000, with eight priority programmes (covering hazards or sectors where major improvements are necessary if the Revitalising targets are to be met) implemented the following year. Therefore, it might plausibly be expected that any increase in the levels of reporting to HSE resulting from raised stakeholder awareness (following the introduction of these programmes) would occur around 2001/02. This study aimed to help to understand whether the observed increased trend in RIDDOR-reportable major injuries reflected improved levels of reporting, or a worsening incidence of major injury.

The main findings of this study are that 29% (n = 145) of the companies involved reported fewer accidents to HSE than they reported to have occurred at their site on the questionnaire. The majority of the sample (n = 290, 59%) reported the same number of accidents to both HSE (through the RIDDOR system) and the HSL project team through the questionnaire. This is assumed to be accurate reporting.

145 (29%) companies under-reported a total of 900 (32%) major and over-3-day injuries to HSE during the four-year period from April 1999 to March 2003. 19% (n = 93) of companies in the present sample under-reported 236 (47%) major injuries over the four-years. 23% (n = 115) of companies under-reported 664 (29%) over-3-day injuries to HSE between 1999 and 2003. Thus, it appears that a relatively small percentage of companies are responsible for under-reporting large numbers of incidents, especially in the major injury category.

The paired samples *t* tests indicate that the differences between the questionnaire returns and the RIDDOR data held in FOCUS are unlikely to be due to chance (excluding major injury 1999-2000). Therefore, if this study's assumption (that differences between injuries reported on the questionnaire and those listed on FOCUS offer a true indication of reporting accuracy) is upheld once the numerous limitations have been considered, these differences can be regarded as evidence of under-reporting to HSE.

Major injury reports located on FOCUS for the current sample of manufacturing companies broadly follow the four-year trend found across the workforce as whole. The current sample reported to HSE (as located in FOCUS) the same decreased number of major injuries until 2000/01, although this is followed by a plateau in number of injury reports rather than the nationally observed increase. Although, official HSE figures for the manufacturing sector detail a continued decline in the number of reported major injuries from 1999-2000 onwards (HSE/HSE, 2003). The number of over-3-day injuries reported by the present sample to HSE (as located in FOCUS) increases from 1999-2000 until 2000/01, in contrast to the decreasing number of injuries reported by the wider workforce population and by the manufacturing sector. From 2000/01 onwards, the current sample reported fewer over-3-day injuries, thus reflecting the trend data held by HSE (RIDDOR).

4.1.1 Reporting level of major injuries

Overall, 93 (19%) companies in the present sample under-reported 236 (47%) major injuries to HSE, at some stage within the four-year period of interest. Taking the sample as a whole, the difference between major injury data reported on the questionnaires and the FOCUS system is statistically significant for all years, with the exception of 1999-2000.

Chronologically, across the four-year period of investigation, the difference in major injury reporting figures has increased year on year, i.e. the level of reporting appears to be decreasing (getting worse). Particularly, levels of reporting were significantly higher in 1999-2000 than in 2001/02 and 2002/03. Similarly, using the LFS rate of reportable injury, HSE estimate that the level of reporting of non-fatal injuries has fallen (i.e. deteriorated) steadily from 1999-2000 to 2002/03 (in industry as a whole and in the manufacturing sector).

HSE estimates the number of major injuries across the whole of the industry to be at a similar extent in 2002/03 as in 1999-2000. Although, in the manufacturing sector official HSE figures state that the number of reported major injuries fell slightly between 1999-2000 and 2002/03 (HSE/HSE, 2003). Taken as a whole all this information would seem to suggest that major injury has actually deteriorated in real terms and any improvement seen in the manufacturing industry may have only been an artefact of diminishing reporting levels.

In view of the introduction of the Revitalising Health and Safety programme, which was anticipated to *increase* levels of reporting (through mechanisms of increased stakeholder awareness of reporting duties), this continued decrease seen in the sample in the level of reporting of major injuries is somewhat unexpected. The comparatively small sample size, and the low total number of major injuries that occurred across the timeframe may explain this trend.

4.1.2 Reporting level of over-3-day injuries

The data collected indicates the presence of 664 (29%) under-reports for over-3-day injuries to HSE within 23% (n = 115) of the manufacturing companies sampled.

Post 2001, the current data shows a decrease in reported over-3-day injuries on both the questionnaire and the FOCUS system. However, the numerical difference in reporting totals between both sources is maintained at approximately the same level during this time period as in preceding years, suggesting that reporting levels have remained roughly constant over the four-year period of interest. Statistical testing supports this, as no significant differences were present in the year-on-year variation in the level of reporting of over-3-day injury.

In contrast, using the LFS rate of reportable injury, HSE estimate that the level of reporting of non-fatal injuries has fallen (i.e. deteriorated) steadily from 1999-2000 to 2002/03. HSE state that the number of reported over-3-day injuries has fallen steadily from 1999-2000 to 2002/03. This applies to both industry as a whole and the manufacturing sector (HSE/HSE, 2003). The data from this survey suggests that this improvement is a real change and not an artefact of worsening reporting levels as could be implied from the LFS data.

4.2 REPORTING LEVEL BY SIZE OF COMPANY

With respect to the small companies sampled (n = 328), relatively small numbers of both major and over-3-day injuries were reported (both on FOCUS and on the questionnaire). Therefore, this limits the generalisability of reporting trends to small companies within the wider workforce. Nonetheless, the results bear some consideration. The general pattern of consistent

under-reporting is noted for all four years, and although there is some variation between the degree of under-reporting observed between years, this may be attributable to the small size, which increases the risk of statistical error.

The results gained for medium sized companies (n = 104) demonstrate under-reporting of major and over-3-day injuries in all four years. There is non-linear variation in terms of under-reporting across the four-year period for both injury types, limiting conclusions that may be drawn concerning reporting trends.

The present sample of large companies (n = 64) displayed somewhat anomalous reporting patterns, for example, the *over*-reporting of major injuries in 1999-2000. As previously discussed, data displaying over-reporting should be viewed with great caution as companies should not have experienced fewer injuries than they have reported to HSE. Data from these companies might be incorrect because it is probable that they have accurately reported their accidents to HSE but have kept inaccurate company accident records. This result, in combination with the relatively small sample of companies of this size gained, mean that it is prudent to interpret the other results guardedly. Major injuries were under-reported during the other three years, with a significant difference reported for 2002/03. This contradicts the expected increase in reporting following the Revitalising programme. In terms of reporting of over-3-day injuries, a roughly constant level of reporting is observed across the four-year period.

4.3 REPORTING LEVEL BY TYPE OF COMPANY

Food and Beverage companies (n = 61) displayed variable, and rather inconclusive reporting patterns. The major injury reporting pattern was consistent with that of the entire sample, in that under-reporting was noted in each year. However, in the first two years of investigation, over-3-day injuries were over-reported to HSE, although the small relative difference between all yearly reports on FOCUS and the questionnaire for this injury type render the utility of these findings limited. Similarly, as only 22 Paper and Pulp companies responded to the questionnaire, and the numbers of reported injuries were minimal, conclusions as to reporting accuracy cannot be validly generalised to this sub-sector as a whole. However, albeit for a very small sample of companies there appears to be a much higher level of reporting for this sector. It is possible that this is as a result of increased stakeholder awareness of reporting requirements as a result of the PABIAC initiative (Horbury & Collier, 2002), which ran from April 1998 to March 2001.

Within Rubber and Plastic companies (n = 60), the results regarding major injury reporting are highly variable between each reporting year, thus are inconclusive. In contrast, results suggest that over-3-day injuries are consistently under-reported to HSE, with a slight linear increase in reporting observed chronologically across the four years.

The respondents from the Basic and Fabricated Metals industry (n = 240) markedly under-reported major injuries to HSE in each of the four years. This level of under-reporting was roughly steady across the investigation period. Likewise, a pattern of consistent over-3-day injury under-reporting was also observed within this sub-sector.

The results for the Electrical and Optical sector (n = 113) suggest a significant pattern change in major injury under-reporting levels has taken place across the four years of interest. In comparison to the 1999-2000 and 2000/2001, the subsequent two years display a significantly higher level of under-reporting. However, the small number of major injuries reported in either source over this period cast some doubt over the generalisability of this finding. In terms of

over-3-day injuries, this sub-sector shows under-reporting in all four years, with some variability in the degree of under-reporting observed.

4.4 LIMITATIONS

It should be noted that the present study experienced a number of shortcomings that should be acknowledged because of their potential impact on the validity of the results gained. These are particularly salient given that the results were based on the assumption that differences between injuries reported on the questionnaire and those listed on FOCUS offer a true indication of reporting accuracy.

- 1) One possible source of error is the practice within HSE of recoding injury types. Reports to RIDDOR are frequently reclassified, with major injuries being changed to over-3-day (seldom vice versa). This procedure may perhaps affect the accuracy of the current comparison between questionnaire data and reports on the FOCUS system for example, an over-3-day injury may be reported to HSE as a major injury, so it is reclassified correctly by HSE in FOCUS, but will still be recorded by the company as a major injury. Appendix M details the results of later work carried out to explore the area of injury misclassification.
- 2) It is known within HSE that on occasion companies submit duplicate RIDDOR forms. The FOCUS system has no automatic way of removing these replicas, although some subsequent checks are done. This may account for a company having more reports in FOCUS than on the self-reported questionnaire. Even though the existence of duplicates cannot be discounted, this explanation for the 'over-reporting' uncovered in this study is assumed to be highly unlikely and more probably due to error within the data, both from the questionnaires and from FOCUS.
- 3) Another confounding influence is likely to be that the individual completing the questionnaire may have done so incorrectly, using inaccurate figures:
 - a) This may possibly be the result of disorganised record keeping, in that the accident book was either not-up-to-date, or missing entirely (in which case the respondent would have worked from memory, which is obviously prone to inaccuracy over a four year period). In support of this premise, from notes written on some of the questionnaires, it was apparent that some companies did not have accurate accident records (in which instances, the questionnaires were discarded).
 - b) The results for the sample as a whole indicated a lower level of reporting of both major and over-3-day injuries in 1999-2000. It is plausible that if accident records are not kept up-to-date, and accidents must be recollected from memory, data from this time will be most prone to inaccuracy, due to recall failure.
 - c) There exists potential for simple lapses, whereby respondents filled the correct right numbers into wrong boxes by accident.
 - d) The danger of double counting (i.e. coding one injury as both a fracture and an over-3-day injury) on the questionnaire is another possible problem, even though the questionnaire specifically states that respondents should "count each injured person once".
 - e) When interpreting the results for 'Nature of Injury', eye injury was the most frequently reported injury outcome in the current manufacturing sample. This is incongruent with the workforce as a whole, where fractures are the most prevalent major injury. It is possible that some misunderstanding of the eye injury category has taken place. It was evident that a few of the eye injuries reported on the postal questionnaire may not have been defined by RIDDOR as major injuries. This was

due to the addition of written descriptions, such as, ‘no loss of sight’; ‘scratch to eyeball’; ‘solution splashed in eye’ (such data were not included in the sample).

- f) Written notes accompanying the questionnaire also offer insight into participant’s comprehension of the major injury category ‘Any other injury that led to unconsciousness for more than 24 hours’. For example, in one case, the box was marked but the individual had crossed out ‘for more than 24 hours’ (this figure was excluded from the database).
- g) Researchers entering data from the postal returns found that occasionally it was difficult to tell if the questionnaire had blank spaces because no injuries had taken place or because no records were available. Best assumptions were made where possible otherwise the questionnaire was discarded.

The degree of error in the accuracy of reporting figures from the remainder of the sample cannot be estimated. That stated, as the research relied on voluntary participation, and companies were not obliged to respond to the questionnaire, premeditated under-reporting seems unlikely. If a company had deliberately tried to avoid reporting accidents to HSE, then it seems reasonable to conclude that they would be unwilling to admit to more accidents in an HSE-sponsored questionnaire.

- 4) There exists some potential for error when searching for a specific company’s RIDDOR reports on the FOCUS system, primarily as a result of deficiencies in the system’s search engine. Several problems were encountered:
 - a) When a respondent informed the project team of a change of company name and / or address, it became unclear how the questionnaire related to FOCUS, as the questionnaire could be registered on FOCUS under the old name at the same address, or the new name at a different address. Either an educated ‘best-guess’ was made or the questionnaire was discarded.
 - b) Searching a company’s previous RIDDOR reports on FOCUS is also subject to potential error. For example, when searching for a specific company, different results in terms of numbers of reported injuries were *often* obtained depending on which search field criteria were used (i.e. company name; name and postcode; name and full address). Every attempt was made to be methodical and consistent in the search technique adopted (see Appendix E for FOCUS matching guidelines).
- 5) It was apparent upon receipt of the questionnaires, that a small number of companies received questionnaires addressed to a different company, at an address near them. In these instances, the respondent replaced the original company name and address with their own, and returned the questionnaire. It should be acknowledged that Experian Limited considerably reduced the number of usable questionnaires as a result of SIC code misclassification. In total, 19% (n = 44) of the paper-based questionnaires returned were received from non-manufacturing companies.
- 6) The limitation of ‘self-selection bias’ or ‘volunteer bias’ should be acknowledged (Oppenheim, 1992). As with all voluntary surveys, although every attempt is made by the researchers to send the questionnaire to a random sample, it is the individuals themselves who decide whether or not to participate. This therefore means that the questionnaire returns may reflect some attribute of the companies choosing to respond. This may take the form of a pre-existing interest in the subject. This is especially relevant as this research is concerned with companies who have no interest, i.e. those not returning their RIDDOR reports.
- 7) It should be recognised that the current sample may not be fully representative of the manufacturing sector, nor the workforce as a whole, given the relatively small sample size

obtained. The validity of generalisations is further reduced when breaking down the sample by sub-divisions, as generalising from a small number of incidents is not advisable.

- 8) The data collected from the manufacturing sample did not request information on the number of employees at each year. Therefore, the responses only detailed the number of employees in 2003. As a whole, the economy has witnessed a drop in employment figures, yet this study does not take into account any changes in the number of employees. In addition, no consideration was given to information on the ratio of contract to permanent staff, nor males to females. These factors have also been shown to influence workplace injury rates (McKnight, Elias & Wilson, 2001).
- 9) This study has explored the injuries reported to the employer (i.e. those logged in the accident books) and therefore is likely to reflect the under-reporting made by companies who are not familiar with RIDDOR. However, research (see Weyman, 1998, for a review) suggests that:
 - a) Job insecurity (e.g. temporary and contract staff) can lead to the under-reporting of accidents to an employer.
 - b) A company's policy on accident reporting; their use of safety schemes (linked to bonuses and incentives for low accident rates – known as the perverse motivation to not report), and the safety culture prevalent within an organisation may all influence the propensity of employees to report accidents.Therefore, this study is missing this third tier of under-reporting, as these injuries will not be logged in the accident books.
- 10) As a supplementary objective, it was hoped that this study would help to pinpoint the characteristics of those companies (within the manufacturing sector) most likely to engage in under-reporting practices. Results offer no insight into this profile with respect to size of company, nor type of product manufactured. Again however, the dangers of over-generalising from a small sample are highlighted.

4.5 MAIN FINDINGS

- In total, 3,021 injury reporting questionnaires were distributed in total. 496 responses were received that were suitable for further analysis, giving a response rate of 16%. The 496 business units incorporated a working population of approximately 50,000 people. This sample is considered sufficient to provide a reasonably robust indication of the level of reporting accuracy within the sub-sectors of the manufacturing industry that were targeted, and may provide a useful point of comparison for further studies.
- The majority of the sample (n = 290, 59%) reported the same number of accidents to both HSE and the HSL project team. This is assumed to be accurate reporting. 145 (29%) of the companies sampled reported fewer accidents to HSE than they reported to have occurred at their site through the questionnaire, hence are assumed to be under-reporting.
- In total 900 (32%) injuries were under-reported to HSE: 236 (47%) major injuries and 664 (29%) over-3-day injuries were not reported to HSE yet they were recorded on the questionnaires.
- This translates to an overall reporting level of 68%: with a reporting level of 53% for major injury and a reporting level of 71% for over-3-day injury.

- A total of 375 (76%) companies in the current sample had not reported any injuries to HSE. 294 (59%) companies did not report any injuries at all on the questionnaire.
- The present results suggest that the reporting level of all injuries combined (i.e. major plus over-3-day) has fallen across the four-year period. Similarly, using the LFS rate of reportable injury, HSE estimate that the level of reporting of non-fatal injuries in manufacturing has fallen (i.e. deteriorated) steadily from 1999-2000 to 2002/03 (HSE/HSE, 2003).
- The results of this preliminary study suggest that there has been a decrease in the level of reporting of major injuries to HSE over recent years. Specifically, the level of reporting was higher in 1999-2000 than in 2001/02 and 2002/03. Official HSE figures say that the number of reported major injuries in manufacturing declined between 1999-2000 and 2002/03. This finding may therefore suggest that major injury has actually deteriorated in real terms.
- Analysis of the data from this survey suggest that yearly reporting levels of over-3-day injury have remained constant, as no significant variations were found. Annual statistics published by HSE estimates the number of reported over-3-day injuries in manufacturing to have fallen steadily between 1999-2000 and 2002/03. This study therefore suggests that this improvement is a real change and not an artefact of worsening reporting levels.
- In summary, the present study shows that the level of reporting of major injuries across the sample showed a statistically significant decrease over the four-year period studied. This is a surprising finding and suggests that the Revitalising Health and Safety programme has not raised awareness amongst stakeholders within manufacturing industry regarding their legal reporting duties. However, a number of potential limitations of the data have been highlighted, the presence of which necessitates a degree of caution in interpreting the results.

4.6 RECOMMENDATIONS

- To provide a clearer picture of reporting accuracy, there is potential to conduct a similar study using a larger and more diverse sample of companies within the manufacturing and other industries. Application of a longitudinal study design over a greater period of time may perhaps offer further insight into ongoing variability in reporting trends, which might ostensibly relate to the presence of safety / reporting / awareness initiatives. However, the fiscal cost and high potential burden to industry of such a survey should be acknowledged.
 - Suggested revisions to questionnaire:
 - major injury classification
 - employment levels over time
 - guidance on n/a vs. zero.

There appears to exist further potential to raise awareness amongst stakeholders of their legal duty to report accidents to HSE. The results of the present study have not generally led to the identification of types of companies that are more likely to under-report, either with respect to size nor type of manufacturing process. Therefore, on the basis of these results, an overarching approach to stakeholder awareness raising may be more useful than targeting specific industry groups.

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APPENDIX A – POSTAL QUESTIONNAIRE REQUESTING ACCIDENT INFORMATION FOR FOUR YEARS

Company name:

Address:

Postcode:

Please amend the above details if incorrect.

1. What products do you manufacture? Please tick the box below that best describes your area of industry.

Food & Beverages	<input type="checkbox"/>	Basic & Fabricated Metals	<input type="checkbox"/>
Paper & Pulp	<input type="checkbox"/>	Electrical & Optical	<input type="checkbox"/>
Rubber & Plastic	<input type="checkbox"/>		

2. How many people does your company employ at this site? *(Include production, office, temporary, full time and part time staff. Exclude contractors / agency staff)* _____

3. We are interested in the accidents, if any, that have occurred on this site over the last four years. Please tell us about the number of injured employees in each injury outcome in the table.

- Please count each injured person once. E.g. count at “fracture” an employee with a fractured wrist who also stayed in hospital for more than 24 hours.

Injury Outcome As a result of a work accident	April 02 – March 03	April 01 – March 02	April 00 - March 01	April 99 – March 00
Death of an employee				
Amputation: loss of all/part of limb, fingers, toes. <i>(Exclude loss of fleshy tips, loss of nail)</i>				
Fracture <i>(Exclude fingers, thumbs, toes, and broken noses)</i>				
Dislocation of shoulder, hip, knee or spine <i>(Exclude dislocation of ankles, wrists, elbows)</i>				
Eye injuries resulting from chemical, hot metal burn or penetration of eyeball, including loss of sight (temporary or permanent) <i>(Exclude damage to eye sockets/surrounds)</i>				
Any other injury that required admittance to hospital for more than 24 hours				
Any other injury that led to unconsciousness or required resuscitation				
Any injuries which do not fall in the above categories but resulted in the person being either off work or at work but unable to carry out their normal work for more than 3 consecutive whole days (including both work and non-work days e.g.				

weekends)				
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**Thank you for taking the time to fill in this questionnaire.
All your responses will be treated in the strictest confidence.**

APPENDIX B – TELEPHONE-BASED QUESTIONNAIRE REQUESTING ACCIDENT INFORMATION FOR FOUR YEARS

URN No:					Size:		Page No:	
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Company Name:	
Company Address:	
Postcode:	

If the above details are incorrect can you please amend them?

Health and Safety Executive
Accident Research

jn: 874031

Thank you for taking time to fill in this questionnaire. Once you have completed the questionnaire, please return it to us by one of the following methods: We will give you a call in a couple of days if we don't hear from you in the meantime.

Fax:	01663 762 362	Lynne Barlow / Carole Clulow
E-mail:	lbarlow@wirthlineurope.com	
Post:	Accident Research WirthlinEurope International House, Pepper Rd, Hazel Grove Stockport, SK7 5BW	
Tel:	01663 765 115	Interviewer Name:

We will give you a call in a couple of days if we don't hear from you in the meantime.

Q1	What products do you manufacture / process?	
	PLEASE TICK ONE BOX BELOW THAT BEST DESCRIBES YOUR AREA OF INDUSTRY	
	Food & Beverages	<input type="checkbox"/> 1
	Paper & Pulp	<input type="checkbox"/> 2
	Rubber & Plastic	<input type="checkbox"/> 3
	Basic & Fabricated Metals	<input type="checkbox"/> 4
	Electrical & Optical	<input type="checkbox"/> 5

Q2	How many people does your company employ at this site? PLEASE INCLUDE PRODUCTION, OFFICE, TEMPORARY, FULL TIME AND PART TIME STAFF. EXCLUDE CONTRACTORS / AGENCY STAFF. PLEASE USE LEADING ZEROES
Number Of People	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>

Q3	We are interested in the accidents, if any, that have occurred on this site over the last four years. Please tell us about the number of injured employees in each injury outcome in the table. ➤ Please count each injured person once. E.g. count at “fracture” an employee with a fractured wrist who also stayed in hospital for more than 24 hours.				
	Injury Outcome As a result of a work accident	April 02 - March 03	April 01 - March 02	April 00- March 01	April 99 – March 00
	Death of an employee				
	Amputation: loss of all/part of limb, fingers, toes. <i>(Exclude loss of fleshy tips, loss of nail)</i>				
	Fracture <i>(Exclude fingers, thumbs, toes, and broken noses)</i>				
	Dislocation of shoulder, hip, knee or spine <i>(Exclude dislocation of ankles, wrists, elbows)</i>				
	Eye injuries resulting from chemical, hot metal burn or penetration of eyeball, including loss of sight (temporary or permanent) <i>(Exclude damage to eye sockets/surrounds)</i>				
	Any other injury that required admittance to hospital for more than 24 hours				
	Any other injury that led to unconsciousness or required resuscitation				

	Any injuries which do not fall in the above categories but resulted in the person being either off work or at work but unable to carry out their normal work for more than 3 consecutive whole days (including both work and non-work days e.g. weekends)				
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Thank you for taking the time to fill in this questionnaire.
 Your responses will be passed on to The Health And Safety Laboratory who will treat them in the strictest confidence.

APPENDIX C – SAMPLE TARGETS

Table C1. Postal questionnaire

Sample size: 1300									
	SIC	% Sectoral share	% of sample within sector (small)	% of sample within sector (medium)	% of sample within sector (large)	Proposed number within sample (small)	Proposed number within sample (medium)	Proposed number within sample (large)	Total sample
Food & Beverages	15/16	12.35%	64.6%	19.7%	15.7%	104	32	25	161
Paper and Pulp	21	3.99%	67.2%	19.8%	13.0%	35	10	25	70
Rubber & plastic	25	11.91%	68.4%	19.0%	12.5%	106	29	19	154
Basic & Fabricated Metals	27/28	47.26%	66.7%	19.8%	13.5%	410	122	83	615
Electrical & optical	30-33	24.49%	64.1%	20.8%	15.1%	204	66	48	318
Total		100.00%				859	259	200	1318

NB numbers may not add to overall sample size due to rounding

Table C2. Telephone-based questionnaire

Sample size: 1500									
	SIC	% Sectoral share	% of sample within sector (small)	% of sample within sector (medium)	% of sample within sector (large)	Proposed number within sample (small)	Proposed number within sample (medium)	Proposed number within sample (large)	Total sample
Food & Beverages	15/16	12.35%	64.6%	19.7%	15.7%	120	36	29	185
Paper and Pulp	21	3.99%	67.2%	19.8%	13.0%	40	12	25	77
Rubber & plastic	25	11.91%	68.4%	19.0%	12.5%	122	34	22	178
Basic & Fabricated Metals	27/28	47.26%	66.7%	19.8%	13.5%	473	141	95	709
Electrical & optical	30-33	24.49%	64.1%	20.8%	15.1%	235	77	55	367
Total		100.00%				990	300	226	1516

NB numbers may not add to overall sample size due to rounding

APPENDIX D – ACCOMPANYING LETTER TO POSTAL QUESTIONNAIRE

[Date]

[Name and address of company]

Dear Sir / Madam

Revitalising Health and Safety – examining progress against targets

The Government and the Health and Safety Commission have set targets for improving health and safety performance over a ten-year period, commencing in 1999/2000. These targets are part of a wide programme of strategies and interventions known as *Revitalising Health and Safety*. The Health and Safety Laboratory has been commissioned by the Health and Safety Executive to carry out research to help contribute towards accident and ill health reduction. Specifically we are trying to find more information on the type and number of accidents in different industries since the launch of *Revitalising Health and Safety*. To enable us to do this we are sending the attached brief questionnaire to a large number of manufacturing companies nationally.

All the information provided by participating companies will be treated with the strictest of confidence and participating companies will not be identified individually. The information will be used for research purposes only and will not result in any further action from HSE.

I hope you are able to contribute to this important area of work by completing the questionnaire and returning it in the stamped addressed envelope provided.

If you have any queries regarding the research, please contact me at the Health and Safety Laboratory on 0114 2892752.

Yours faithfully

Peter Marlow

Encs

APPENDIX E – GUIDELINES FOR FOCUS MATCHING PROCEDURE

FOCUS Search Procedure

Objective: search to determine the number of injuries occurring at a given company site between 01/04/1999 and 31/03/2004

Leave to one side incomplete questionnaires i.e. those that have not been trading for the full four years; or indicated N/A in any of the years of interest and; those where the address has been changed. Do not discard - Please pass them back to be checked and filed.

1. Double click the focus icon
2. Click the events button
3. Select 'National' for Search Type
4. From Report drop down menu select 'Accidents', then 'Summary'
5. In the 'Incident date range' enter from: 01/04/1999 to: 31/03/2004
6. Enter search criteria: company name in 'Name' box and postcode area in 'Pcode' box (first half of postcode only; this can be 2, 3 or 4 characters i.e. S3 or SK17)
7. Click the Search button on the bottom of the screen (the number next to where it says 'Qualified' is the total number of injuries found for that company).
8. Click the 'Picklist' button to see the list of injuries – the company details of the record highlighted are displayed underneath the list.
9. If nothing is found please search again using just the company name and then using just the postcode.

In Accident Screen:

- Check '**Location Info**' and '**Client Info**' on the bottom of the screen – this changes as you highlight different injuries.
- Make sure the injury/injuries took place on the same site as the address shown on the questionnaire. Double-check this by taking note of the 7 digit 'Location No' and 'Client No'.
- Ignore injuries reported from locations different from questionnaire address (you may need to use your judgment at this point if you feel the questionnaire reflects all sites – make a note and pass back). If necessary re-do search using the 'Location No' in order to display the correct site.
- '**Acc. Rep Type**': 1=fatal; 2=major; 3=over-3-day.
- From the screen **record the injury type for each year** (see blank table sheet, also note company name and attach to questionnaire)
- Note: the injuries may not necessarily be listed in chronological date order – so please check.
- Please be careful not to make any errors when recording the injury types by year especially when there's a large number.

APPENDIX F – TALLY-TABLE USED TO RECORD INJURIES LOCATED ON FOCUS

Record of injuries reported on FOCUS

'jobs' Number:

Company Name:

Injuries found: **NO / YES** (if yes complete table below)

Injury Type	01/04/03- 31/03/04	01/04/02- 31/03/03	01/04/01- 31/03/02	01/04/00- 31/03/01	01/04/99- 31/03/00	Total
1						
2						
3						
Total						

APPENDIX G – AN INVESTIGATION INTO ‘OVER-REPORTING’

Revised results – removing over-reporting data

Removing records that have instances of over-reporting can be performed in a number of ways, depending on what index of over-reporting is used:

- a) Remove records where there are any instances at all of over-reporting (either major or 3-day injury) – **This removes 96 records.**
- b) Remove records where across the 4-year period, the absolute total of all injuries (both types) is over-reported – **This removes 65 records.**
- c) Either remove records where across the 4-year period, the absolute total of
 - i. Major injures is over-reported – **removes 54 records**
 - ii. 3-day injuries is over-reported – **removes 55 records**

For consistency, option a) was chosen. Therefore, the usable sample is reduced from 496 to **398** (decreasing sample size by ~20%).

So after recalculating the figures with these records removed, the tables look like this:

Table G1. Number of companies under-reporting injury rates for each reporting year (all over-reporting records removed)					
		April 99 - March 00	April 00 - March 01	April 01 - March 02	April 02 - March 03
Whole Sample (based on both major & over-3-day injuries)	Number of companies under-reporting on the whole for each year	55	62	71	84
	Percentage of total sample under-reporting	14%	16%	18%	21%
Major Injury	Number of companies under-reporting	23	28	35	41
	Percentage of total sample under-reporting	6%	7%	9%	10%
Over-3-day Injury	Number of companies under-reporting	47	54	59	68
	Percentage of total sample under-reporting	12%	14%	15%	17%

It can be seen from Table G1 that the percentage of the total sample under-reporting remains nearly the same as when the over-reporting records are left in (see Table 3), for both major and over-3-day injuries. Similarly, the percentages are roughly the same when under-reporting is considered across all four years of interest (compare Table 4 and Table G2).

Table G2. Companies under-reporting on the whole across ALL 4 years		
		Companies under-reporting on the whole across ALL 4 years
Major Injury	Number of companies	68
	Percentage of total sample	17%
Over-3-day Injury	Number of companies	92
	Percentage of total sample	23%

Of real interest are the injury figure totals for major and over-3-day injuries for each of the four years, and the difference between these figures, when over-reporting records have been removed. For ease of comparison, both sets of figures are included in Table G3 below.

Note: Those in black are the data with over-reporters left in. Those in bold italic are data with over-reporting records removed.

Table G3. Total of major and over-3-day injuries for each reporting year						
		April 99 - March 00	April 00 - March 01	April 01 - March 02	April 02 - March 03	Total
Major Injury	Questionnaire Total	108 69	128 77	132 89	135 82	503 317
	FOCUS Total	82 0	62 1	62 5	61 0	267 6
	Difference	26 69**	66* 76**	70** 84**	74** 82**	236** 311**
	Level of reporting	76% 0%	48% 1%	47% 6%	45% 0%	53% 2%
Over-3-day Injury	Questionnaire Total	544 176	642 201	595 195	495 162	2276 734
	FOCUS Total	406 24	445 28	407 17	354 23	1612 92
	Difference	138* 152**	197* 173**	188** 178**	141** 139**	664** 642**
	Level of reporting	75% 14%	69% 14%	68% 9%	71% 14%	71% 12%

*=Difference is significant at the 0.05 level

**= Difference is highly significant at the 0.01 level

The table above suggests that those companies that over-reported responses were responsible for a large proportion of the accidents (of both types) reported on the questionnaire and also on the FOCUS system. This is shown by the significant reduction in injury totals when these records are removed.

Note: It is interesting that the sample with all records left in covers 496 companies, with a combined workforce of 50,431 employees. Where over-reporting records have been removed, this covers 398 companies, but a workforce of only 20,791.

This suggests that many of the companies that were over-reporting had large numbers of employees. Therefore, their inaccurate reporting may be a reflection on the large numbers of accidents they had, as backed up by Table G3 (although you might expect accident reporting systems to be better at such sites).

	Size of Company		
	Small	Medium	Large
Total responses in previous sample (N=496)	328	104	64
Total responses in new sample (N=398)	312	62	24

Previous sample {New sample}: ‘496 {398} questionnaires suitable for analysis reported a total of 2,779 {1,051} accidents (503 {317} major injuries, 2,276 {734} over-3-day injuries) over the four years. In total, the same companies reported 1,879 {648} accidents to HSE on the FOCUS system, over the same time period (267 {6} major injuries, 1,612 {642} over-3-day injuries). Therefore, the overall difference between the total numbers of accidents reported on the questionnaires and those reported to HSE for the four-year period was 900 {409}, a statistically significant difference of 32% {39%} (p<0.01)’.

Summary

When records with *any instance* of over-reporting are removed, there is a great reduction in the numbers of accidents reported on both the questionnaire and on FOCUS, but **the larger reduction is seen in terms of FOCUS accident reports**. Because of this increased difference between questionnaire and FOCUS, the results swing considerably towards a greater proportion of accident under-reporting, as would be expected. However, because the differences are all so high, **it becomes difficult to track changes in levels of reporting across the four-year period**, which is one of the key objectives of the study. Please note, revised ANOVAs show a difference between 1999/00 and 2002/03 for Basic & Fabricated Metals; and between 1999/00 and 2003/04 for small companies only. No other yearly trends were found.

Therefore, when the data is arranged in this manner, the level of reporting appears to be consistently low across all four years, which does not help to explain the observed rise in recorded official accident figures.

APPENDIX H – NUMBER OF RESPONSES (OVERALL, POSTAL & TELEPHONE): USABLE SAMPLE

Table H1. Overall number of responses - usable sample								
Manufacturing Type	Size of Company						Total	
	Small		Medium		Large			
	Contacted	Responses	Contacted	Responses	Contacted	Responses	Contacted	Responses
Food & Beverages	280	42	64	13	57	6	401	61
Paper & Pulp	89	13	13	7	14	2	116	22
Rubber & Plastic	220	39	59	9	42	12	321	60
Basic & Fabricated Metals	1092	169	237	51	78	20	1407	240
Electrical & Optical	558	65	110	24	108	24	776	113
Total	2239	328	483	104	299	64	3021	496

NB. 3,021 companies contacted via telephone and post; 496 usable questionnaires completed

Table H2. Postal responses - usable sample								
Manufacturing Type	Size of Company						Total	
	Small		Medium		Large			
	Posted	Returns	Posted	Returns	Posted	Returns	Posted	Returns
Food & Beverages	115	16	34	5	24	4	173	25
Paper & Pulp	42	3	6	3	1	0	49	6
Rubber & Plastic	120	14	8	1	21	3	149	18
Basic & Fabricated Metals	483	72	122	20	16	6	621	98
Electrical & Optical	237	18	80	10	48	13	365	41
Total	997	123	250	39	110	26	1357	188

NB. 1,357 companies contacted via post; 188 usable questionnaires returned

Table H3. Telephone responses - usable sample								
Manufacturing Type	Size of Company						Total	
	Small		Medium		Large			
	Contacted	Interviews	Contacted	Interviews	Contacted	Interviews	Contacted	Interviews
Food & Beverages	165	26	30	8	33	2	228	36
Paper & Pulp	47	10	7	4	13	2	67	16
Rubber & Plastic	100	25	51	8	21	9	172	42
Basic & Fabricated Metals	609	97	115	31	62	14	786	142
Electrical & Optical	321	47	30	14	60	11	411	72
Total	1242	205	233	65	189	38	1664	308

NB. 1,664 companies contacted via telephone; 308 usable interviews conducted

APPENDIX I – THANK YOU LETTER SENT TO RESPONDENTS

[Name]
[Address]

[dd] June 2004

Dear [Name],

**RE: QUESTIONNAIRE ON REVITALISING HEALTH AND SAFETY – EXAMINING PROGRESS
AGAINST TARGETS**

I am writing with regard to the questionnaire you returned earlier this year. Thank you very much for your assistance in taking the time to complete the questionnaire.

Your responses have been of significant benefit and the survey in which you participated has now been completed successfully. You may be interested to know that in 2002/03 the manufacturing industry reported 41 fatal and 6,809 non-fatal injuries to HSE. A further 32,550 injuries in which the employee was off work for over 3-days were also recorded.

Please let me again assure you that all the information received has been treated with the strictest of confidence. Participating companies have not and will not be identified individually, and the information provided has been used for research purposes only. If you have any queries regarding the research, please contact me at the Health and Safety Laboratory on 0114 2892752.

Kind Regards,

Peter Marlow

Peter Marlow
Researcher

APPENDIX J – DATA RECEIVED FROM NON-MANUFACTURING COMPANIES

The table below outlines the total figures for major and over-3-day injuries for each of the four years, as well as the difference between these figures. The data covers 31 responses from a combined workforce of 2,032 employees, excluding data from those respondents where employee number was not stated. Data from those companies with incomplete four-year records has also been excluded. The questionnaires do not seem to cluster within a specific sector; they are drawn from a fairly disparate cross-section of industry.

Table J1. Data received from non-manufacturing companies						
		April 99 - March 00	April 00 - March 01	April 01 - March 02	April 02 - March 03	Total
Major Injury	Questionnaire Total	2	5	1	3	11
	FOCUS Total	0	0	0	0	0
	Difference	2	5	1	3	11
	Level of reporting	0%	0%	0%	0%	0%
Over-3-day Injury	Questionnaire Total	6	10	11	8	35
	FOCUS Total	1	2	4	1	8
	Difference	5	8	7	7	27
	Level of reporting	17%	20%	36%	12%	23%

APPENDIX K – STATISTICS RATIONALE

1. OVERALL DIFFERENCE IN INJURY NUMBERS ACROSS THE YEARS = REPEATED MEASURES ANOVA (overall, and by company size and type)

- Repeated measures ANOVAs were performed. This test was used as it is parametric and the data demanded a parametric test as the same companies were trading across all the years. Data were assumed to be normally distributed due the large sample size - an assumption underlying the use of a parametric test. Repeated measures ANOVA compares variances between samples in order to estimate the significance of the differences between sets of means.

2. BASED ON THE ANOVA RESULTS - TO EXPLORE WHERE (I.E. BETWEEN WHICH YEARS) THE SIGNIFICANT CHANGE IS = PAIRED SAMPLES *t* TESTS (overall, and by company size and type)

- This was used as it is parametric and takes into account that the same companies are trading in each year when exploring significance levels.

3. TO EXPLORE WHETHER IN ANY PARTICULAR YEAR THERE WAS A SIGNIFICANT DIFFERENCE BETWEEN SELF-REPORT NUMBERS VERSUS FOCUS NUMBERS = PAIRED SAMPLES *t* TEST (calculated separately in each year for over-3-day and major injury)

APPENDIX L – AN INVESTIGATION INTO EYE-INJURY DATA

The table below outlines the total injury figures for major and over-3-day injuries for each of the four years from the questionnaire only. It also shows the number of eye injuries self-reported by the 496 companies in the manufacturing first survey.

Table L1. Self-reports: Major (with/without eye injuries) and over-3-day injuries						
		April 99 - March 00	April 00 - March 01	April 01 - March 02	April 02 - March 03	Total
Major & Over-3-day Injury	Questionnaire Total (with eye injuries)	652	770	727	630	2779
	Questionnaire Total (without eye injuries)	616	697	645	547	2505
Major Injury	Questionnaire Total (with eye injuries)	108	128	132	135	503
	Eye injuries alone	56	78	77	63	274
	Questionnaire Total (without eye injuries)	52	50	55	72	229
Over-3-day Injury	Questionnaire Total	544	642	595	495	2276

APPENDIX M – AN INVESTIGATION INTO THE POSSIBLE MISALLOCATION OF INJURIES

Following submission of the draft report further investigative work was undertaken to examine the discrepancy between the self-reported injuries and the injury data found in FOCUS.

To recap, the data from the questionnaires received from the industry were input into SPSS 12.01 for Windows. In addition, injury reports made to HSE from those companies that responded to the questionnaire were identified on the FOCUS system, and these data were also input into SPSS to allow statistical analysis to be performed. This allowed a direct comparison of the reported injuries for each of the four years through the following calculation:

Questionnaire reported injuries – FOCUS reported injuries = Difference in reporting level

The results of this calculation provided an indication of reporting accuracy, whereby:

- **Positive reporting difference = Under-reporting**
- **Negative reporting difference = Over-reporting**

The results of the difference in reporting level were then subject to further analysis. It has been considered that the discrepancy between the company reporting of injuries and the FOCUS reported injury data might come from a misallocation of injury type into the wrong category. For example, a company has deemed an injury as over-3-day (O3D) to HSE but their own records may have recorded it as a major injury; or they have reported it as a major injury but it has subsequently been re-classified in the FOCUS system as O3D. This hypothesis was examined by analysing the difference in reporting level figures for major and over-3-day injuries by each company for each year and assigning a potential misallocation value. The potential misallocation value was calculated as follows:

Example 1

Difference in reporting level for Major injury = -1

Difference in reporting level for Over-3-Day injury = +3

We can say that there was an over-reporting of one major injury and an under-reporting of three O3D's; therefore, one injury may have been misallocated to a major injury when it may have been an O3D. Thus the value one is marked as potential misallocation to a major injury.

The company have recorded it as a major injury when HSE may have marked it as an over-3-day injury.

Example 2

Difference in reporting level for Major injury = +2

Difference in reporting level for Over-3-Day injury = -1

We can say that there was an under-reporting of two major injuries and an over-reporting of one O3D, therefore, one injury may have been misallocated to O3D when it may have been a major injury. Thus the value one is marked as potential misallocation to O3D.

Table M1 below shows the cumulative total for potential misallocations for each company size.

Size	Year 99/00		Year 00/01		Year 01/02		Year 02/03	
	Miss Major	Miss3 Day	Miss Major	Miss3 Day	Miss Major	Miss3 Day	Miss Major	Miss3 Day
Small				1			2	
Medium	6	4	3	4	1	3	3	3
Large	17	2	12	4	15	3	10	8
TOTAL	23	6	15	9	16	6	15	11

Please see Table M2 for full results.

Table M2 below shows the potential misallocation values for each company in each year.

Company Size	Number	Year 99/00		Year 00/01		Year 01/02		Year 02/03	
		Miss Major	Miss O3D	Miss Major	Miss O3D	Miss Major	Miss O3D	Miss Major	Miss O3D
<i>Small</i>	1				1			1	
	2							1	
<i>Medium</i>	3						2		
	4						1		
	5					1		1	
	6		1		2				2
	7		1						1
	8		1					2	
	9		1						
	10	2							
	11	1							
	12				1				
	13			1					
	14	1			1				
	15	1		2					
	16	1							
<i>Large</i>	17						1		2
	18	2		2			1	3	
	19						1		
	20			1		6			
	21	4				5		2	
	22					1			1
	23			1		1		1	
	24	1		1		1			
	25					1			
	26				1				4
	27								1
	28							1	
	29							1	
	30			2				1	
	31							1	
	32	2							
	33	1		1					
	34				3				
	35		2						
	36	2		1					
	37	1							
	38			2					
	39	2		1					
	40	1							
	41	1							
	42	1							
TOTAL		24	6	15	9	16	6	15	11

Table M2. Observation

Looking at the total column the inclination for companies, independent of size, seems to be a possible trend to misallocate major injuries. This is to say that they have over-reported major injuries to HSE when the injury may have been an over-3-day. This may be expected due to the potential re-classification of major injuries to O3D by HSE in FOCUS.

Further Analysis

Table M3. Summary of reported accidents by company and the possible misallocations

Size of company	Total O3D accidents	Number of possible misallocations O3D	Percent	Total Major accidents	Number of possible misallocations Major	Percent
Small (328)	97	1	1.03%	69	2	2.9%
Medium (104)	650	14	2.15%	234	13	5.5%
Large (64)	1527	17	1.11%	198	55	27.7%

Of the 328 small companies who reported 97 O3D injuries a total of 1 of these (1.03%) were possibly misallocated.

Of the 328 small companies who reported 69 major injuries a total of 2 of these (2.9%) were possibly misallocated.

Of the 104 medium companies who reported 650 O3D injuries a total of 14 of these (2.15%) were possibly misallocated.

Of the 104 medium companies who reported 234 major injuries a total of 13 of these (5.5%) were possibly misallocated.

Of the 64 large companies who reported 1527 O3D injuries a total of 17 of these (1.11%) were possibly misallocated.

Of the 64 large companies who reported 198 major injuries a total of 55 of these (27.7%) were possibly misallocated.

Table M4. Number of major and over-3-day injuries self-reported by year and possible misallocations

Company Size	No.	Year 99/00		Year 00/01		Year 01/02		Year 02/03		Possible Misallocations	
		Major	O3D	Major	O3D	Major	O3D	Major	O3D	Major	O3D
Small	328	14	18	13	19	22	25	20	35	2	1
Medium	104	52	155	64	206	63	172	55	117	13	14
Large	64	41	388	51	414	46	394	60	331	55	17

Table M5. Self reported injuries for Major and Over-3-Day injuries, **possible** misallocations and proportions per year and company size

Company Size	Year 99/00			Year 00/01			Year 01/02			Year 02/03		
	Major	Major Misallo	%	Major	Major Misallo	%	Major	Major Misallo	%	Major	Major Misallo	%
Small	14	0	0	13	0	0	22	0	0	20	2	10
Medium	52	6	11.5	64	3	4.7	63	1	1.6	55	3	5.5
Large	41	17	41.5	51	12	23.5	46	15	32.6	60	10	16.6
	O3D	O3D Misallo	%	O3D	O3D Misallo	%	O3D	O3D Misallo	%	O3D	O3D Misallo	%
Small	18	0	0	19	1	5.3	25	0	0	35	0	0
Medium	155	4	2.6	206	4	1.9	172	3	1.7	117	3	2.6
Large	388	2	0.5	414	4	1	394	3	0.8	331	8	2.4

It is important to note that any observations made from the above information would be based on exploratory conjecture. Therefore due to the speculative nature of this data analysis it would be unreliable to make any assumptions based on the findings.

