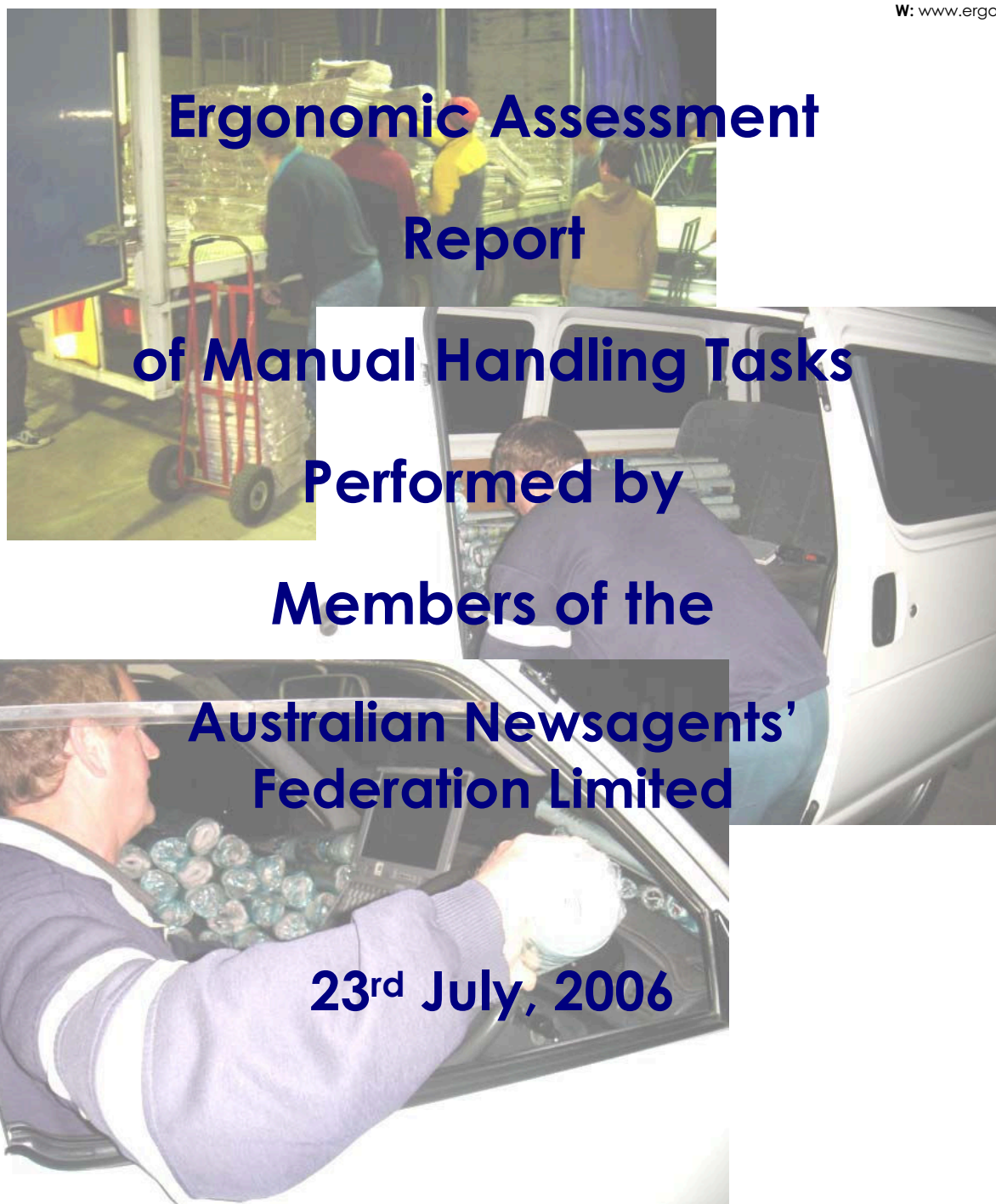


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## **1. ACKNOWLEDGEMENTS**

I would like to acknowledge the constructive and useful feedback I received from all the people with whom I consulted whilst undertaking the ergonomic assessments at both the Henley and Lonsdale Distribution Centres.

Particular thanks to Christopher Rankin, Beverley Osborne, Max Bugg and Neville Thorp for facilitating the site visits.



## 2. EXECUTIVE SUMMARY

This report summarizes the identification, assessment and control of manual handling hazards associated with the delivery of newspapers by South Australian members of the Australian Newsagents' Federation.

The assessment process involved a comprehensive review of delivery tasks at the Henley and Lonsdale depots with multiple visits over four days at each location (i.e. Monday, Wednesday, Saturday and Sunday). Refer to the methodology section for more details regarding the assessment process (page 8).

The worksite assessments yielded a quantified level of task demands for a range of newspaper delivery tasks, particularly, unloading the delivery truck, operating the wrapping machine, loading the delivery vehicle and delivery of wrapped/bundled newspapers.

Some of the significant features associated with the worksite assessments include the weight of the bundles of newspapers that are unloaded from the truck (refer to table i (extracted from page 12 of the report)). Bundles of newspapers were stacked up to five bundles high on the delivery truck (even when there was empty storage space on the truck – so four bundles high could have been achieved).



**Figure i: Bundles stacked x5 high on the delivery truck.**

The weight and dimensions of wrapped newspapers was measured (refer to tables i & ii respectively).

**Table i: Average weight (kilograms) of individual newspapers.**

Assessment Day	Assessment Location		
	Henley Depot	Lonsdale Depot	Sample Newspapers
Monday	.24 kg	.22 kg	
Wednesday	.42 kg	.34 kg	
Saturday	1.04 kg	1.09 kg	1.070 & 1.270 kg
Sunday	.72 g	.59 kg	

**Table ii: Average height and width (millimeters) of cross section of Advertiser (&Sunday Mail) for each of the four sample days (Henley & Lonsdale combined). Width = width of cross sectional area of newspaper wrapped. Height = height of cross sectional area of newspaper (wrapped).**

Assessment Day	Paper Dimensions	
	Width	Height
Monday "crease end" first	42.45mm	34.05mm
Wednesday "crease end" first	49.25mm	41.70mm
Saturday "crease end" first	78.5 mm	66.20mm
Saturday "feather end" first	69.45 mm	67.75 mm
Sunday "crease end" first	66.20mm	55.40mm
Sunday "feather end" first	64.33 mm	53.75 mm

The Results section of this report (page 10) has outlined significant ergonomic risk factors associated with the newspaper delivery tasks. These risk factors are particularly related to dimensions of the weekend papers (Advertiser and Sunday Mail) when combined with the repetition, volume and manual handling aspects of the delivery process. In particular, there are significant risks associated with the delivery/throwing of the larger dimensioned and heavier Saturday Advertiser and Sunday Mail newspapers.

The recommendations for managing the identified risks include the following:

**1. Unloading Delivery Trucks (refer to page 26)**

- 1.1. Maximum of four bundles high on trucks.
- 1.2. One bundle to be lifted at a time and carried from the truck.
- 1.3. Use trolleys to transfer bundles from trucks to wrapping machines.

**2. Feeding Wrapping Machine (refer to page 27)**

- 2.1. Stand to one side of support stand when feeding the wrapping machine.
- 2.2. Review guarding on some wrapping machines.
- 2.3. Feed Advertiser and Sunday Mail "feather end first" into wrapping machine to reduce cross sectioned dimensions of wrapped newspapers.
- 2.4. Use earplugs when using wrapping machine.

**3. Loading Strapped Bundles of Newspapers into Delivery Vehicles (refer to page 28)**

- 3.1. Limit roped bundles to one bundle of newspapers that are loaded into vehicle.
- 3.2. Follow task specific manual handling tips for this task.
- 3.3. Follow design tips for paper catchment container.

**4. Newspaper Requirements (refer to page 29)**

- 4.1. Keep cross sectional area of wrapped newspapers to a maximum of 55mm.
- 4.2. Keep weight of wrapped newspapers below a maximum limit of 0.6 kg.

**5. General Systems of Work (refer to page 29)**

- 5.1. Agreement needs to be achieved regarding the maximum number of newspapers that can be thrown per person in the delivery process.



The current level of throwing per person is too high, particularly given the over-weighted and dimensioned Saturday Advertiser and Sunday Mail.

An estimate of 200-300 papers thrown per person (provided newspaper recommendations are followed – section 4) would be a more realistic requirement.

- 5.2. Agreement between the suppliers of the newspapers (i.e. The Advertiser) and the Australian Newsagents' Federation about the safe task demands for the distribution of the newspapers. The current situation, in my view, is unsafe and modifications to the weight, dimensions and volume of papers distributed per person need to be reduced to provide a safe system of work.

There are requirements for the performance of safe work by members of the Australian Newsagent's Federation as per the "Handling Procedures" outlined in section 8.5 of the Territorial Distribution Agency Agreement where it states *"Distributor must ensure that its employees, contractors and agents engaged in the performance of this Agreement, including, but not limited to, the handling, wrapping, strapping or delivery of Publications:*

*(a) perform their duties in a manner which does not expose them to any risk to their health, safety and welfare;*

*(b) do not cause any injury to themselves or to others, and ....."*

There is also, in my opinion, and as outlined in the South Australian Occupational Health, Safety and Welfare Regulations (1995) an obligation for the manufacturers of the newspapers, News Corporation in this case, to provide a product that is safe to handle by the members of the Australian Newsagent's Federation.

There are some specific manual handling hazards associated with the weight and dimensions of the Saturday Advertiser and Sunday Mail as outlined in this report with in the context of the current delivery methodologies. These need to be resolved between the Australian Newsagent's Federation so the members of the latter organisation can distribute the newsagents in a safe manner.

Thank you for asking me to undertake this ergonomic assessment program.

Please do not hesitate to contact me if you have any queries regarding this report.

Yours sincerely,

David Nery, B.Sc. Hons (Flinders) M. Sc. (London)  
Ergonomist.

### 3. INTRODUCTION

Manual handling injuries represent some of the most frequent and significant of the injuries sustained by members of the Newsagents' Federation in relation to the distribution of newspapers.

The process of delivering the newspapers involves a broad range of manual handling activities which includes lifting of heavy and bulky loads such as bundles of newspapers and in contrast, highly repetitive hand/arm movements that are associated with the wrapping and throwing of individual newspapers.

This report provides a synopsis of the identification, assessment and control of the manual handling hazards associated with the tasks performed by members of the Newsagents' Federation during the distribution of newspapers.

This section of the report provides an outline of the following background information related to this project:

- The aims and objectives of this program;
- The outcomes of the proposed assessments;
- A review of the structure of this report.



**Figure 1: A van being loaded for delivery.**

#### 3.1 Background Information

The South Australian Occupational Health, Safety and Welfare Regulations (1995) state the following in relation to the assessment of workplace hazards:

*"An employer must ensure that any manual handling that is likely to be a risk to health and safety is identified and assessed."*

*(Section 2.9.3(1))*

Furthermore, the previously mentioned regulations state the following in relation to the control of hazards:

*"If a manual handling task is assessed as being a risk to health and safety, the employer must take such steps as are reasonably practicable to control the risk."*

*(Section 2.9.4(1))*

This assessment program has followed the same approach outlined in the South Australian Occupation Health Safety and Welfare Regulations (1995) in terms of the identification, assessment and control of manual handling hazards that are associated with the distribution of newspapers by members of the Newsagents' Federation.



As noted in the Executive Summary (page 4) there is a set of requirements for "Handling Procedures" in section 8.5 of the Territorial Distribution Agency Agreement in relation to following safe work practices during the delivery of newspapers. As previously noted, there is also a requirement for the manufacturer of the newspapers to provide a product that is safe for those it contracts to distribute that newspaper. The previously mentioned handling assessment requirements as outlined in the South Australian Occupation Health, Safety and Welfare Regulations (1995) were used in this assessment program.

As outlined in the methodology section of this report, all aspects of the distribution of newspapers by members of the Newsagents' Federation were assessed in this program. The newspapers can be lifted up to six times by one person in the distribution process (refer to Table 1). This accuracy can significantly increase the risk factors associated with the newspaper delivery process. That is, the risk factor associated with repetition becomes increasingly hazardous when combined with the high volume of newspapers distributed and the increasing weights and dimensions of the newspapers. The specific aspects of these particular hazards are examined in detail in the results section of this report. Specific hazard ratings and risk control strategies are discussed in relation to these points. These issues are outlined in the South Australian Manual Handling Code of Practice (1990) which states the following in relation to risk factors associated with repetitive work:

*"The risk of injury rises with the increasing frequency, repetition and duration of manual handling activity by any one employee in a work period. How often, and for how long, a task is performed are key risk factors to be considered."*

*Problems with frequency and duration are not restricted to lifting or lowering of loads. Pushing, pulling, carrying and holding of loads can also be a problem if performed frequently or for prolonged periods."*

*(Section 4.14-4.15 p15)*

*"Manual handling operations involving the use of smaller muscle groups such as hands (whether in sustained or repetitive static activity) should not be overlooked in assessing risks because these muscles fatigue quickly when overloaded."*

*(Section 4.18 p15)*



**Figure 2: Bundles of newspapers (x5 high) delivered by truck.**

### 3.2 Aim of this Assessment Program

The aim of this assessment program was to assess hazards associated with each of the tasks performed by members of the Newsagents' Federation during the distribution of newspapers.

Some detail is provided in relation to the level of risk associated with each of the tasks that were assessed. Risk control recommendations are also provided in relation to each of the tasks that have been examined in this assessment process.

Appendix A of this report summarises the risk assessment matrix used in the assessment of the job tasks.



**Figure 3: Gripping a wrapped newspaper during a simulated throwing action (note wrist deviation down towards the little finger – ulnar deviation).**

### 3.3 Outcomes of the Assessment Program

There are two main outcomes for this program. The first is associated with the assessment of tasks performed by members of the Newsagents' Federation. This report provides an accurate assessment of "where we are now" in relation to the manual handling risks that are presented during the distribution of the newspapers. The second outcome is to provide detailed recommendations in relation to strategies that could be implemented to reduce the level of risk associated with the previously mentioned manual handling tasks.

### 3.4 Structure of this Report

There are three main sections following this part of the report. The first is the Methodology section, this is followed by the Results section and the last is the Recommendations section.

The Methodology section summarises the means by which the data was collected for this program. The Results section provides a synopsis of the data which was extracted from the assessment process and determines the level of risks for individual tasks. Finally, the Recommendations section provides a series of risk control strategies that need to be implemented to control the risks which were identified in the Results section.

The Bibliography section lists the reference documents which were used in the research related to this report and the Appendices references materials which have been developed as part of the assessment process.

## 4. METHODOLOGY

### 4.1 Tasks Assessed in this Program

Table 1 summarises each of the tasks which were assessed in this manual handling program.

**Table 1: Tasks assessed in this program.**

Task Number	Task Name
1.	Unload bundles of papers from delivery trucks & load next to wrapping machine.
2.	Wrap individual newspapers.
3.	Load newspapers (wrapped and bundled) into delivery vehicles.
4.	Distribute papers from vehicle to client locations by either throwing individual paper or lifting bundles.

### 4.2 Assessment Locations

Our contacts and locations for the two on-site ergonomic assessments were as follows:

1. Max Bugg, Lonsdale Depot, Unit 3 – 5, Lindsay Road, Lonsdale.
2. Neville Thorp, Henley Depot, Cnr Mitton & Shannon Road, Henley Beach.

### 4.3 Dates of Assessments

Table 2 summarises the dates of the assessments at each of the two locations.

**Table 2: Assessment dates for both Henley and Lonsdale locations.**

Day of Assessment	Lonsdale	Henley
Saturday	22 <sup>nd</sup> April, 2006	8 <sup>th</sup> April, 2006
Sunday	23 <sup>rd</sup> April, 2006	9 <sup>th</sup> April, 2006
Monday	24 <sup>th</sup> April, 2006	10 <sup>th</sup> April, 2006
Wednesday	26 <sup>th</sup> April, 2006	12 <sup>th</sup> April, 2006

### 4.4 Analysis of Tasks

The newspapers were weighed using digital scales or a digital strain gauge. During each testing night a sample of ten Advertiser (or Sunday Mail) newspapers would be measured. The length (this is a constant at 410mm), the cross sectional dimensions (height and width) and the weight of the individual newspapers (when wrapped) were measured. I also measured an additional sample of five newspapers on the Saturday and Sunday with the "crease" side fed in first. The main test sample on Saturday and Sunday was with the "feather end first" being fed into the wrapping machine. This provided a comparison of the cross sectional dimensions of the newspaper when it was wrapped, depending on which side was

fed into the wrapping machine first. We also measured the Weekend Australian on the Saturday site visit and the Australian newspaper during the week assessment days (Monday & Wednesday).

We were able to quantify the number of newspapers delivered to our sample distributor and were also able to quantify the number of newspapers that were rolled during the distribution process by our sample distributor.

During the site visits we were able to undertake an analysis of tasks at the distribution depots and also went out on delivery runs from both the Henley and Lonsdale depots.

Finally, I undertook follow up visits to particular locations on the delivery runs that I assessed to measure clearances and fence heights to gain a further understanding of the risks associated with throwing newspapers at particular locations.



***Figure 4: Weighing the individually wrapped newspapers.***

## 5. RESULTS

This section of the report summarises the results of the on-site assessments at the Henley and Lonsdale depots.

### 5.1 Overview of Manual Handling Tasks.

Table 1 summarises the manual handling tasks that are involved with the distribution of newspapers by members of the Australian Newsagents' Federation (SA Branch).

**Table 1 (repeated): Tasks assessed in this program.**

Task Number	Task Name
1.	Unload bundles of papers from delivery trucks & load next to wrapping machine.
2.	Wrap individual newspapers.
3.	Load newspapers (wrapped and bundled) into delivery vehicles.
4.	Distribute papers from vehicle to client location by either throwing paper or lifting bundle.

The results of the assessments for each of the four tasks are presented in this section of the report. The following aspects of each task are reviewed in the Results section:

1. Task description.
2. Job task elements.
3. Risk factors.
4. Conclusion.



## 5.2 Unloading Bundles from the Truck (Medium – High Injury Risk Rating)

Figures 5 – 8 illustrate the unloading of bundles of newspapers from the delivery truck.

### Task Description – Unloading Bundles from the Truck

This task requires people to grasp a bundle of newspapers with two hands (generally one hand on each of the two straps), lift the bundles from the truck and take them to the wrapping machine. On occasion, some people would grasp one bundle of newspapers in each hand.

The height of the side of the trucks that were measured varied between 930mm (Isuzu truck) to 1280mm (GS Transport truck). Generally, the papers stacked 4 bundles high on the truck brings the total height of the bundles on the truck to 1.96metres above ground level.

On one occasion a truck had x5 bundles high which brought the height of the top bundle to 2,280mm above ground level.

The height of the individual bundles of newspapers varies but it is generally between 170mm and 210mm at the point where the straps cover the bundle. The bundle height slightly increases beyond the strap tension on the bundle.

The weight of the bundles varies according to the type of newspapers and how many newspapers are loaded within the bundle. Table 3 summarises the weight of the bundles of newspapers for each of the four sample nights for both locations.

The bundles are unloaded from the truck, carried approximately between 2-15 metres and placed next to a wrapping machine. Alternatively, on the second delivery, the bundles (those which are not to be wrapped individually) may be lifted directly from the truck into the vehicle which is parked within 3 metres from the truck (Henley Depot). A third variation is that bundles can be unloaded from the truck and placed on a trolley and then the trolley pushed to a wrapping machine for the newspapers to be processed.



Figure 5: Reaching to the upper levels of the newspaper bundles.



Figure 6: Drivers unloading papers from the truck.



Figure 7: Reversing truck into sorting depot.



Table 5 summarises the number of bundles of Advertisers taken from the trucks and processed at each of the two locations which were assessed in this program.

At both locations there is quite clearly an increase in the numbers of bundles of Advertisers processed on Saturday, and Sunday Mails processed on Sundays, compared to other days. On Saturday there were two people working for the sample distributor but on the other days there was only one person involved with the distribution of the newspapers (for the sample distributor).



**Figure 8: Bundles stacked x5 high on the delivery truck.**

There is some assistance provided by the truck driver in relation to re-distributing the papers towards the edge of the truck and in fact unloading some newspapers from the truck. However, the majority of newspapers are unloaded by the newsagent distributors from the truck to their vehicle or wrapping machines.

**Table 3: Average weight (kilograms) of bundles of newspapers.**

Assessment Day	Assessment Location	
	Henley Depot	Lonsdale Depot
Monday	13.44 kg	13.20 kg
Wednesday	15.12 kg	14.96 kg
Saturday	15.6 kg	15.0 kg
Sunday	14.4 kg	15.93 kg

**Table 4: Average weight (kilograms) of individual newspapers.**

Assessment Day	Assessment Location		
	Henley Depot	Lonsdale Depot	Sample Newspapers
Monday	.24 kg	.22 kg	
Wednesday	.42 kg	.34 kg	
Saturday	1.04 kg	1.09 kg	1.070 & 1.270 kg
Sunday	.72 g	.59 kg	

**Table 5: Number of bundles unloaded by one distributor.**

Assessment Day	Assessment Location	
	Henley Depot	Lonsdale Depot
Saturday	135	180
Sunday	107	77 bundles rolled
Monday	20	21 bundles rolled
Wednesday	35	31 bundles rolled

### **Job Task Elements – Unloading Bundles from the Truck**

The key job task elements for this task are unloading the bundles of newspapers from the truck and transporting them to either the wrapping machine or delivery vehicle.

### **Risk Factors – Unloading Bundles from the Truck**

The following risk factors have been identified for this manual handling task:

- Reaching above shoulder height (Medium Injury Risk Rating)
- Repetitive manual handling (High Injury Risk Rating)
- Carrying the bundles (Medium Injury Risk Rating)
- Bending and reaching forwards (Medium Injury Risk Rating)

### **Reaching Above Shoulder Height (Medium Injury Risk Rating)**

The South Australian Manual Handling Code of Practice (1990) states the following regarding reaching above shoulder height:

*"If the load is located above the employee's shoulder height or below mid-thigh height or otherwise requires extended reach, then the risk of injury is increased. An increased risk also occurs where the load requires maneuvering to be placed accurately into position."*

*(Section 4.20 p15)*

The weight and bulk of the newspaper bundles also interacts with this aspect of the work. The South Australian Manual Handling Code of Practice (1990) states the following in relation to the weight of the object:

*"Some evidence shows that the risk of back injury increases significantly with objects above the range of 16-20kg, therefore from the standing position it is advisable to keep the load below or within this range;"*

*(Section 4.23(b) p16)*

*"As weight increases from 16kg up to 55kg, the percentage of healthy adults who can safely lift, lower, or carry the weight, decreases. Therefore, more care is required for weights above 16kg and up to 55kg in the assessment process. Mechanical assistance and/or team lifting arrangements should be provided to reduce the risk of injury associated with these heavier weights."*

*(Section 4.23(c) p16)*

In this particular case there is a significant interaction between the job task risk factors. That is, whilst the bundles of newspapers are at or about 15kg in weight, they are quite bulky in terms of their dimensions, lifted through extreme ranges of movement (lifted from above shoulder height and down to ground height) and there is a high volume of manual handling. This creates a medium risk manual handling scenario.

### **Repetition (High Injury Risk Rating)**

Table 5 indicates highly repetitive manual handling associated with lifting the bundles of newspapers from the trucks to the wrapping machine and vehicles.

*"The risk of injury rises with the increasing frequency, repetition and duration of manual handling activity by any one employee in a work period. How often, and for how long, a task is performed are key risk factors to be considered.*

*Problems with frequency and duration are not restricted to lifting or lowering of loads. Pushing, pulling, carrying and holding of loads can also be a problem if performed frequently or for prolonged periods."*  
(Section 4.14-4.15 p15)

What also needs to be considered is that whilst these risk ratings have been ascribed to unloading the bundles of newspapers from the truck to the wrapping machine there is repeated lifting of the newspapers within the delivery process. That is, the newspapers are lifted up to six times during the distribution process (table 1). For example, as illustrated in Table 5, 107 bundles of Sunday Mail newspapers were delivered to one distributor at the Henley Depot. If each bundle weighed approximately 15.3 kg (20 newspapers per bundle at approximately .76kg per newspaper) this would produce a total net weight of lifting the papers through the delivery process of 1,626.4kg lifted from the truck per shift. If the newspapers are lifted six times in the distribution process, this brings the total amount lifted through one night of the distribution of Sunday Mails for one agent to 9,758.4kg.

Similar extrapolations of data can be applied to each of the data sets presented in Table 5. Quite clearly, on the Saturday and Sunday runs in particular, there is a very high level of repetition of lifting with a significant risk of injury from the combination of repetition and other previously mentioned risk factors associated with this work.

### **Carrying Newspapers (Medium Injury Risk Rating)**

One of the trucks does not fit into the distribution depot at Henley Beach and so it is parked outside. This increases the distance over which the newspapers need to be carried to the wrapping machine. Generally, the newspapers are carried between 4 and 6 metres between the truck and the wrapping machine if the truck is parked inside the depot. However, if the truck is parked outside the depot, the distance increases from 4 to 12 metres. This extra distance, particularly in light of the repetition of the task, can increase the manual handling risk factors associated with this work.

### **Bending and Reaching Forwards (Medium Injury Risk Rating)**

There can be significant forward bending associated with lifting a bundle of newspapers from the truck (particularly if the truck driver has not pushed the bundle to the edge of the truck prior to it being lifted). There is also some bending below mid thigh level required to place the bundle onto the trolley or placed on the floor next to the wrapping machine.

In relation to bending and reaching forwards, the South Australian Manual Handling Code of Practice (1990) states the following:

*"The centre of gravity of the load should be as close to the body as possible. A load is more difficult (heavier) to lift or carry if it is not close to the body. For example, 10kg held at a distance of 80cm imposes the same load as 50kg right next to the body."*

*(Section 4.70(e) p43)*

The interaction of the repetition of this task combined with the reaching forwards and the biomechanical loading on the spine that is related to lifting the papers off the truck, carrying them and loading them next to the wrapping machine, would result in a high potential for risk of injury. These risk factors would be further increased if one person lifted two bundles of newspapers (particularly, if combined with unsafe manual handling practices).

### **Conclusion – Unloading Bundles from the Truck**

There are significant risk factors associated with the reaching above shoulder height, repetition of the task, carrying the bundles of newspapers and bending and reaching whilst load-bearing the bundles of newspapers. The interaction of these previously mentioned risk factors has resulted in a risk rating of medium to high being associated with this job task.

### 5.3 Wrapping Newspapers (Medium Injury Risk Rating)

#### Task Description – Wrapping Papers

As illustrated in figures 9 & 10, newspapers are placed on a stand which is approximately 780mm in height (refer to figure 10). The bundles of newspapers, as previously noted, are between 190 & 210mm in height. The papers are lifted individually from the bundle with a bilateral pincer grip and fed into the wrapping machine. The machine wraps the paper and ejects it automatically into a collection bin which is located directly adjacent to the wrapping machine.



**Figure 9: Feeding papers into the wrapping machines.**

One of the key variations in the wrapping process is that some distributors will rotate the paper 180° and feed it into the wrapping machine “feather end first”. Turning the newspaper prior to feeding it into the wrapping machine (when required) results in the wrapped newspaper having a cross sectional surface area which is circular. However, if the thicker newspapers are fed through “crease end first” they tend to have a more oval shape. This is highlighted in the dimensions of the newspapers which are summarised in table 7 (page 23).



**Figure 10: Feeding papers into the wrapping machine.**

The additional turning of the newspaper prior to feeding it into the machine introduces an extra step in the process. However, it does reduce the cross sectional surface area of the larger newspapers which is critical in reducing the risk of overuse injury that is related to throwing the newspapers from the vehicle during the delivery process.

**Table 6: Average height and width (millimeters) of cross section of Advertiser (& Sunday Mail) for each of the four sample days (Henley & Lonsdale combined). Width = width of cross sectional area of newspaper wrapped. Height = height of cross sectional area of newspaper (wrapped). Data for ‘crease end’ first wrapping only.**

Assessment Day	Paper Dimensions	
	Width	Height
Monday “crease end” first	42.45mm	34.05mm
Wednesday “crease end” first	49.25mm	41.70mm
Saturday “crease end” first	78.5 mm	66.20mm
Saturday “feather end” first	69.45 mm	67.75 mm
Sunday “crease end” first	66.20mm	55.40mm
Sunday “feather end” first	64.33 mm	53.75 mm

### **Job Task Elements – Wrapping Papers**

The key job task elements for this task are as follows:

- Bilateral pincer grip of the newspapers.
- Twisting the spine when feeding the newspaper into the wrapping machine.
- Static muscle loading on neck and shoulders related to prolonged fixed work procedures (Approximately 2 – 4 hours of wrapping required per person each night depending on volume of number of people wrapping).

### **Risk Factors – Wrapping Papers**

#### **Repetition and over use related injury (Medium – High Injury Risk Rating)**

An example of the repetition of this task is reflected in the following calculation:

- Henley Depot – Saturday night, 840 newspapers wrapped in 150 minutes
- This corresponds to 840 newspapers wrapped every 9000 seconds
- This corresponds to 1 newspaper being fed into the machine and wrapped every 10.71 seconds.

The very short cycle time, limited range of movement and repetitive work sustained over a 2-3 hour period represents a significant risk of over use related injury for this task.

As figures 9 & 10 illustrate, there is a deviation of the hand downwards (ulnar deviation) combined with the pincer grip and short cycle time for this task. All of these movement elements are consistent with research which has identified increased risk of over use related injury such as carpal tunnel syndrome (Silverstein et al, 1987a & 1987b).

#### **Static Muscle Loading of Neck and Shoulders (Medium Injury Risk Rating)**

In order to process the high volume of newspapers, the wrapper will stand in the position illustrated in figures 9 & 10 for approximately 2 – 3 hours per night (depending on the volume of newspapers to be wrapped).

In this case the neck is being flexed at approximately 40° and the arms extended forwards which would result in a significant strain on the trapezius muscles and this can increase neck and shoulder fatigue.

### **Conclusion – Wrapping Papers**

The short cycle time, repetitive hand/arm movements, deviated joint posture and prolonged nature of the paper wrapping task means there is a medium injury risk rating associated with the upper limb over use related injury (particularly tennis elbow and carpal tunnel syndrome).

The static muscle loading of the neck and shoulders will also contribute to the neck and shoulder muscle fatigue which could be related to this task.



#### 5.4 Loading Delivery Vehicles (Medium – High Injury Risk Rating)

##### **Task Description – Loading Vehicles**

This aspect of the job requires wrapped newspapers to be lifted from the container illustrated in figure 11. The bundle of wrapped newspapers is then carried to the delivery vehicle and then loaded into the van or sedan.

##### **Job Task Elements – Loading Vehicles**

The key job task risk elements for this task are as follows:

- Bending and reaching for bundles of wrapped papers from the catchment container.
- Loading bundles of wrapped newspapers into delivery vehicle.

##### **Risk Factors – Loading Vehicles**

##### **Bending, Reaching and Lifting Wrapped Bundles of Newspapers.**

As previously noted, the bundles of newspapers can weigh approximately 16kg. There are variations between distributors but they would generally use a rope or strap to collect between 1 & 2 bundles of wrapped newspapers from the container. This corresponds to a weight of between 15 – 32 kg.

The container illustrated in figure 11 has sides that are 820mm in height. Its design means that the operator is required to bend down (essentially from the lumbar spine) to lift a load weighing between 15-32kg out of the container which can place significant load on the lumbar spine. In the case of the assessed Saturday night at Henley where 850 newspapers were rolled, if two bundles were lifted out at a time (15 papers per bundle) this would require lifting 32 kgs out of the container (illustrated in figure 11), 28 times per night. The combination of biomechanical load on the lumbar spine, the weight of the bundle and frequency with which this task is performed would represent a medium to high risk of lumbar spine injury for this task.



**Figure 11: Lifting bundles of wrapped papers.**



**Figure 12: Carrying wrapped newspapers to the delivery van.**



**Figure 13: Newspapers loaded into a delivery van.**

### **Loading into Delivery Van (Medium Injury Risk Rating)**

The delivery vans which were assessed had an internal width of approximately 1.5 metres with rear door access and also sliding access door at one side. There is a maximum forward reach of approximately 1.4 metres as the operator reaches across the width of the van to load bundles of newspapers behind the driver's seat. A Toyota Corolla wagon which was assessed had a width of 1.57m and required a forward reach of approximately 1.5 metres (provided the side doors are used to load the papers into the forward most section of the vehicle).



**Figure 14: Lifting bundles of newspapers into rear of delivery van.**

If two bundles of wrapped newspapers are lifted with a strap or rope, this represents a load of 32kg lifted over a distance of up to one metre in front of an operator whilst the spine is in a flexed position. As previously noted, the South Australian Manual Handling Code of Practice (1990) states the following in relation to biomechanical load on the lumbar spine as a result of the load lifted in front of the body:

*"The centre of gravity of the load should be as close to the body as possible. A load is more difficult (heavier) to lift or carry if it is not close to the body. For example, 10kg held at a distance of 80cm imposes the same load as 50kg right next to the body."*

*(Section 4.70(e) p43)*

### **Conclusion – Loading Vehicles**

There are a variety of vehicles which are used to deliver newspapers and these are categorized into vans and cars (sedans & wagons). Both types of vehicles have a width of approximately 1.5 metres and do require an extended reach forwards to load papers into the rear sections of those vehicles. The risk of injury associated with loading a single bundle of newspapers is medium. However, the risk rating for this task may be increased to high with a two bundle load.

## 5.5 Throwing Papers (High Injury Risk Rating)

### Task Description – Throwing Newspapers

This is one of the most high risk aspects of the paper distribution process. It requires a person to drive the vehicle, check the computer read-out and throw a wrapped newspaper from the vehicle to a delivery location. On occasion bundles of newspapers are also lifted from the vehicle and placed at various delivery locations.

The issues related to lifting bundles of newspapers have already been discussed when lifting the bundles from the truck to the wrapping machine. A similar level of risk occurs in terms of the range of movement, weight of bundles and manual handling methods applied in this case. By far the most hazardous part of this job in terms of risk and frequency is the manual throwing of wrapped newspapers from the vehicle to a particular delivery destination.

### Job Task Elements – Throwing Newspapers

Manual throwing of the wrapped newspaper from the vehicle involves the following types of movements:

- Forehand throwing of newspaper from the driver's side window (refer to figure 15).
- Backhand throwing of newspaper from driver's side window (refer to figure 16).
- Backhand throwing of newspaper from the passenger side window (refer to figure 17).

Generally speaking, operators will throw the forehand throw over the top of the vehicle (refer to figure 15) when they require extra elevation to throw a newspaper up an embankment, a significant horizontal distance to the residence or to throw the newspaper over a fence.

A backhand throw out of the driver's side window is used where elevation or distance is not as significant for delivering newspapers on the driver's side of the vehicle. Equally, backhand throws out of the passenger window (with the left hand) are required for delivering to the passenger side of the vehicle where elevation is not required when throwing a paper to the delivery location.



**Figure 15: "Forehand" throw over top of vehicle.**



**Figure 16: "Backhand" throw out of driver's window.**



**Figure 17: "Backhand" throw out of passenger window.**



There are many challenges associated with this aspect of the work, not the least of which is being able to throw the newspaper up to 5-6 metres horizontal distance to deliver to the client location. In addition, there are issues associated with the elevated throwing over high fences, obstructions such as trees and verandahs. The distributor also has to contend with the requirement to have the accuracy to throw the newspaper over the fence but not too far that it breaks a window or lands on the roof of a building.



**Figure 18: "Feather end first"  
Saturday Advertiser.**

### **Risk Factors – Throwing Newspapers**

There are a number of significant risk factors associated with this aspect of the work which include the following:

- Risk of tennis elbow injury related to backhand throwing.
- Risk of carpal tunnel syndrome related to grip, throwing force and diameter of newspapers.
- Shoulder injury risk associated with forehand and backhand motions of throwing the newspaper.
- Delivery locations.



**Figure 19: Weekend Australian.**

Each of these risk factors will be discussed in this section of the report.

### **Tennis Elbow: Backhand Throwing Action**

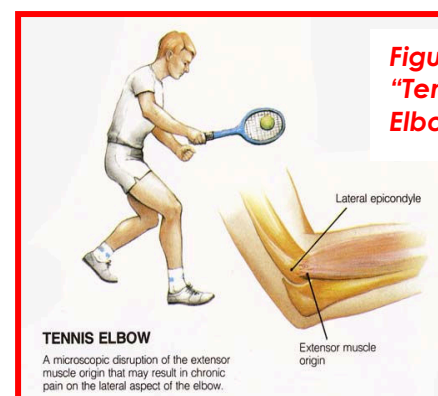
When distributing the newspapers the distributor will use a right handed backhand motion to throw the newspaper out of the driver's side window (refer to figure 16) or use a left handed backhand throwing motion to throw the newspaper from the passenger side window (refer to figure 17).



**Figure 20: "Crease end first" Saturday Advertiser.**

Lateral epicondylitis (Tennis Elbow) has a number of recognized risk factors. These include the following:

- "Repeated extension of the wrist or fingers – e.g. repeated backhand throwing actions." (Pheasant, 1993).
- "Repeated forceful movements of the wrist and forearm." (Pheasant, 1993).
- "Repeated throwing actions with the arm." (Putz-Anderson, 1988).



**Figure 21:  
"Tennis  
Elbow".**

The observation of the backhand throwing action would have a high degree of risk of injury for lateral epicondylitis compared against the above mentioned recognized risk factors.

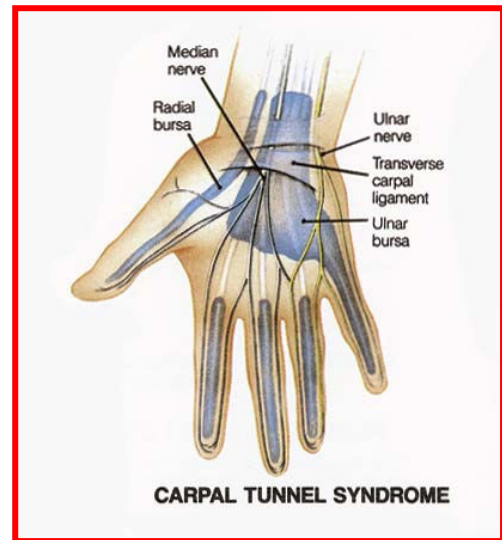
There is a degree of risk of lateral epicondylitis associated with the first part of the "forearm" throwing over the vehicle (refer to figure 15). In this case there is an extension motion (dorsi flexion) of the wrist combined with high grip force when throwing a newspaper from a vehicle.

### **Carpal Tunnel Syndrome: Gripping and Throwing the Newspaper**

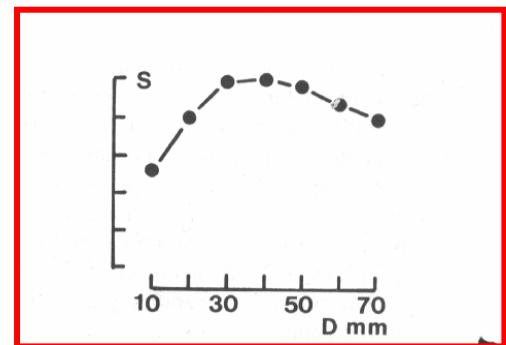
Silverstein et al (1987a & 1987b) have identified that in highly repetitive work with high manual force exertions (as is the case in this instance), the prevalence of carpal tunnel syndrome was fifteen times higher than in jobs with low repetitiveness and low force exertions.

The criteria for high repetitiveness was a cycle time of less than 30 seconds and high force exertions had a criteria of more than 4kg of exertion. Throwing the newspapers would qualify for this criteria based on the frequency and force exertions required to throw the newspaper.

In addition to the force and frequency of the task there are significant carpal tunnel risk factors associated with the dimensions of the newspapers. Research into the relationship between the gripping force and diameter of a handle has illustrated that hand diameters in the order of 75mm can result in a 13% reduction in maximum grip strength with a neutral wrist position. If there is 45° extension of the wrist, which there is when throwing the newspaper (refer to figure 15), the grip strength can be reduced by 30%. Furthermore, the maximum grip strength has been identified with handles with a diameter of 45mm (Pheasant & Scriven, 1983). Other research has identified a maximum thrust (force along the axis of the handle) can be exerted with handles with a 30-50mm diameter size. As figure 23 illustrates, there is a progressive reduction in the grip strength capability of people when handle diameters increase beyond 45mm. As table 6 (page 16) illustrates, the height and width cross sectional dimensions of the wrapped Saturday Advertiser newspapers is 66.2mm x 78.5 respectively. Furthermore, the weekend Australian paper also has wrapped cross sectional dimensions in excess of 45mm (Average dimensions Height 62.20mm and Width 56.80mm). The grip illustrated in figure 15 shows that the fingers are not even able to cross over the tip of the thumb due to the large diameter of the newspaper.

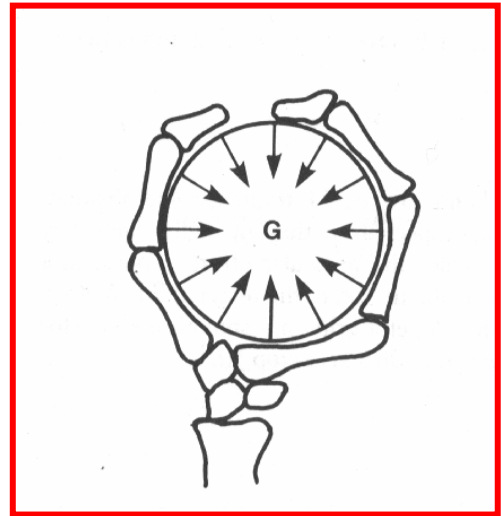


**Figure 22: Carpal Tunnel Syndrome.**



**Figure 23: Gripping thrust strength (S) as a function of the diameter of the handle (D). (Pheasant, 1993)**

When the increased strain associated with gripping a large diameter newspaper is combined with the extension of the wrist, the repetitive (and short cycle time) throwing and the forceful movements associated with throwing the newspaper, the resultant risk is a high risk rating for over use related injury.



**Figure 24: Conceptual cross sectional view of the hand grip on a cylindrical handle. (Pheasant, 1993)**

**Table 7: The average width/height of newspapers fed into wrapping machine 'feather end' first or crease first (Saturday and Sunday newspapers only, both locations combined). Width = cross sectional area of newspaper wrapped. Height = cross sectional area of newspaper (wrapped).**

Assessment Day	Paper Dimensions				Sample Newspapers	
	"Feather end" first		Crease first			
	Width	Height	Width	Height	Width	Height
Saturday	71.15mm	67.75mm	78.5 mm	66.20mm	77mm	85mm
Sunday	64.33mm	53.75mm	66.20mm	55.40mm		

### Shoulder Injury: Gripping and Throwing of the Newspaper

Some shoulder injuries such as shoulder tendonitis and shoulder problems in general are found in work tasks where there is sustained abduction and flexion of the shoulder which is more than 60°, particularly, where combined with repetitive forceful movements (Putz-Anderson, 1988). Abduction is the movement where the arm is moved to the side but away from the body at the shoulder joint. In the case of the forehand throwing over the top of the vehicle motion the shoulder needs to be abducted to at least 90° for the arm to be placed out of the vehicle window and abducted at an even greater angle during the throwing motion. A similar magnitude of shoulder movement can be associated with the backhand throwing motion where the arm will need to be abducted to at least 90° to gain clearance out of the vehicle window and also to clear papers obstructing access out of the passenger side window (refer to figure 17). There is also a degree of external and internal rotation of the shoulder during the throwing motion which could, given the increased rate and frequency of this work task, increase shoulder problems for delivery drivers.



### **Delivery Locations**

Every delivery area has its idiosyncrasies in terms of the requirements for throwing the newspapers. The degree of risk of injury that has previously been described is based on relatively low fences (lower than one metre) and curbside access of the vehicle. Even in these circumstances, as noted, there is a high degree of risk of injury for these types of delivery scenarios.

There are, however, circumstances where the risk of injury can be further exacerbated by the poor access to the property. Figures 25 – 28 illustrate some delivery locations on Seaview Road and Military Road at Henley Beach where the distributors need to throw the newspapers between 5 -6 metres from the driver's side window and elevate the newspaper over a height of up to 3 metres above ground height over the height of the fence. Close proximity of the houses beyond the fence means that there needs to be a high elevation of the newspaper to throw the paper over the fence but not carry too far onto the verandah or break a window.

In these circumstances, as previously noted, there is an increased risk of over use related injuries to upper limbs and specific strategies need to be developed for these high risk delivery locations.



**Figure 25: 281 Military Road, Henley Beach.**



**Figure 26: 307 Military Road, Henley Beach.**



**Figure 27: 313 Military Road, Henley Beach.**



**Figure 28: 364 Seaview Road, Henley Beach.**

### **Conclusion – Throwing Newspapers**

This section of the report has identified a clear and high risk of overuse related injury particularly in relation to lateral epicondylitis, carpal tunnel syndrome and shoulder injuries related to the delivery of newspapers (particularly the heavier and larger dimensioned Saturday and Sunday newspapers).

The risk factors that have been identified are related to the weight and dimensions of the newspaper together with the force required to throw the newspaper, the frequency of the task and the distance over which the newspaper needs to be thrown. All these risk factors, as previously described, combine to produce a high degree of risk of injury for this aspect of the delivery process.

## 6. RECOMMENDATIONS

This section of the report summarises the risk control recommendations that can be implemented to control the hazards that have previously been identified in the results section of this report.

### **1. Unloading Bundles from the Truck (refer to page 11).**

#### **1.1 Maximum height of bundles on trucks.**

On occasions, bundles are stacked up to five high with unused storage capacity towards the rear of the truck. A maximum of four bundles high should be stacked on the truck.



**Figure 5 (repeated): Reaching to the upper levels of the newspaper bundles.**

#### **1.2 One bundle to be lifted at a time and carried from the truck.**

Figure 8 illustrates contrasting styles of lifting bundles of newspapers from the truck. It is generally recommended that only one bundle be lifted at a time from the truck. This allows the operator to hold the bundle closer to their body to reduce overall weight and better arm position when lifting the bundle. This is a safer manual handling practice and reduces risk of injury.



**Figure 8 (repeated): Bundles stacked x5 high on the delivery truck.**

#### **1.3 Use trolleys to transfer bundles from the truck to the wrapping machine.**

A wide assortment of trolleys is used to transfer bundles from the truck to the wrapping machine. These include a variety of types of designs of sack trucks and flat bed trolleys as illustrated in figure 29. These trolleys save a lot of excessive double handling and carrying of bundles of newspapers and reduce the manual forces involved with carrying materials.



**Figure 29: Variety of trolleys used for loading bundles of newspapers.**



## **2. Feeding Papers into Wrapping Machine**

**2.1 Stand to one side of support stand when feeding newspapers into the wrapping machine.** Figure 9 shows a reduced level of lumbar spine flexion as a result of standing to one side of the paper stand when feeding newspapers into the wrapping machine. If operators stand behind the stand it causes more lumbar spine flexion as the operator has to lean forwards over a greater horizontal distance to feed the machine (refer to figure 30).



**Figure 9 (repeated): Standing to one side of the stack of newspapers.**

## **2.2 Review guarding on some wrapping machines.**

The main cog and some moving parts are exposed on the wrapping machine shown in figure 9. In contrast the wrapping machine illustrated in figure 30 has the cog and moving parts of the machine covered, which reduces the risk of becoming entangled with the moving parts during the wrapping process. The wrapping machines of the types illustrated figure 9 should have the moving parts guarded like on the machine illustrated in figure 30.



**Figure 30: Standing directly behind the stack of newspapers.**

## **2.3 Feed Advertiser and Sunday Mail into wrapping machine.**

As noted in 5.3 of this report (refer to page 16) there are significant dimensional differences in the cross sectional area of the newspaper depending on whether it is fed in 'crease' first or 'feather end' first.

Feeding the weekend newspapers (Saturday Advertiser, Weekend Australian and Sunday Mail) into the machine "feather end" first will reduce the cross sectional surface area of the newspapers after they are wrapped. This will have benefits in terms of reduced diameter of the paper to be gripped which will have significant benefits in terms of reduced risk of overuse injury for manually grasping and throwing the wrapped newspapers.



**Figure 31: Exposed moving part on the wrapping machine.**

## **2.4 Use ear plugs when using wrapping machine.**

This study was related to manual handling task assessments of distribution tasks. However, a follow up safety review may consider some of the acoustic issues related to the operation of the wrapping machines. Although decibel level was not

assessed during this program, further review of the noise levels and encouragement for wrapping machine operators to use ear plugs will help reduce any risk associated with noise emissions from the wrapping machines.

### **3. Loading Strapped Bundles of Newspapers into Delivery Vehicles**

**3.1 Limit roped bundles to one bundle lifted at a time.** As noted in the results section of this report (refer to section 5.4, page 18) there can be a significant risk involved with lifting bundles of newspapers from the wrapped paper catchment container to the delivery vehicle (refer to figure 11).

#### **3.2 Follow task specific tips for this task.**

Some of the basic tips for this task include the following:

- Only lift one bundle of newspapers at a time.
- Hold load close to body when lifting.
- Do not twist spine when lifting bundle.
- Use leg where possible to “flick” bundle of newspapers into vehicle.

**3.3 Follow design tips for paper catchment container.** Figure 34 illustrates a wooden base that has been put into the paper catchment container. It means that when the papers are bundled, it sits high to the top of the container. This in turn significantly reduces the level of lumbar spine flexion and loading required to lift the bundle of wrapped newspapers out of the container. There is significant bending and strain to the lumbar spine when lifting out of the container illustrated in figure 11. In contrast, a basic modification to the container means that significant amounts of lumbar spine flexion can be reduced by following the design illustrated in figure 33.



**Figure 11(repeated): Lifting bundles of wrapped papers.**



**Figure 32: Use leg where possible to “flick” bundle into delivery vehicle.**



**Figure 33: Design of newspaper catchment container.**



**Figure 34: Wooden base in container reduces lumbar spine flexion.**

## **4. Newspaper Requirements**

### **4.1 Newspaper dimensions**

As noted in the Results section of this report (refer to section 5.5 - page 20) the risk of overuse injury increases with the weight and dimensions of the wrapped newspaper, particularly in light of the highly repetitive carrying and throwing actions used to distribute the newspapers.

It is recommended that the cross sectional dimensions of the newspaper be kept at a maximum of 55mm in both width and height of the cross sectional area of the wrapped newspaper. As noted in the previously mentioned Results section, this will maximize the grip strength capability of the person to hold and manoeuvre the wrapped newspaper with minimal risk of over use injuries of the type that are described.

Simply folding the newspaper "feather end" first will not be enough in itself to sufficiently reduce the cross sectional area of the weekend Saturday Advertiser, Weekend Australian and Sunday Mail to a level that is safe to distribute with the current methods and current volumes that are distributed per person. Some of the risk associated with this can be reduced by reducing the level of repetition of the task. That is, providing more people to perform the task and thus reducing the number of papers for an individual to handle.

### **4.2 Weight of newspapers.**

It is recommended that the maximum weight of the newspapers be in the order of .6 kilogram with the current levels of volume of newspapers distributed and thrown per person. Again, as discussed in section 4.1 of this report, the level of risk associated with this task can be reduced by reducing the repetition of the task per person. That is, having more people throw the newspapers, thus reducing the volume of thrown newspapers per person. At the current level of work load of throwing newspapers per person, the bulk of the mechanical stresses on the person are significant, resulting in a high degree of risk for the task as it is currently undertaken.

In summary, if the weight and dimensions of the newspaper are to exceed that which is recommended in this report, then the volume of newspapers distributed per person is to be reduced in order to significantly reduce the risk of injury associated with wrapping and throwing the Saturday Advertiser, Weekend Australian and Sunday Mail newspapers.

## **5. General Systems of Work (Refer to section 5.5, page 20)**

**5.1 Numbers of newspapers delivered per person.** A general agreement needs to be achieved regarding the maximum numbers of newspapers that can be thrown in the delivery process. Currently, one person may throw in the order of 400 – 600 newspapers per night on a weekend where there are larger volumes and heavier, larger dimensioned newspapers. Increasing the numbers of people involved in the distribution process would allow 200 – 300 newspapers to be thrown per person which, in combination with the reduced dimensions and weight of the newspapers would significantly improve the safety for the newspaper wrapping and to a larger degree, newspaper throwing task.

### **5.2 Agreement regarding the distribution of newspapers.**

Agreement needs to be achieved between the suppliers of the newspapers (The Adelaide Advertiser) and the Newsagents' Federation about the task demands for



the distribution of newspapers. The current situation, in my view, is unsafe and modifications to the weight, dimensions and volume of newspapers distributed per person needs to be reduced to provide a safe system of work.

Thank you for asking me to undertake this ergonomic assessment program. Please do not hesitate to contact me if you have any queries regarding any aspect of this ergonomic assessment report.

Yours sincerely,

**David Nery** B.Sc. Hons. (Flinders), M.Sc. (London)  
**Ergonomist**, Nery Ergonomic Services

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## APPENDIX A

### Risk Assessment Methodology used in this Program

The risk assessment process was undertaken using the risk assessment matrix below.

Probability	Consequence			
	Extreme	High	Medium	Low
Frequent	1	1	2	3
Occasional	1	2	3	4
Remote	2	3	4	5
Improbable	3	4	5	5

<b>5 Rating</b>	Very low priority, fix within 12 month plan
<b>4 Rating</b>	Low priority, fix within 3 month plan
<b>3 Rating</b>	Medium priority, fix within 1 month plan
<b>2 Rating</b>	High priority, fix within 1 week plan
<b>1 Rating</b>	Very high priority, fix immediately

Descriptions selected for **probability** are as follows:

<b>Frequent</b>	Likely to occur repeatedly
<b>Occasional</b>	Likely to occur several times
<b>Remote</b>	Likely to occur sometimes
<b>Improbable</b>	Not likely to occur but probable

Descriptions selected for **consequences** are as follows:

<b>Extreme</b>	Fatal
<b>High</b>	Severe injury or illness with a long period off work and/or permanent impairment
<b>Medium</b>	Minor injury or illness, requiring medical treatment, but no permanent impairment
<b>Low</b>	Superficial injury or illness with little or no requirement for first aid treatment

## APPENDIX B

### Synopsis of David Nery's Academic History & Client Services of Nery Ergonomic Services

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**David Nery B.Sc. Hons. (Flinders), M.Sc. (London)**

**Ergonomist**

#### 1. Nery Ergonomic Services

Nery Ergonomic Services is a consulting firm that has been established for 14 years. We have staff qualified in the areas of ergonomics, engineering and workstation design. We have received research Grants from the WorkCover Corporation (SA), Meat & Livestock Australia, The South Australian Mining & Quarrying Occupational Health & Safety Committee and The Occupational Health & Safety Trust.

#### 2. David Nery - Academic Qualifications

- Honours Degree in Science – 1984-1988 (Flinders University, SA)
- Masters Degree in Ergonomics 1989 – 1990 (University of London, UK)

#### 3. David Nery - Employment Experience

- Lecturer in Ergonomics, University of South Australia (part-time, 1991-1998)
- Lecturer in Ergonomics, Douglas Mawson Institute of TAFE (part time, 1994-1998 & 2000 – current)
- Consultant Ergonomist, Nery Ergonomic Services (1991 – current)

#### 4. David Nery - Academic Work Experience

- I have presented the results from my ergonomics research work at state-based, national and international conferences.
- I was selected by TAFE nationally to write the ergonomics curriculum that is taught for ergonomics subjects at the certificate and associated diploma level within TAFE across Australia.
- In my position as Lecturer in Ergonomics at the University of South Australia, I was involved in teaching a wide range of ergonomics topics and supervising and participating in ergonomics related research

#### 5. David Nery - Ergonomics Consulting Experience

- I have worked as a Consultant Ergonomist in Industry for 14 years. I have worked in most industry groups over this time. I have attached a list of some of the clients.
- Some of the ergonomic services I provide include the following:
  - Manual handling audits and training
  - Office ergonomics audits and training

- Ergonomic assessments of mobile plant (access/egress, cabin ergonomics and seating)
- Machine guarding assessments
- Accident & incident assessments
- Ergonomic hazard management programs.

## 6. Some Of My Clients

Adelaide Brighton Cement	Electrolux	Origin Energy (VIC)
Adelaide Bank	ETSA Corporation	Pacific Waste Management
Adelaide City Council	FAYS	Pasminco Port Pirie Smelter
Adelaide Festival Centre Trust	Foxtel	Penrice Soda Products Pty Ltd
Ai Automotive	General Motors Holden	Piper Alderman Lawyers
Air International (NSW & SA)	George Chapman Pty Ltd	Primo Meats Australia
Auditor General's Department	Gun & Davey Lawyers	Rocla
Australia Post	Health Insurance Commission	SA Water
Australian Taxation Office	Henderson Automotive	SABCO
BHP	Henley & Grange Council	Sanitarium Health Food Comp'y.
Boral Industries	Hi Fert Kadina & Port Adelaide	Santos (SA & QLD)
Brambles	Hills Industries	Sheridan Australia
Bridgestone Australia	Hilton Adelaide	Stamford Grand
BRL Hardies	Hyatt Regency Adelaide	Stamford Plaza
Centrelink	James Hardie Industries	TAFE
Child Support Agency	Laidlaw Young Barristers & Solicitors	Tarac Australia
Cleanaway	Lysaght Building Industries	Telstra
Coal Services Pty Ltd	M.A.Q.O.H.S.C.	The Expro Group
Coopers Brewery	Marble House Australia	Thomson Playford Lawyers
CSIRO (QLD)	Marion City Council	Tip Top Bakeries
CSR Building Products	Metro Meats	Transport SA
Dept. Human Service	Metserv	United Trades & Labour Council
Dept. Human Services	Mitsubishi Motors Aust. Ltd	United Water
Dept. Marine & Harbours	Mt Arthur Coal (NSW)	University of Adelaide
Dept. of Family & Comm. Services	Nalty Memorial Service	University of South Australia
Dept. Science & Technology	Nestle Australia Pty Ltd (SA & NSW)	West Beach Trust
Dept. Treasury & Finance	Novotel Adelaide	Western Mining Corporation
Donaldson Walsh Lawyers	OneSteel Ardrossan	Westpac Banking Corporation
Drayton Coal (NSW)	Origin Energy (SA)	Yalumba Winery (SA & NSW)