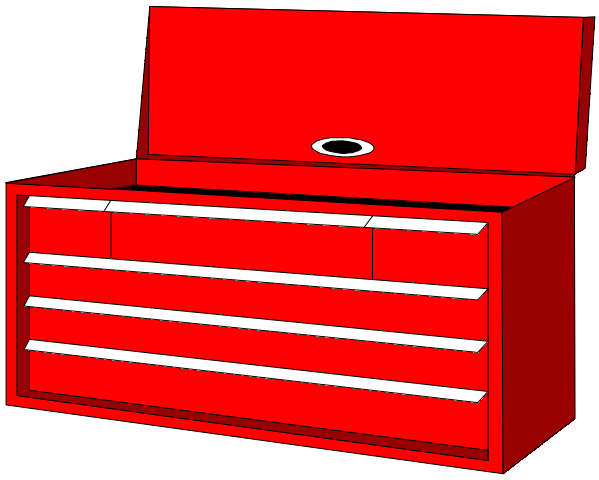
# Industrial Musculoskeletal Injury Reduction Program

## Common Industry Jobs (CIJs)

# Tailer Tool Kit



**IMIRP program coordinated by:**

**Council of Forest Industries**

**Industrial Wood & Allied Workers of Canada**

**Advanced Ergonomics Inc.**

**In cooperation with the Workers' Compensation Board of British Columbia**

# TAILER TOOL KIT
# Table of Contents

# Overview
# Tailer

**Job Summary**

A Tailer is responsible for sorting and redirecting wood that has been cut by a machine (e.g., band saw, trim saw, edger). A Tailer will monitor wood on transfer deck, singulate wood pieces, sort wood, monitor conveyor belts for jam-ups, clear jam-ups, manually transfer boards to be recirculated, and clean up the workstation. Refer to the Physical Demands Analysis for more detail.

IMIRP ergonomists have found that there are three distinctly different workstation designs for the Tailer job. Refer to the PLEASE NOTE section on page 8 to determine whether to use the **Tailer**, **Headrig Tailsawyer**, **or Booth Operator** tool kit for the Tailer at your mill.

**Physical Demands**

The physical demands of the Tailer may include:

a) Forceful exertions of the neck/shoulder, elbow/wrist, and low back
b) Repetitive movements of the neck, neck/shoulder, elbow/wrist, low back, and ankle/foot
c) Awkward postures of the neck, neck/shoulder, elbow/wrist, low back, and ankle/foot
d) Static postures of the foot
e) Continuous standing and walking
f) Repetitive handling (e.g., pushing, pulling, lifting, turning) of different-sized wood pieces (edging, boards, cants, and waste wood)

## Mental Demands

A Tailer must be constantly alert throughout the shift. Outgoing conveyors and drop gates must be monitored for any potential cross-ups or jam-ups. Also, a decision must be made after inspecting each piece of wood as to where it needs to be sent next (e.g., discard waste wood, send to stacker, send to trim saw, send cants to gang saw). After determining where to send each piece of wood, some pieces may be handled (e.g., waste wood is pushed into a drop chute) or controls are activated to send the wood to the appropriate area (e.g., foot pedal is depressed to open a drop gate).

## Major Variations

With different mills, the following major variations may be found:

1) Size of wood pieces handled varies greatly from mill to mill, and may even vary between Tailers of different machines in the same mill. This affects the amount of force exerted by the worker, and therefore the risk of MSI. The size of wood pieces handled by a Tailer varies depending on:
   a) Size of logs processed by a particular sawmill
   b) Machine being tailed (e.g., a Tailer of the cant saws will tend to have larger wood to handle compared to the Edger Tailer in the same mill)

2) The work pace may vary, depending on the speed of the machine being "tailed", and the number of pieces of wood cut at a time by the machine being tailed. This affects the number of repetitive movements performed (e.g., pieces of wood handled per minute, frequency of turning the neck to monitor lumber coming into the workstation).

3) The number of different places to sort the wood may vary, affecting the number of decisions made per minute, and the number of movements to handle wood and/or operate controls. For example:
   a) At mill A, there are two places to sort the wood:
      i) cants and boards go on to the edger (cants and boards are not touched)
      ii) discard waste wood (lift piece, and let it fall into drop chute)
   b) At mill B, there are four places to send sorted wood:
      i) cants go to gang saw (cants are not touched)
      ii) 2x6 boards go to stacker (press foot pedal to open drop gate
      iii) discard waste wood (lift piece, and let it fall into drop chute)
      iv) send some pieces to edger (push pieces forward on transfer deck)

**Minor Variations**

No minor variations were noted.

**PLEASE NOTE**

The IMIRP ergonomists have found that there are three distinctly different workstation designs for the Tailer job. The information contained the **Tailer** Tool Kit corresponds to the **Tailer #1** workstation design.

**Tailer #1** manually singulates and sorts wood on a transfer chain, usually stands for the duration of the shift with some side to side movement, and operates controls occasionally. Most of the Tailers observed have this type of workstation.

**Tailer #2** singulates and sorts wood with a hand tool (e.g., pike pole), can walk more frequently throughout the shift, and operates controls occasionally. This workstation is similar to the Headrig Tailsawyer. If your mill has a Tailer described above, please refer to the **Headrig Tailsawyer** Tool Kit.

**Tailer #3** sorts wood along a transfer chain while seated, and operates controls continuously throughout the shift to achieve this task. Manual handling of wood occurs infrequently. This workstation is very similar to that of the Booth Operator. If your mill has a Tailer described above, please refer to the **Booth Operator** Tool Kit.

# Physical Demands Analysis
# Tailer

## PDA General Instructions: Tailer

The purpose of this PDA is to familiarise healthcare professionals with the physical demands of a Tailer. This PDA can be used to gather information about an individual's job and to assist in developing a rehabilitation and return-to-work plan. It is not intended for use in claims adjudication.

Where applicable, common industry job data (e.g., hand tools, tasks) have been included in the tables of this document. The information reported was collected from a sample of Tailer(s) in the BC Sawmill Industry. However, the PDA requires completion by the healthcare professional, with input from the injured worker to highlight tasks that aggravate the injury or prevent the worker from returning to their job. The worker's supervisor may be contacted for further information or verification of tasks.

A PDA should be filled out for each individual worker following an injury. Subsequent changes in the work process may reduce the accuracy of any pre-existing physical demands assessments.

# PDA Table of Contents

# Physical Demands Analysis
# Tailer

## Task List

For each of the tasks listed below, please indicate whether it occurs at the mill.

### Monitor wood on transfer deck

A Tailer monitors wood along the transfer deck in order to decide which pieces need to be singulated and/or sorted. Controls such as push buttons and foot pedals may be used to operate the transfer deck and other machinery as needed.

*Does this task occur at your mill?*

☐ Yes ☐ No

### Singulate wood pieces

A Tailer singulates pieces of wood (cants, slabs, boards, etc.) so that it will feed into the next belt, machine, or drop gate properly. Wood is also singulated to facilitate sorting.

*Does this task occur at your mill?*

☐ Yes ☐ No

## Sort wood

A Tailer sorts cut wood and sends it to the appropriate area for further processing by manually transferring pieces (e.g., discarding waste wood), pulling or pushing pieces (e.g., pulling pieces to be trimmed), or operating controls to send pieces to another conveyor belt (e.g., opening a drop gate).

*Does this task occur at your mill?*

☐ Yes ☐ No

## Monitor conveyor belts for jam-ups

A Tailer monitors conveyor belts in the immediate area for jam-ups. Conveyor belts may be viewed directly (which may require looking behind or to the side of the workstation) or via video monitors.

*Does this task occur at your mill?*

☐ Yes ☐ No

## Clear jam-ups

A Tailer unjams conveyors, saws, drop gates, etc., using tools (e.g., pike pole, picaroon), pieces of wood, or their hands (to pull boards out). Forceful exertions may be required.

*Does this task occur at your mill?*

☐ Yes ☐ No

## Manually transferring boards to be recirculated

A Tailer manually transfers boards (lifting, lowering) from a holding area back onto the transfer deck to be recirculated (e.g., to the edger, trim saw)

*Does this task occur at your mill?*

☐ Yes ☐ No

## Clean-up duties

A Tailer is responsible for keeping the workstation free from tripping hazards and excessive debris. This may include sweeping, picking pieces of wood off the floor, etc.

*Does this task occur at your mill?*

☐ Yes ☐ No

## Other duties as assigned

A Tailer may be assigned to other duties, such as assisting with saw changes, or rotating into other jobs for a portion of the shift. Alternate duties will vary greatly from mill to mill.

*Does this task occur at your mill?*

☐ Yes ☐ No

# Job Profile

Date: _____

Company Name: _____ Division: _____

Employee Name: _____ Supervisor: _____

Phone: _____ Fax: _____

Is a Return-to-Work (RTW) strategy in place? ☐ Yes ☐ No

If yes, check all that apply: ☐ Modified Job ☐ Modified Worksite ☐ Graduated RTW

Describe:

_____

_____

_____

Length of shift _____ hours

Formal breaks

- ☐ Two 10 minute breaks
- ☐ One 30 minute lunch break
- ☐ Other: _____

Informal breaks

- ☐ Yes, length of break varies
- ☐ Yes, _____ minutes/shift

Work pace control

- ☐ Self-paced
- ☐ Time pressure (e.g., completing a task during the 30 minute lunch break)
- ☐ Other: _____

Job rotation

☐ Yes ☐ No

Describe:

_____

_____

_____

_____

# Work Organisation

## Task Description

The table below contains a list of tasks performed by a Tailer. Use the left column to check off (✓) tasks that are present. Estimate the *Percent of Shift* each task is performed and place a check mark (✓) in the appropriate column. The *Comments* section may be used to include information related to duration, frequency, and cycle times. Additional tasks can also be included under *Other*.

| | Task | Percent of Shift | | | | Comments |
|---|---|---|---|---|---|---|
| | | Rarely 0 to 5% | Occasionally 6 to 33% | Frequently 34 to 66% | Constantly 67 to 100% | |
| | *Monitor wood on transfer deck* | | | | | • *May operate controls (e.g., foot pedals) to control the transfer deck or other machinery as needed* |
| | *Singulate wood pieces* | | | | | • *May include separating slabs from cants, uncrossing boards, or holding back some boards to singulate* |
| | *Sort wood* | | | | | • *Subtasks may include: discarding waste wood, pulling boards to be trimmed, operating a drop gate*<br>• *Wood may be handled manually to sort (pushed, pulled, and transferred), or sorted using controls (operating foot pedals, push buttons, etc.)*<br>• *Work pace may vary greatly from mill to mill, and from one Tailer to another in the same mill* |
| | *Monitor conveyor belts for jam-ups* | | | | | • *May involve turning the neck to view conveyors, or conveyors may be visible on video monitors* |
| | *Clear jam-ups* | | | | | • *Manual handling of wood is required to unjam conveyors and drop gates*<br>• *Forceful exertions may be necessary* |
| | *Manually transfer boards to be recirculated* | | | | | • *Boards are transferred from a holding area to a transfer deck to be re-edged, re-trimmed, etc.* |
| | *Clean-up duties* | | | | | • *This may include sweeping the floor, or picking up wood pieces to keep the workstation free of tripping hazards and excessive debris* |

# Workstation Characteristics

## Dimensions & Layout

Sketch workstation(s) and indicate relevant measurements, such as working heights and reaches.

## Flooring, Displays and Seating

The table below lists several components of a workstation. For *Flooring* and *Displays* there are several options provided. Please indicate all of the options that apply to the workstation. For the *Seating* section, describe and identify the features of the seat, if applicable. The *Comments* section may be used to include additional information, especially any workstation characteristics of concern.

| **Workstation Characteristics** | **Comments** |
|---|---|
| **Flooring** *(Check all that apply)*<br>☐ Cement<br>☐ Wood<br>☐ Rubber matting<br>☐ Metal<br>☐ Other: _____ | |
| **Displays** *(Check all that apply)*<br>☐ Lights on console<br>☐ Mirrors<br>☐ Video monitors<br>☐ Computer monitors<br>☐ Scrolling display<br>☐ Signal lights<br>☐ Other: _____ | |
| **Seating** *(Check all that apply)*<br>☐ Armrests<br>☐ Backrest<br>☐ Swivel seat<br>☐ Slide track<br>☐ Lumbar support<br>☐ Foot rest<br>☐ Casters #: _____<br>*Indicate if adjustable:*<br>☐ Height<br>☐ Armrests<br>☐ Backrest<br>☐ Forward tilt | Height of seat: _____ cm<br>Depth of seat: _____ cm<br>Width of seat: _____ cm<br>Covering type: _____ |

# Equipment & Machinery Controls

The table below contains a list of the types of controls used by a Tailer. Use the left column to check off (✓) controls that are present at the work site. Highlight controls that may aggravate the injury, or which the worker finds difficult to use. The *Comments* section may be used to include any additional information. Additional controls can be included under *Other*.

| | Type of Control | Function | Comments |
|---|---|---|---|
| | *Push/pull buttons* | • *Start/stop rollcases*<br>• *Activates transfer deck and conveyors*<br>• *Master stop/start* | • *Used as needed (on an occasional basis)* |
| | *Push buttons* | • *Master start/stop*<br>• *Cant incline*<br>• *Cant flippers*<br>• *Hold down rolls*<br>• *Activates roll cases*<br>• *Activates jump rollers*<br>• *Controls movement of transfer deck* | • *Used as needed (on an occasional basis)* |
| | *Foot pedals* | • *Stop/start transfer chains*<br>• *Activate lifter forks before drop gate*<br>• *Open/close gate or drop gate*<br>• *Activate end plate to stop boards*<br>• *Lift rollers*<br>• *Open bins* | • *Frequency of foot pedal use may vary from occasional to continuous depending on the mill* |
| | *Toggle switches* | • *Move main deck forward/reverse*<br>• *Roll cases – forward/reverse*<br>• *Kickers* | • *Used as needed (on an occasional basis)* |
| | *Other:* | | |
| | | | |

# Physical Demands

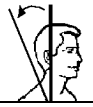
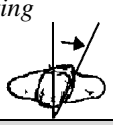
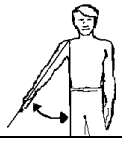
## Whole Body Physical Demands

Identify each of the physical demands required by a Tailer and list the corresponding tasks in the second column. Check off (✓) the estimated *Percent of Shift,* and use the *Comments* section to include information related to duration, frequency, and cycle times.

| Physical Demands | Tasks or Activity | Percent of Shift | | | | Comments |
|---|---|---|---|---|---|---|
| | | Rarely 0 to 5% | Occasionally 6 to 33% | Frequently 34 to 66% | Constantly 67 to 100% | |
| *Example: Standing* | • *All tasks* | | | | ✓ | • *All tasks are performed standing, with some side to side movement*<br>• *Foot pedals are used on a frequent basis* |
| *Walking* | | | | | | |
| *Sitting* | | | | | | |
| *Standing* | | | | | | |
| *Climbing* | | | | | | |
| *Balancing* | | | | | | |
| *Kneeling/ Crouching* | | | | | | |
| *Other:* | | | | | | |

## Body Postures

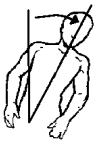
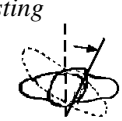
The table below outlines the body postures that may be adopted throughout the shift by a Tailer, related to tasks. Check off (✓) the estimated *Percent of Shift,* and use the *Comments* section to include information describing posture duration, frequency, cycle times, and hand used.

| Body Posture | Task(s) | Percent of Shift | | | | Comments |
|---|---|---|---|---|---|---|
| | | Rarely 0 to 5% | Occasionally 6 to 33% | Frequently 34 to 66% | Constantly 67 to 100% | |
| *Example*<br><br>*Shoulder Flexion* | • *Singulate wood pieces*<br>• *Sort wood*<br>• *Clear jam ups*<br>• *Clean-up duties* | | | ✓ | | • *Flexion is usually coupled with handling wood*<br>• *Frequency of shoulder flexion was observed to be 30 to 40 times per minute*<br>• *Work is generally below shoulder height, but degree of flexion increases for shorter workers* |
| ***Neck*** | | | | | | |
| *Flexion*  | | | | | | |
| *Extension*  | | | | | | |
| *Twisting*  | | | | | | |
| ***Shoulder*** | | | | | | |
| *Flexion*  | | | | | | |
| *Abduction/ adduction*  | | | | | | |
| *Extension*  | | | | | | |

| Body Posture | Task(s) | Percent of Shift | | | | Comments |
|---|---|---|---|---|---|---|
| | | Rarely 0 to 5% | Occasionally 6 to 33% | Frequently 34 to 66% | Constantly 67 to 100% | |
| ***Forearm*** | | | | | | |
| *Rotation*  | | | | | | |
| ***Wrist*** | | | | | | |
| *Wrist Movements*  | | | | | | |
| ***Hand/Fingers*** | | | | | | |
| **Handling* | | | | | | |
| **Fingering* | | | | | | |
| **Gripping* | | | | | | |

## Legend for Hand and Fingers

| | | | | |
|---|---|---|---|---|
| *Handling* | *Grasping, turning, holding, etc.* | | | |
| *Fingering* | *Picking, pinching, etc.* | | | |
| *Gripping* | *Power*  | *Pinch*  | *Hook*  | *Precision*  |

| Body Posture | Task(s) | Percent of Shift | | | | Comments |
|---|---|---|---|---|---|---|
| | | Rarely 0 to 5% | Occasionally 6 to 33% | Frequently 34 to 66% | Constantly 67 to 100% | |
| ***Back*** | | | | | | |
| *Flexion*  | | | | | | |
| *Lateral Flexion*  | | | | | | |
| *Twisting*  | | | | | | |
| *Extension*  | | | | | | |

# Manual Material Handling

The table below contains a list of general manual material handling activities performed by a Tailer. Indicate tasks that require one or more of these activities, and fill in the weight of the objects, or the force required, for each action. Check off (✓) the estimated *Percent of Shift,* and use the *Comments* section to include information related to duration, frequency, cycle times, and characteristics of objects handled. If necessary, please refer to Appendix A to calculate the weight of the wood being handled.

| Activity | Task Description | Weight (kg) | Percent of Shift | | | | Comments |
|---|---|---|---|---|---|---|---|
| | | | Rarely 0 to 5% | Occasionally 6 to 33% | Frequently 34 to 66% | Constantly 67 to 100% | |
| *Pushing* | | | | | | | • *Frequency of manual material handling varies depending on the rate of wood produced by the saw being tailed* |
| *Pulling* | | | | | | | |
| *Lifting* | | | | | | | |
| *Lowering* | | | | | | | |
| *Carrying* | | | | | | | |

## Hand Tools

Indicate the hand tools used by a Tailer by placing a check mark (✓) in the far left column. Determine the weight of the hand tool and enter it in the appropriate column. Check off (✓) the estimated *Percent of Shift,* and use the *Comments* section to include information related to duration, frequency, cycle times, and characteristics of objects handled.

| | Type of Tool | Task(s) | Weight (kg) | Percent of Shift | | | | Comments |
|---|---|---|---|---|---|---|---|---|
| | | | | Rarely 0 to 5% | Occasionally 6 to 33% | Frequently 34 to 66% | Constantly 67 to 100% | |
| | *Pike pole* | • *Singulate wood pieces*<br>• *Clear jam-ups* | *2.0 to 3.9* | | | | | • *Lengths of pike poles vary* |
| | *Picaroon* | • *Clear jam-ups* | *1.8* | | | | | • *Very infrequent use* |
| | *Air hose* | • *Clean up duties* | *2.6* | | | | | • *During down time as needed* |
| | *Chain saw* | • *Clear jam-ups* | *8.7 to 10.3* | | | | | |
| | *Other:* | | | | | | | |
| | | | | | | | | |

# Environmental Conditions

## Work Environment

The table below contains a list of environmental conditions that may be of concern. If any of these factors aggravate the injury, describe in the *Comments* section.

| Factor | Comments |
|---|---|
| **Vibration** *(Indicate source)*<br>☐ Seat<br>☐ Floor<br>☐ Tool<br>☐ Other: _____ | |
| **Noise level** | |
| **Lighting level** | |
| **Other:** | |

## Location of Workstation

The table below contains a list of potential work environments. Indicate with a check mark (✓) in the left column which of the work environments apply to the specific workstation. For example, the workstation may be inside a building with both a local fan and heater, exposed to the outside by a doorway that is always open. In this situation, 'Inside exposed', 'Heater present', and 'Fan present' would all be checked.

| | Work Environment |
|---|---|
| | Outside uncovered |
| | Outside covered |
| | Inside enclosed |
| | Inside exposed |
| | Heater present |
| | Fan present |

## Temperature

The table below contains a list of the geographical regions of British Columbia. Indicate the appropriate region with a check mark (✓) in the left column. Refer to the regional map in Appendix B of the PDA.

| Region | | Avg. Max July/Aug | Avg. Min Dec/Jan | Extreme Max. | Extreme Min. |
|---|---|---|---|---|---|
| | Vancouver Island | 22.5 °C | -0.6 °C | 36.1 °C | -18.8 °C |
| | Southwestern BC | 22.9 °C | 0.4 °C | 35.6 °C | -18.3 °C |
| | Cariboo Chilcotin Coast | 22.2 °C | -11.6 °C | 36.4 °C | -42.5 °C |
| | High Country | 26.3 °C | -9.9 °C | 39.6 °C | -39.7 °C |
| | Okanagan Similkameen | 26.5 °C | -8.4 °C | 36.0 °C | -36.3 °C |
| | Kootenay Country | 26.2 °C | -6.7 °C | 38.5 °C | -32.0 °C |
| | British Columbia Rockies | 24.7 °C | -12.3 °C | 37.5 °C | -42.2 °C |
| | North by Northwest | 19.5 °C | -11.7 °C | 32.9 °C | -38.1 °C |
| | Peace River Alaska Highway | 20.0 °C | -20.2 °C | 34.6 °C | -47.7 °C |

# Personal Protective Equipment

The table below contains a list of the personal protective equipment (PPE). For the Tailer at your mill, indicate with a check mark (✓) which of the PPE items are required.

| | | | | | |
|---|---|---|---|---|---|
| | Gloves<br>Type: | | Hard Hat | | Leather Apron |
| | Glove Liners | | Steel-toed Boots | | Dust Mask |
| | Eye Protection | | Hearing Protection | | Seat Belt |
| | Face Shield/Helmet | | Life Jacket | | Harness |
| | Knee Pads | | Other: | | Other: |

# Appendix A – Weight of Wood Equation

## 1. Type of Wood Handled

The table below contains a list of the types of wood processed in British Columbia. The weight per board foot wet and dry is given for each species. This information will be used in the table in *Section 4* to calculate the weight of the wood handled. Please indicate all of the types of wood processed.

| Wood Handled | | Wet lb./ Board Foot | Dry lb./ Board Foot | Wood Handled | | Wet lb./ Board Foot | Dry lb./ Board Foot |
|---|---|---|---|---|---|---|---|
| | Douglas Fir | 3.60 | 2.83 | | Larch | 3.48 | N/A |
| | Hemlock | 3.42 | 2.49 | | Spruce/Pine/Fir* | 2.95 | 2.18 |
| | Red Cedar | 2.42 | 2.00 | | Alpine Fir | 2.67 | 2.00 |
| | Yellow Cedar | 3.01 | 2.49 | | Lodge Pole Pine | 3.26 | 2.41 |
| | Sitka Spruce | 2.76 | 2.23 | | White Spruce | 2.93 | 2.15 |

*The Spruce/Pine/Fir values are an average of White Spruce, Lodge Pole Pine, and Alpine Fir.

## 2. Size of Wood*

The table below contains a list of different sizes or dimensions of wood. The percentage next to the size of the wood is the multiple used to compare the size of the board to a board foot (1" by 12" by 12"). This multiple will be used in the table in *Section 4* to calculate the weight of wood handled. Please indicate all of the applicable sizes of wood handled at the workstation. Add any other sizes to the bottom of the table if your particular size of wood is not listed.

| 1" Sizes | | Multiple | 2" Sizes | | Multiple | 4" Sizes | | Multiple | 6" Sizes | | Multiple | 8" Sizes | | Multiple |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 by 4 | 0.33 | | 2 by 4 | 0.67 | | 4 by 4 | 1.33 | | 6 by 6 | 3.00 | | 8 by 8 | 5.33 |
| | 1 by 6 | 0.50 | | 2 by 6 | 1.00 | | 4 by 6 | 2.00 | | 6 by 8 | 4.00 | | 8 by 10 | 6.67 |
| | 1 by 8 | 0.67 | | 2 by 8 | 1.33 | | 4 by 8 | 2.67 | | 6 by 10 | 5.00 | | 8 by 12 | 8.00 |
| | 1 by 10 | 0.83 | | 2 by 10 | 1.67 | | 4 by 10 | 3.33 | | 6 by 12 | 6.00 | | | |
| | 1 by 12 | 1.00 | | 2 by 12 | 2.00 | | 4 by 12 | 4.00 | | | | | | |

* Conservative estimates of actual wood dimensions

*If the size of the board is different from those in this table, use this equation to find out the multiple value.*

**[(Dimensions of wood) x 12] / 144 = Multiple**
**For example:** For a 5 by 5 piece of wood [(5x5) x 12]/144 = 2.08

## 3. Length of Wood

The table below contains a list of the common lengths of wood. Please indicate which of these lengths are being handled at this particular workstation. Add additional lengths to the table if necessary. This information will be used in the table in *Section 4*.

| Length of Wood | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 6 foot | | 12 foot | | 18 foot | | 22 foot |
| | 8 foot | | 14 foot | | 20 foot | | 24 foot |
| | 10 foot | | 16 foot | | Other: | | Other: |

## 4. Weight of Wood Equation*

The table below is used to calculate the weight of the boards being handled. The weight is calculated by multiplying the species weight/board foot (*Section 1 value*) by the size of wood multiple (*Section 2 value*) and by the length of wood (*Section 3 value*).

**Example**: For a run of wet Spruce/Pine/Fir, 2" x 4", 16 feet long

**2.95** *(wet lb./ board foot)* x **0.67** *(size of wood multiple for 2" x 4")* x **16** *(length of board in feet)* = **32 lbs**.

For the heaviest species handled, enter the lb./board foot value, the multiple for the largest size of this wood, and the largest length of this wood. Multiply these values together to determine the weight of the board in pounds.

For the most common species handled, enter the lb./board foot value, the multiple for the most common size of wood, and the most common length of this wood. Multiply these values together to determine the weight of the board in pounds.

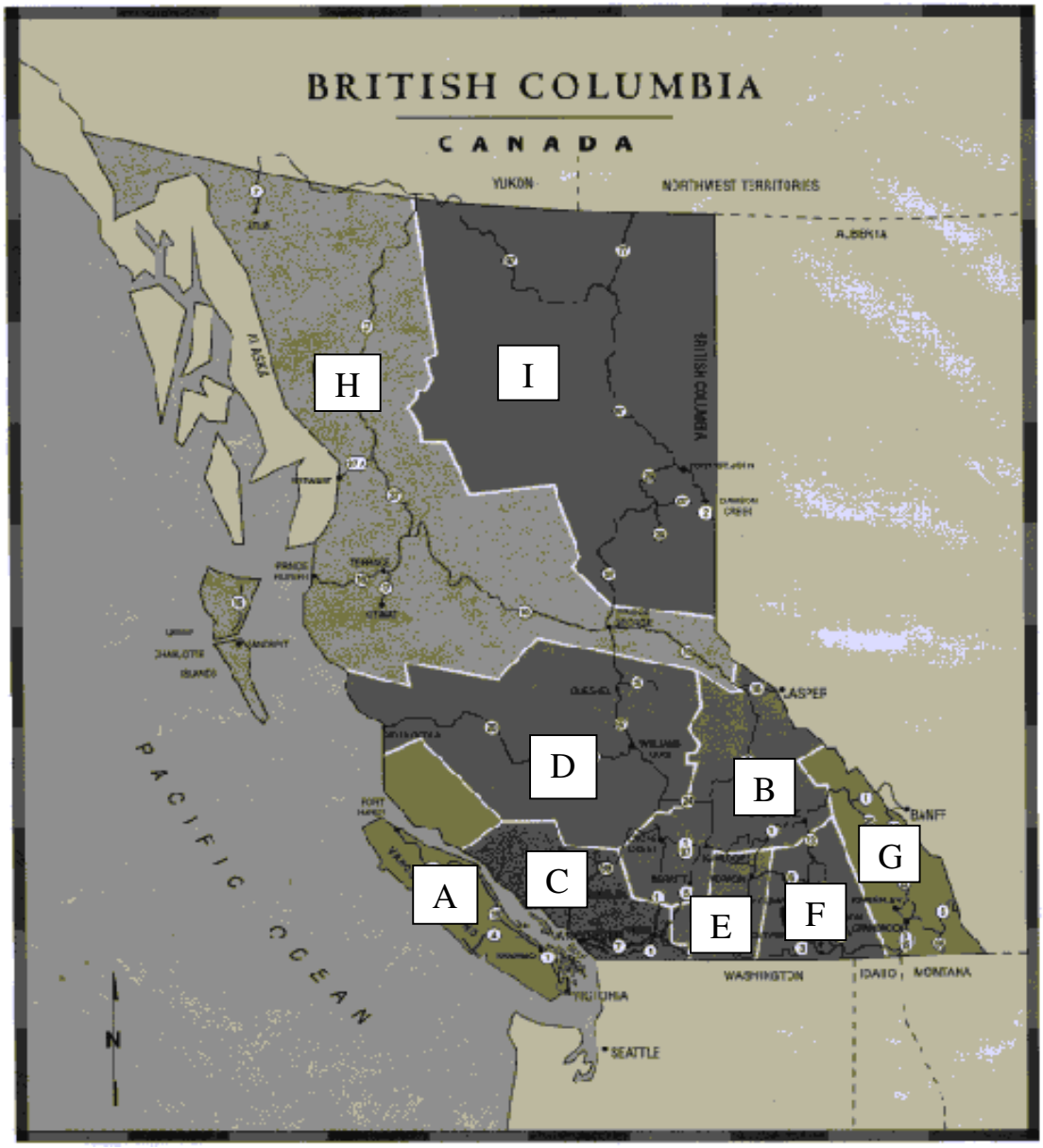
For the lightest species handled, enter the lb./board foot value, the multiple for the smallest size of wood, and the shortest length of this wood. Multiply these values together to determine the weight of the board in pounds.

***If required, divide the pound value by 2.2 to obtain the weight of the board in kilograms.***

| **Type of Wood Handled (lb./ board foot)** *From Section 1* | | **x** | **Multiple (size of wood)** *From Section 2* | **x** | **Length of Wood** *From Section 3* | **=** | **Weight of the Board in pounds** | **Divide by 2.2 to calculate value in kilograms** |
|---|---|---|---|---|---|---|---|---|
| **Heaviest Species Handled** | | x | | x | | = | | |
| **Most Common Species Handled** | | x | | x | | = | | |
| **Lightest Species Handled** | | x | | x | | = | | |

* Weight may vary from the above calculation depending on the cell moisture content of the wood, actual wood dimensions, and wood density.

# Appendix B – Regional Map




| | |
|---|---|
| **A** - Vancouver Island | **F** - Kootenay Country |
| **B** - High Country | **G** - British Columbia Rockies |
| **C** - Southwestern BC | **H** - North by Northwest |
| **D** - Cariboo Chilcotin Coast | **I** - Peace River Alaska Highway |
| **E** - Okanagan Similkameen | |

# Risk Factor Identification Checklist
# Tailer

## Purpose

The Risk Factor Identification Checklist for a Tailer is used to **identify** potential ergonomic risk factors. Keep in mind that the purpose of this checklist is only to **identify** potential ergonomic risk factors, **not** to assess them.

The checklist can be used as part of your ergonomic intervention process, when workers express concerns about their work environment, during regular workplace inspections and observations, or when conducting an accident or injury investigation. Ideally, management and worker representatives who have completed the IMIRP Occupational Health & Safety Committee and Supervisor Ergonomic Training Session should complete this checklist. Try to view different workers in the same occupation when completing the checklist. Some specific examples are given to help answer the questions.

## Instructions

### General

Except for the first two questions, all remaining questions will require an answer with an implied frequency. For appropriate questions indicate with a check mark (✓) whether the answer to the question is 'No' or **'**Yes'. This way you will have a record indicating that all risk factors have been considered in the identification process.

If you indicate 'No', please continue to the next question. If the question refers to a situation which does not exist (e.g., there is no seating available), please indicate 'No' in the appropriate box and continue to the next question.

If your answer is 'Yes', please check the appropriate box and then circle the frequency ('S' for 'Sometimes' or 'O' for 'Often'). If you answer 'Yes – Sometimes', then this risk factor **may be** a potential area of concern. If you answer 'Yes – Often' then there is an increased likelihood that this risk factor **is** an issue. Each mill will be responsible for defining what 'Sometimes' and 'Often' will mean to them. It is important that all people who complete the checklist are consistent in how they determine if a risk factor occurs 'Sometimes' or 'Often'. Use the 'Comments' section to indicate specific tasks, or to make other notes about the direct risk factors.

Since ergonomic risk factors frequently occur in combinations, you may find similar questions in different sections. Answering all questions will ensure that the situations that involve combinations of ergonomic risk factors are identified. It is very important to recognise all risk factors that occur in the work area.

Please note that for some of the questions it will be beneficial to ask the worker for their input. Please take the opportunity to include the operator in the risk factor identification process as much as possible. Videotaping the job of interest and reviewing the checklist in a quiet area with the worker may allow for more discussion.

**Summary Tables**

At the end of each body part section, summarise your findings in the table provided. If any of the direct risk factor sections contain a 'Yes', indicate 'Yes' in the appropriate section of the summary table. Answer the questions referring to injury statistics and discomfort survey findings. If there are only 'No' answers in a direct risk factor section, indicate 'No' in the summary table for that section. Use the summary information to determine how you will use the Work Manual.

# Risk Factor Identification Checklist – Tailer

Management Representative _____

Worker Representative _____

Date _____

Risk Identification completed:

☐ Before implementation of solutions

☐ After implementation of solutions

| Job History | | No | Yes | Comments |
|---|---|---|---|---|
| 1 | Are there records of musculoskeletal injuries or accidents to indicate a risk of musculoskeletal injury? (refer to Worksheet 1 in Implementation Guide) | | | |
| 2 | Are there worker comments to indicate a risk of musculoskeletal injuries? (refer to Worksheet 2 in Implementation Guide) | | | |

**Definitions**

**Force:** Force is the amount of physical effort required by the person to do a task and/or maintain control of tools and equipment. The effort depends on the type of grip, object weight and dimensions, body posture, type of activity, surface of the object, temperature, vibration, duration of the task, and number of repetitions.

**Repetition:** Repetition is defined as similar or the same motions performed repeatedly. The severity of risk depends on the frequency of repetition, speed of the movement or action, the number of muscle groups involved, and the required force. Repetition is influenced by machine or line pacing, incentive programs, piecework, and deadlines.

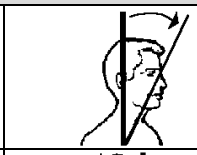
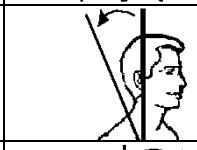
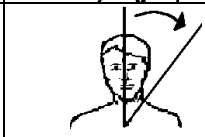
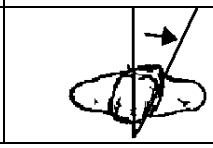
**Static Postures:** Static loading (sustained exertions) is physical effort (body postures) that is held, requiring muscle contraction for more than a short time.

**Contact Stress:** Contact stress is the contact of the body with a hard surface or edge. Contact stress can also result when using a part of the body as a hammer or striking instrument.

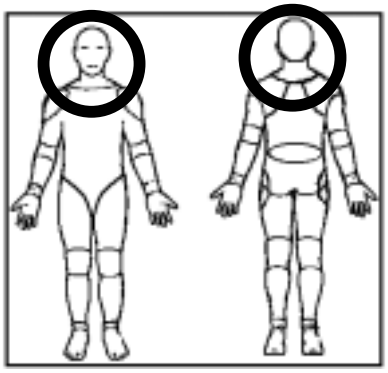
**Awkward Postures:** Awkward postures occur when there is a deviation from a power working posture. Some examples of awkward postures typically include reaching behind, twisting, working overhead, and forward or backward bending.

**Vibration:** Vibration is oscillation of a tool or surface. Vibration can be transmitted through the arm or through the whole body.

## NECK

| Repetition | N | Y | | Comments: |
|---|---|---|---|---|
| Are identical or similar motions performed over and over again? (e.g., looking side to side frequently) | | | S O | |
| Ask the worker: Do you spend a large percentage of the day performing one action or task? (e.g., turning boards, pulling and lifting boards) | | | S O | |
| **Static Posture** | | | | |
| Ask the worker: Do tasks require your neck or shoulders to be maintained in a fixed or static posture? (e.g., working with the arms away from the body when handling boards) | | | S O | |
| **Awkward Posture** | | | | |
| Flexion  | | | S O | |
| Extension  | | | S O | |
| Lateral Bending  | | | S O | |
| Rotation  | | | S O | |

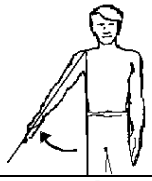
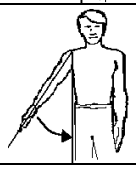
| Please indicate whether the following direct risk factors were identified at the **NECK**. | | |
|---|---|---|
| **Direct Risk Factors** | Repetition | ☐Yes ☐No |
| | Static Posture | ☐Yes ☐No |
| | Awkward Posture | ☐Yes ☐No |
| In the **Injury Statistics** investigation, were there injury reports for the Neck or Head/Eye or Upper Back? (see Worksheet 1 in the Implementation Guide) | | ☐Yes ☐No |
| In the **Discomfort Survey** investigation, were there reports of discomfort for the Neck or Head/Eye or Upper Back? (see Worksheet 2 in the Implementation Guide) | | ☐Yes ☐No |



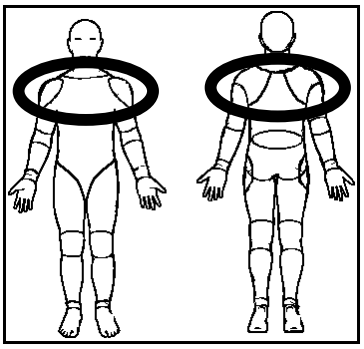
*Body parts within the circled area will be classified as NECK issues.*

## SHOULDER

| **Force** | N | Y | | Comments: |
|---|---|---|---|---|
| Is forceful physical handling performed? Such as: Lifting | | | S O | |
| Lowering | | | S O | |
| Pushing | | | S O | |
| Pulling | | | S O | |
| Carrying | | | S O | |
| **Repetition** | | | | |
| Are identical or similar motions performed over and over again? (e.g., turning boards, pulling boards back) | | | S O | |
| Ask the worker: Do you spend a large percentage of the day performing one action or task? (e.g., sorting and singulating wood) | | | S O | |
| **Static Posture** | | | | |
| Ask the worker: Do tasks require your shoulders to be maintained in a fixed or static posture? (e.g., working with the arms away from the body when handling boards) | | | S O | |
| Ask the worker: Do you hold parts, tools, or objects for long periods? (e.g., holding a pike pole continuously) | | | S O | |

| **Awkward Posture** | | N | Y | | Comments: |
|---|---|---|---|---|---|
| Flexion |  | | | S O | |
| Extension |  | | | S O | |
| Abduction |  | | | S O | |
| Adduction |  | | | S O | |

| Please indicate whether the following direct risk factors were identified at the **SHOULDER**. | | |
|---|---|---|
| **Direct Risk Factors** | Force | ☐Yes ☐No |
| | Repetition | ☐Yes ☐No |
| | Static Posture | ☐Yes ☐No |
| | Awkward Posture | ☐Yes ☐No |
| In the **Injury Statistics** investigation, were there injury reports for the Shoulder or Neck or Upper Back? (see Worksheet 1 in the Implementation Guide) | | ☐Yes ☐No |
| In the **Discomfort Survey** investigation, were there reports of discomfort for the Shoulder or Neck or Upper Back? (see Worksheet 2 in the Implementation Guide) | | ☐Yes ☐No |



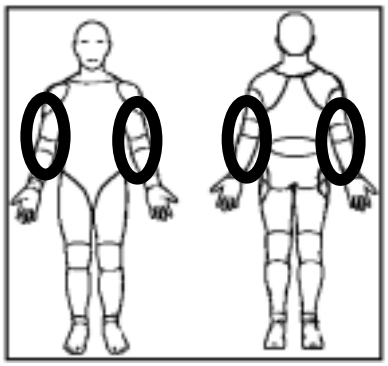
*Body parts within the circled area will be classified as SHOULDER issues.*

## ELBOW

| Force | N | Y | | Comments: |
|---|---|---|---|---|
| Is forceful physical handling performed? Such as:<br>Lifting | | | S<br>O | |
| Lowering | | | S<br>O | |
| Pushing | | | S<br>O | |
| Pulling | | | S<br>O | |
| Carrying | | | S<br>O | |
| Turning materials | | | S<br>O | |
| Are objects handled in a power grip? (e.g., pike pole)  | | | S<br>O | |
| Are objects handled in a pinch grip? (e.g., pieces of lumber)  | | | S<br>O | |
| Are objects handled in a hook grip? (e.g., oil cans)  | | | S<br>O | |
| Ask the worker: Do you wear gloves while performing your job?<br>If the answer is **No**, check the **No** box and go to next section. | | * | S<br>O | |
| *If the answer to the above question is **Yes**, ask the worker:<br>Are the gloves too large/small? | | | S<br>O | |
| Does the thickness of the gloves cause problems with gripping? | | | S<br>O | |
| **Repetition** | | | | |
| Are identical or similar motions performed over and over again? (e.g., turning boards, pulling boards back) | | | S<br>O | |
| Ask the worker: Do you spend a large percentage of the day performing one action or task? (e.g., sorting and singulating wood) | | | S<br>O | |

| **Static Posture** | N | Y | | Comments: |
|---|---|---|---|---|
| Ask the worker: Do tasks require your shoulders to be maintained in a fixed or static posture? (e.g., working with the arms away from the body when handling boards) | | | S<br>O | |
| Ask the worker: Do you apply constant pressure on controls/objects with your hand? (e.g., continuous use of push buttons or joysticks) | | | S<br>O | |
| Ask the worker: Do you hold parts, tools, or objects for long periods? (e.g., holding a pike pole continuously) | | | S<br>O | |
| **Contact Stress** | | | | |
| Ask the worker: Do **any** objects, tools or parts of the workstation put pressure on **any** parts of your hand or arm, such as the backs or sides of fingers, palm or base of the hand, forearm, elbow? (e.g., hand tools that dig into the palm of the hand) | | | S<br>O | |
| **Vibration** | | | | |
| Ask the worker: Is vibration transmitted to your hand through a tool or piece of equipment? (e.g., pneumatic drill) | | | S<br>O | |

| Please indicate whether the following direct risk factors were identified at the **ELBOW**. | | |
|---|---|---|
| **Direct Risk Factors** | Force | ☐Yes ☐No |
| | Repetition | ☐Yes ☐No |
| | Static Posture | ☐Yes ☐No |
| | Contact Stress | ☐Yes ☐No |
| | Vibration | ☐Yes ☐No |
| In the **Injury Statistics** investigation, were there injury reports for the Elbow or Forearm? (see Worksheet 1 in the Implementation Guide) | | ☐Yes ☐No |
| In the **Discomfort Survey** investigation, were there reports of discomfort for the Elbow or Forearm? (see Worksheet 2 in the Implementation Guide) | | ☐Yes ☐No |



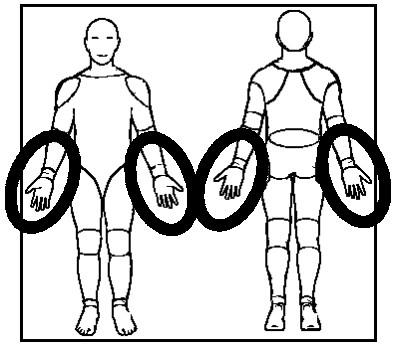
*Body parts within the circled area will be classified as ELBOW issues.*

## WRIST/HAND

| **Force** | N | Y | | Comments: |
|---|---|---|---|---|
| Is forceful physical handling performed? Such as:<br>Lifting | | | S<br>O | |
| Lowering | | | S<br>O | |
| Pushing | | | S<br>O | |
| Pulling | | | S<br>O | |
| Carrying | | | S<br>O | |
| Turning materials | | | S<br>O | |
| Are objects handled in a power grip? (e.g., pike pole)  | | | S<br>O | |
| Are objects handled in a pinch grip? (e.g., pieces of lumber)  | | | S<br>O | |
| Are objects handled in a hook grip?<br>(e.g., oil cans)  | | | S<br>O | |
| Ask the worker: Do you wear gloves while performing your job?<br>If the answer is **No**, check the **No** box and go to next section. | | * | S<br>O | |
| *If the answer to the above question is **Yes**, ask the worker:<br>Are the gloves too large/small? | | | S<br>O | |
| Does the thickness of the gloves cause problems with gripping? | | | S<br>O | |
| **Repetition** | | | | |
| Are identical or similar motions performed over and over again? (e.g., turning boards, pulling boards back) | | | S<br>O | |
| Ask the worker: Do you spend a large percentage of the day performing one action or task? (e.g., sorting and singulating wood) | | | S<br>O | |

| **Static Posture** | N | Y | | Comments: |
|---|---|---|---|---|
| Ask the worker: Do tasks require your shoulders to be maintained in a fixed or static posture? (e.g., working with the arms away from the body when handling boards) | | | S<br>O | |
| Ask the worker: Do you apply constant pressure on controls/objects with your hand? (e.g., continuous use of push buttons or joysticks) | | | S<br>O | |
| Ask the worker: Do you hold parts, tools, or objects for long periods? (e.g., holding a pike pole continuously) | | | S<br>O | |
| **Contact Stress** | | | | |
| Ask the worker: Do **<u>any</u>** objects, tools or parts of the workstation put pressure on **<u>any</u>** parts of your hand or arm, such as the backs or sides of fingers, palm or base of the hand, forearm? (e.g., hand tools that dig into the palm of the hand) | | | S<br>O | |
| Ask the worker: Do you use your hand like a hammer for striking? (e.g., while unjamming wood stuck in a drop gate) | | | S<br>O | |
| **Awkward Posture** | | | | |
| Flexion  | | | S<br>O | |
| Extension  | | | S<br>O | |
| Ulnar Deviation  | | | S<br>O | |
| Radial Deviation  | | | S<br>O | |
| **Vibration** | | | | |
| Ask the worker: Is vibration transmitted to your hand through a tool or piece of equipment? (e.g., pneumatic drill) | | | S<br>O | |

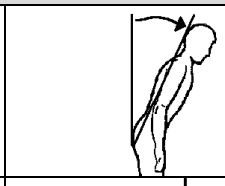
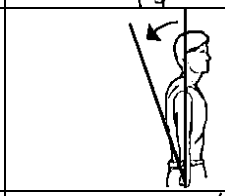
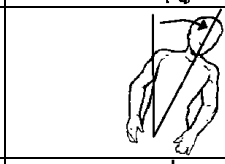
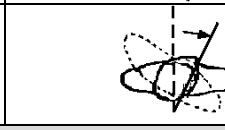
| Please indicate whether the following direct risk factors were identified at the **WRIST/HAND**. | | |
|---|---|---|
| **Direct Risk Factors** | Force | ☐Yes ☐No |
| | Repetition | ☐Yes ☐No |
| | Static Posture | ☐Yes ☐No |
| | Contact Stress | ☐Yes ☐No |
| | Awkward Posture | ☐Yes ☐No |
| | Vibration | ☐Yes ☐No |
| In the **Injury Statistics** investigation, were there injury reports for the Wrist or Hand/Finger or Forearm? (see Worksheet 1 in the Implementation Guide) | | ☐Yes ☐No |
| In the **Discomfort Survey** investigation, were there reports of discomfort for the Wrist or Hand/Finger or Forearm? (see Worksheet 2 in the Implementation Guide) | | ☐Yes ☐No |



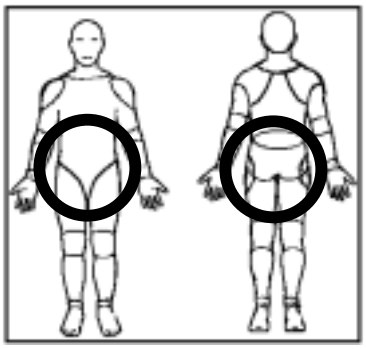
*Body parts within the circled area will be classified as WRIST issues.*

## LOW BACK OR HIP/THIGH

| **Force** | N | Y | | Comments: |
|---|---|---|---|---|
| Is forceful physical handling performed? Such as:<br>Lifting | | | S<br>O | |
| Lowering | | | S<br>O | |
| Pushing | | | S<br>O | |
| Pulling | | | S<br>O | |
| Carrying | | | S<br>O | |
| **Repetition** | | | | |
| Are identical or similar motions performed over and over again? (e.g. bending to lift and handle boards) | | | S<br>O | |
| Ask the worker: Do you spend a large percentage of the day performing one action or task? (e.g., sorting and singulating wood) | | | S<br>O | |
| **Static Posture** | | | | |
| Ask the worker: Do tasks require your trunk and upper body to be maintained in a fixed or static posture?<br>(e.g., bending forward while singulating and sorting wood) | | | S<br>O | |
| Are workers required to sit or stand in a stationary position for long periods of time during the shift?<br>(e.g., standing in one spot with no walking or side to side movement) | | | S<br>O | |
| **Contact Stress** | | | | |
| Ask the worker: Do **any** objects, tools or parts of the workstation put pressure on **any** parts of your hip/thigh? (e.g., conveyors that dig into the hip or thigh) | | | S<br>O | |

| **Awkward Posture** | | N | Y | | Comments: |
|---|---|---|---|---|---|
| Flexion |  | | | S O | |
| Extension |  | | | S O | |
| Lateral Bending |  | | | S O | |
| Twisting |  | | | S O | |
| **Vibration** | | | | | |
| Ask the worker: Is your whole body exposed to vibration for significant portions of the work shift? | | | | S O | |

| Please indicate whether the following direct risk factors were identified at the **LOW BACK or HIP/THIGH**. | | |
|---|---|---|
| **Direct Risk Factors** | Force | ☐Yes ☐No |
| | Repetition | ☐Yes ☐No |
| | Static Posture | ☐Yes ☐No |
| | Contact Stress | ☐Yes ☐No |
| | Awkward Posture | ☐Yes ☐No |
| | Vibration | ☐Yes ☐No |
| In the **Injury Statistics** investigation, were there injury reports for the Low Back or Hip/Thigh? (see Worksheet 1 in the Implementation Guide) | | ☐Yes ☐No |
| In the **Discomfort Survey** investigation, were there reports of discomfort for the Low Back or Hip/Thigh? (see Worksheet 2 in the Implementation Guide) | | ☐Yes ☐No |

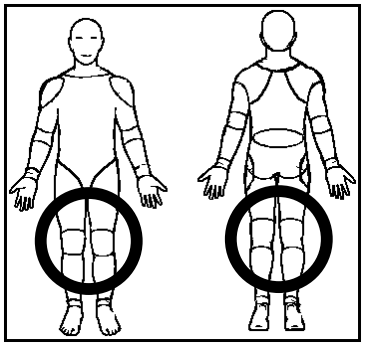


*Body parts within the circled area will be classified as LOW BACK issues.*

# KNEE

| **Repetition** | N | Y | | Comments: |
|---|---|---|---|---|
| Are identical or similar motions performed over and over again? (e.g., climbing stairs, crouching) | | | S O | |
| **Static Posture** | | | | |
| Ask the worker: Do tasks require you to maintain your knee(s) in a fixed or static posture? (e.g., kneeling for long periods) | | | S O | |
| Are workers required to sit or stand in a stationary position for long periods of time during the shift? (e.g., standing in one spot with no walking or side to side movement) | | | S O | |
| Do workers kneel (with one or both knees)? | | | S O | |
| **Contact Stress** | | | | |
| Ask the worker: Do **any** objects or parts of the workstation put pressure on your knee(s)? (e.g., kneeling on a catwalk) | | | S O | |
| **Awkward Posture** | | | | |
| Extreme Flexion  | | | S O | |

| Please indicate whether the following direct risk factors were identified at the **KNEE**. | | |
|---|---|---|
| **Direct Risk Factors** | Repetition | ☐Yes ☐No |
| | Static Posture | ☐Yes ☐No |
| | Contact Stress | ☐Yes ☐No |
| | Awkward Posture | ☐Yes ☐No |
| In the **Injury Statistics** investigation, were there injury reports for the Knee or Hip/Thigh? (see Worksheet 1 in the Implementation Guide) | | ☐Yes ☐No |
| In the **Discomfort Survey** investigation, were there reports of discomfort for the Knee or Hip/Thigh? (see Worksheet 2 in the Implementation Guide) | | ☐Yes ☐No |

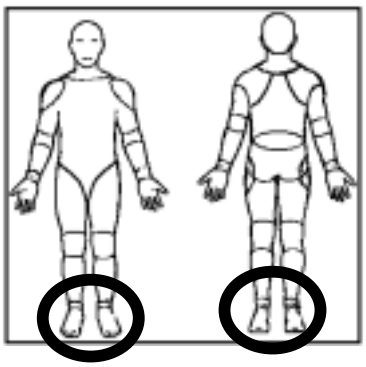


*Body parts within the circled area will be classified as KNEE issues.*

## ANKLE/FOOT

| **Repetition** | N | Y | | Comments: |
|---|---|---|---|---|
| Are identical or similar motions performed over and over again? (e.g., frequent foot pedal use) | | | S<br>O | |
| **Static Posture** | | | | |
| Are workers required to stand in a stationary position for long periods of time during the shift? (e.g., standing in one spot with no walking or side to side movement) | | | S<br>O | |
| **Awkward Posture** | | | | |
| Flexion  | | | S<br>O | |
| Extension  | | | S<br>O | |
| **Vibration** | | | | |
| Ask the worker: Is your whole body exposed to vibration for significant portions of the work shift? (e.g., standing on catwalks) | | | S<br>O | |

| Please indicate whether the following direct risk factors were identified at the **ANKLE/FOOT**. | | |
|---|---|---|
| **Direct Risk Factors** | Repetition | ☐Yes ☐No |
| | Static Posture | ☐Yes ☐No |
| | Awkward Posture | ☐Yes ☐No |
| | Vibration | ☐Yes ☐No |
| In the **Injury Statistics** investigation, were there injury reports for the Ankle or Foot? (see Worksheet 1 in the Implementation Guide) | | ☐Yes ☐No |
| In the **Discomfort Survey** investigation, were there reports of discomfort for the Ankle or Foot? (see Worksheet 2 in the Implementation Guide) | | ☐Yes ☐No |



*Body parts within the circled area will be classified as ANKLE/FOOT issues.*

## CHARACTERISTICS OF OBJECTS BEING HANDLED

| | N | Y | | Comments: |
|---|---|---|---|---|
| Are there problems handling a load due to its size or shape? (e.g., large cants, long, heavy boards) | | | S<br>O | |
| Are there problems handling a load due to its fragile, unbalanced, or non-rigid conditions? (e.g., large containers of liquid) | | | S<br>O | |
| Ask the worker: Do you experience situations where mechanical aids or equipment (e.g., hoists) are not readily available to assist with manipulating an object? | | | S<br>O | |
| Are handles for tools and equipment inappropriate in terms of size or shape? (e.g., hand tools) | | | S<br>O | |
| Ask the worker: Do any objects that you work with (other than tools or equipment) have handles? If the answer is **No**, check the **No** box and go to the next section. | | | S<br>O | |
| If the answer to the above question is **Yes**, ask the worker: Are the handles an inappropriate size or shape for the characteristics of the object? | | | S<br>O | |

## ENVIRONMENTAL CONDITIONS

| **Temperature** | | | | |
|---|---|---|---|---|
| Ask the worker: Are your hands or arms exposed to cold from exhaust air, cold liquids or solids? (e.g., wet gloves due to handling wet wood) | | | S<br>O | |
| Ask the worker: Are you exposed directly to temperature extremes that may cause you to use more force or cause you to fatigue quicker than normal? (e.g., hot or cold, either by equipment or natural environment) | | | S<br>O | |
| **Lighting** | | | | |
| Ask the worker: Do you assume awkward postures to overcome problems associated with glare, inadequate lighting, or poor visibility? | | | S<br>O | |

## ENVIRONMENTAL CONDITIONS [CONTINUED]

| **Noise** | N | Y | | Comments: |
|---|---|---|---|---|
| Have there been complaints on the level of noise in the work area? | | | S<br>O | |
| Ask the worker: Are there any distracting or annoying noises at the workstation? (e.g., air hoses) | | | S<br>O | |

## WORK ORGANISATION

| | N | Y | | Comments: |
|---|---|---|---|---|
| Is the work externally-paced or controlled by a machine or the process? (e.g., work pace controlled by speed of transfer deck) | | | S<br>O | |
| Do peak workloads or sudden increases in pace occur with the tasks? (e.g., sudden increase in the amount of wood coming into the workstation) | | | S<br>O | |
| Ask the worker: Are there indications of excessive fatigue or pain, or symptoms of adverse health effects due to extended work days or overtime? | | | S<br>O | |
| Ask the worker: Are there indications of excessive fatigue or adverse health effects due to shiftwork? | | | S<br>O | |
| Ask the worker: Are rest periods or task variety insufficient to prevent the build-up of fatigue or the risk of adverse health effects? | | | S<br>O | |
| Ask the worker: Are tasks in a job rotation program similar to one another, and therefore not providing a variation in movements? | | | S<br>O | |

# Work Manual

**I**ndustrial
**M**usculoskeletal
**I**njury
**R**eduction
**P**rogram

# Tailer

This Work Manual contains information about the body parts found to be at risk of musculoskeletal injury (MSI) for the Tailer (Injury Education), and how to reduce the risk of MSIs using various control measures (Injury Prevention). Each Work Manual is intended to help Occupational Health and Safety Committee members establish effective solutions to reduce MSIs, and as a resource for workers to understand the MSI risks that they may encounter on the job.

The Body Manual, referenced throughout the Work Manual, is a separate document that contains information on how to prevent common MSIs through exercise. Please note exercises described in the Body Manual should only be used after consulting a healthcare practitioner.

The General Risk Factor Solutions Manual, referenced throughout the Work Manual, is a separate document that contains general, preventative information on Environmental Conditions and Work Organisation issues.

# Work Manual

# Tailer

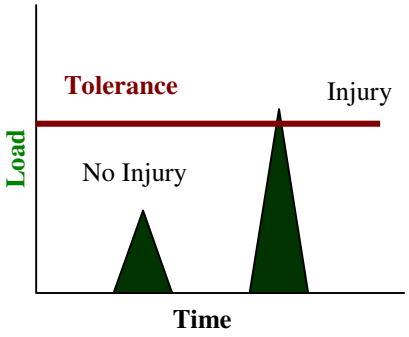
**Disclaimer**

*The BC sawmill IMIRP documents were developed by Advanced Ergonomics Inc. (AEI) based on analyses conducted in a number of voluntary, participating sawmills in British Columbia and should be considered applicable only to the BC sawmill industry. Modification to these documents may reduce their usefulness and/or lead to hazardous situations. Individuals or committees wishing to make Physical Demands Analyses (PDAs) site-specific, or wishing to implement options from the Work Manuals, are advised to first complete the two-day OHSC and Supervisors Ergonomics Training Session. Modifications to a PDA must be within the scope of competence of those individuals making the changes and must be reported to any rehabilitation professional using the PDA. Neither AEI nor the IMIRP Society accepts any responsibility for the use or misuse of these documents.*

# WM Table of Contents

# Injury Education

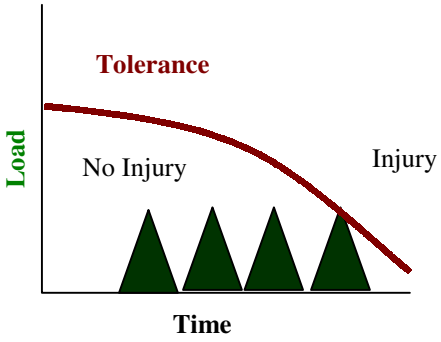
*Injuries occur when …*
*Loads exceed tissue tolerances*




## *Excessive Force*

This type of injury occurs from a single event, where the loads or forces are so great they exceed tissue tolerances and cause an immediate injury. This type of injury is more common with trips and falls.

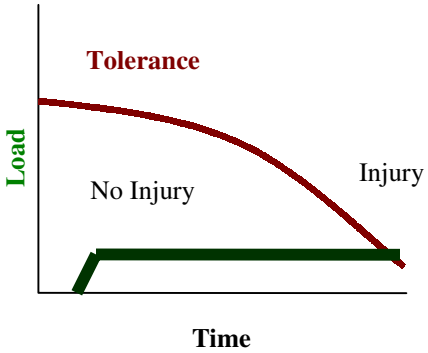
***Example – a worker going over on their ankle and spraining it.***




## *Excessive Repetition*

This type of injury occurs from repeated loading weakening tissue to the point of failure. It progresses slowly to the point where a subfailure load can cause an injury. This type of injury is more common with repetitive tasks.

***Example – a worker pulling lumber off a chain developing a herniated disc.***




## *Excessive Duration*

This type of injury occurs from constant loading weakening tissue to the point of failure. This type of injury is more common with tasks that require workers to adopt static or awkward postures for extended periods.

***Example – a Grader developing neck tension.***

# Body Parts at Risk

The previous page on injury education explains how injuries can occur. The Injury Education section of this Work Manual expands on these principles, relating them to the specific body parts at risk of being injured.

After all of the appropriate information is collected during the investigation of the Tailer job (i.e., injury statistics, discomfort surveys, results from the Identification Checklist), the next steps are to:

1. Match the body parts of concern from your investigation to those described in this section of the Work Manual.

2. Note the direct risk factors associated with each body part of concern.

3. Read the information on the page and try to understand why a body part, in combination with each of the direct risk factors, is of concern.

4. Discover which indirect risk factors are associated with a particular body part problem and the headings under which they are found in the Injury Prevention section of the Work Manual.

5. Note the consequences of the direct risk factor relative to a body part.

6. Note where the potential solutions can be found within the Injury Prevention section of the Work Manual. In addition, for many of the body parts, a reference may be provided to refer to specific sections of the Body Manual.

At the end of the Body Parts at Risk Section, there is a summary page of all the body parts of concern for the Tailer. In addition, a reference table, with a summary of the direct and indirect risk factors by body part, is provided.

In the last section on Injury Prevention, the Work Manual discusses specific solution options for each of the body parts at risk.

# Note on the Tailer

The IMIRP ergonomists have found that there are three distinctly different workstation designs for the Tailer job:

Tailer #1

Tailer #2

Tailer #3

Tailer #1 manually singulates and sorts wood on a transfer chain, usually stands for the duration of the shift with some side to side movement, and operates controls occasionally. Most Tailers observed have this type of workstation.

Tailer #2 singulates and sorts wood with a hand tool (e.g., pike pole), walks more frequently throughout the shift, and operates controls occasionally. This workstation is very similar to the Headrig Tailsawyer. If the Tailer at your mill fits the description of Tailer #2, please refer to the **Headrig Tailsawyer** Tool Kit.

Tailer #3 sorts wood along a transfer chain while seated, and operates controls continuously throughout the shift to achieve this task. Manual handling of wood occurs infrequently. This workstation is very similar to that of the Booth Operator. If the Tailer at your mill fits the description of Tailer #3, please refer to the **Booth Operator** Tool Kit.

PLEASE NOTE that information contained in the **Tailer** Tool Kit, corresponds to Tailer #1 workstation design.

# Major Risk Identification

IMIRP ergonomists have assessed the Tailer position and found that the neck/shoulder, and back are the body parts of major concern while performing their duties. Focussing on solutions that target the areas of major concern will likely reduce the greatest risks associated with this job.

**Neck/Shoulder**: Major risks include working repetitively with the arms away from the body while sorting lumber and discarding waste wood. Other tasks that may contribute to injury/discomfort include reaching behind the body to operate controls, and turning the neck frequently to monitor lumber on the transfer deck.

The following solutions are targeted at reducing the risk of injury to the neck/shoulder:

1. Place control panel in front of or beside worker (page 78)
2. Height of transfer deck (page 79)
3. Platform (page 79)
4. Have an extra Tailer during peak work loads (page 86)
5. Manual material handling (page 86)

**Back**: Tasks that contribute to risk of injury/discomfort to the back include bending forward repeatedly when sorting and handling lumber, discarding waste wood, and unjamming conveyors.

The following solutions are targeted at reducing the risk of injury to the back:

1. Standing work (page 77)
2. Height of transfer deck (page 79)
3. Platform (page 79)
4. Moveable foot pedals (page 82)
5. Have an extra Tailer during peak work loads (page 86)
6. Manual material handling (page 86)

**Elbow/Wrist**: Major risks include gripping lumber repeatedly, and using the forearm muscles to turn lumber when handling boards and discarding waste wood The following solutions are targeted at reducing the risk of injury to elbow/wrist:

1. Height of transfer deck (page 79)
2. Platform (page 79)
3. Have an extra Tailer during peak work loads (page 86)

For stretching and strengthening exercises that would benefit a Tailer, refer to the Neck, Shoulder and Back sections of the Body Manual.

# NECK

**Direct Risk Factors:**
Repetition
Awkward Postures

**A Tailer may look to the side frequently to monitor lumber coming to the workstation.**

## BACKGROUND INFORMATION

- A number of smaller muscles around the neck produce the forces necessary to support and move the head. These muscles remain relatively relaxed when the head is balanced over the spine (neutral posture). The neutral posture occurs when the head is upright and the ears and shoulders are aligned.

## DIRECT RISK FACTORS

### *Repetition*

- When the head is repeatedly turned to the side, the muscles of the neck are subjected to repeated stress with little time for recovery. If the repetitive stress is excessive, and recovery is not adequate, the tissues can fatigue to the point of injury.

### *Awkward Postures*

- Neck muscles are required to turn the head to the side. The further the head is turned to the side, the greater the load on the muscles and tendons.

## INDIRECT RISK FACTORS

### *Workstation Design*

**Additional Workstation Design Options**

- Loading on neck tissues is increased because the orientation of the worker with respect to workstation (infeed, outfeed, location of mirrors and monitors) requires the operator to repeatedly twist the neck in order to monitor the work area.

### *Work Organisation*

**Task Variability**

- Loading on the neck tissues is increased when work being performed at the same workstation with little task variability.

## CONSEQUENCES

- When the head is held in a twisted posture, muscles and soft tissues of the neck may fatigue. Fatigue leads to an accumulation of waste products and/or a decrease in the ability to tolerate additional stress.
- Signs and symptoms include pain, tenderness, muscle spasm in the neck area, and headaches.

## SUGGESTED SOLUTIONS

- For specific solutions that may prevent injuries to the Neck, please see the column labelled "Neck" in the Summary of Solutions on pages 89 & 90.
- For exercises that can help to prevent ***neck*** injuries, see the ***Neck section of the Body Manual.***

**Direct Risk Factors:**
Force
Repetition
Awkward Postures

# NECK/SHOULDER

**A Tailer may work repetitively with the arms away from the body while sorting lumber, discarding waste wood, and operating controls.**

## BACKGROUND INFORMATION

- The shoulder joint is designed for mobility. The joint is held together by muscles and soft tissues. The larger muscle groups around the shoulder are responsible for producing movement (e.g., deltoids). The deeper muscles stabilise the shoulder joint as well as produce movement. These deeper muscles and their tendons are referred to as the rotator cuff.

- The neck and shoulder regions may also work together to produce certain movements, especially when the shoulder muscles are too tired to work alone. The larger muscles of the neck and upper back (e.g., trapezius) elevate the shoulders, and the larger muscles of the shoulders (e.g., deltoids) raise the arms.

## DIRECT RISK FACTORS

### *Force*

- The rotator cuff stabilises the shoulder joint when lumber is pushed, pulled, and manipulated. The heavier the object, or the larger the force required, the greater the load on the rotator cuff.
- If the force placed on the rotator cuff exceeds the tissue tolerances, injury may occur.

### *Repetition*

- When the arms are repeatedly lifted, the muscles of the neck and shoulder are subjected to repeated stress with little or no time for recovery. If the repetitive stress is excessive, and recovery is not adequate, the tissues may fatigue to the point of injury.

### *Awkward Postures*

- Neck and shoulder muscles must support the weight of the arms when they are away from the body. The farther away the arms are from the body, the greater the load on the muscles and tendons.

## INDIRECT RISK FACTORS

### *Workstation Design*

**Working Reaches**

- Loading on the neck and shoulder tissues is increased if controls being used are at a large or awkward reach distance. Operating a control panel that is located behind the operator is one common example of awkward working reach, since reaching behind (shoulder extension) is outside the natural range of motion for the shoulder.

**Working Heights**

- Loading on the neck and shoulder tissues is increased if the transfer deck is too high. The higher the work surface, the more the arms need to be raised and the shoulders elevated in order to turn, push, and pull lumber.

### *Work Organisation*

**Task Variability**

- Loading on the neck and shoulder tissues is increased due to work being performed at the same workstation with little task variability.

## CONSEQUENCES

- When using the arms to push, pull, and manipulate lumber, the muscles of the neck and shoulder may fatigue. Fatigue leads to an accumulation of waste products and/or a decrease in the ability to tolerate additional stress.
- Stressing a fatigued shoulder may lead to degeneration or injury in the rotator cuff muscles of the shoulder joint.
- Signs and symptoms include pain, tenderness, and decreased range of motion and strength in the shoulder joint.

## SUGGESTED SOLUTIONS

- For specific solutions that may prevent injuries to the Neck and Shoulder, please see the columns labelled "Neck" and "Shoulder" in the Summary of Solutions on pages 89 & 90.
- For exercises that can help to prevent ***neck*** and ***shoulder*** injuries, see the ***Neck*** and ***Shoulder sections of the Body Manual.***

# ELBOW/WRIST

**Direct Risk Factors:**
Force
Repetition
Awkward Postures

**A Tailer may grip repeatedly, and use forearm muscles to turn pieces and discard waste wood.**

## BACKGROUND INFORMATION

- Muscles used for gripping are found in the forearm. The tendons of these muscles cross over the elbow and the wrist joints before connecting to bones. The elbow area may be affected by tension generated in the forearm muscles.

## DIRECT RISK FACTORS

### *Force*

- Gripping an object requires activation of the forearm muscles, which generates tension at the tendon/bone connection of the elbow. The harder that an object must be gripped, the greater the load on the tendon/bone connection.

### *Repetition*

- Repeated stress to the elbow without adequate rest could slowly fatigue tissues to the point of injury.

### *Awkward Postures*

- The position of the wrist affects how much muscle tension needs to be generated. There is an optimal wrist position where the forearm muscles work efficiently. This occurs when the wrist is in its natural relaxed (neutral) position. Bending the wrist forward or backward deviates from this position, and the forearm muscles have to work harder to maintain the grip. Consequently, gripping objects with the wrist bent increases the tension generated by muscles, and could lead to tissue fatigue at the tendon/bone connection.

## INDIRECT RISK FACTORS

### *Characteristics of Objects Being Handled*

**Size and Shape**

- Loading on the elbow/wrist increases when wide objects must be gripped. The width of an object affects how much muscle tension needs to be generated. There is an optimal grip width where the forearm muscles work efficiently. Outside this width, muscles have to work harder to generate equivalent tension. Consequently, objects that are too large (e.g., large cuts of wood) could increase the tension generated by muscles, and lead to tissue fatigue at the tendon/bone connection.

**Load Condition and Weight Distribution**

- The further away an object is from the operator, the more force required to manipulate the object in some directions. Therefore, the longer the piece of wood, the heavier it can seem to the operator.

### *Work Organisation*

**Task Variability**

- Loading and movements (e.g., gripping and handling lumber) of the elbow/wrist tissues is increased due to the same task being performed with little task variability throughout the entire shift.

## CONSEQUENCES

- Repeated forceful gripping may lead to fatigue at the tendon/bone connection near the elbow.
- Signs and symptoms include pain in the elbow area and decreased grip strength.

## SUGGESTED SOLUTIONS

- For specific solutions that may prevent injuries to the Elbow/Wrist, please see the column labelled "Elbow/Wrist" in the Summary of Solutions on pages 89 & 90.
- For exercises that can help to prevent ***elbow*** injuries, see the ***Elbow section of the Body Manual.***

# LOW BACK

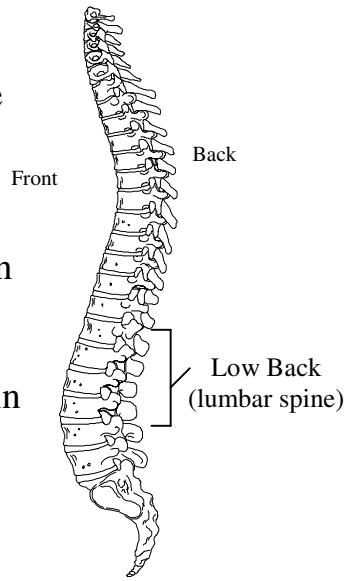
**Direct Risk Factors:**
Force
Repetition
Awkward Postures

**A Tailer may bend forward repeatedly when sorting and handling lumber, manually transferring boards, and clearing jam-ups**.

## BACKGROUND INFORMATION

- The spine is made up of 33 bones called vertebrae. Each of these vertebrae is specially designed to protect the spinal cord and provide support for the back. Between each of the vertebrae are discs. Discs have tough elastic walls that are filled with a watery gel-like substance. These discs are like jelly donuts; when they are pressed down on one side, the other side bulges and puts increased pressure on the wall of the disc. To maintain an even distribution of pressure across the discs, the spine has to be kept in the neutral posture.

*Neutral Spine*



## DIRECT RISK FACTORS

### *Force*

- Lifting increases the loading on the spine. Weight held in the hands is transmitted to the low back. The greater the weight, the greater the loading on the structures of the low back.

### *Repetition*

- Repeated forward bending and lifting can gradually fatigue the structures of the low back. If the repetitive stress is excessive, and recovery is not adequate, the disc walls may fatigue to the point of injury.

### *Awkward Postures*

- Back muscles must support the weight of the upper body when leaning forward. Increased bending of the back increases the loading on the spine and increases the pressure on the walls of the discs.

## INDIRECT RISK FACTORS

### *Workstation Design*

**Working Heights**

- Loading on the back muscles is increased if the transfer deck is too low for the operator. The lower the work surface, the more the worker needs to bend to handle lumber.

### *Work Organisation*

**Task Variability**

- Loading and movements (e.g., bending to sort lumber) of the back muscles is increased due to the same tasks being performed with little task variability throughout the entire shift.

## CONSEQUENCES

- Repeated forward bending may lead to damage in the disc walls.
- Signs and symptoms may include muscle spasm and sharp or radiating pain in the back and/or lower extremities.

## SUGGESTED SOLUTIONS

- For specific solutions that may prevent injuries to the Back, please see the column labelled “Back” in the Summary of Solutions on pages 89 & 90.
- For exercises that can help to prevent ***back*** injuries, see the ***Back section of the Body Manual.***

# ANKLE/FOOT

**Direct Risk Factors:**
Repetition
Awkward Postures

**A Tailer may activate foot pedals frequently while sorting lumber.**

## BACKGROUND INFORMATION

- The muscle responsible for pulling the foot upwards is found in the front of the shin. Its tendon runs beneath thick bands at the ankle before attaching to the foot bones.
- There are a number of small muscles in the base of the foot, as well as a tough band that attaches to the heel bone and runs down towards the toes. This band is called the plantar fascia, and it contributes to the arch in our feet.

## DIRECT RISK FACTORS

### *Repetition*

- Repetitive use of foot pedals may gradually cause small tears in the muscle on the front of the shin. If the repetitive stress is excessive, and recovery is not adequate, the small tears in the muscle on the front of the shin may progress to a more significant problem.
- Repetitive use of foot pedals can cause tissue in the foot to deform and breakdown over time. If the tissue deformation is excessive and recovery not adequate, an injury may occur.

### *Awkward Postures*

- Lifting the foot to activate a foot pedal puts the ankle into an awkward posture, which increases the loading in the muscle on the front of the shin. The further away from the neutral posture the ankle is, the greater the loading to this muscle. If the shoes worn are rigid or heavy, the loading is also increased.
- Pressing down on a foot pedal while the ankle is bent leads to increased loading on the plantar fascia.

## INDIRECT RISK FACTORS

### *Workstation Design*

**Working Heights**

- Loading on the plantar fascia is increased because the height of the foot pedals requires a Tailer to repeatedly activate foot pedals with the ankle bent.

## CONSEQUENCES

- Repeated use of foot pedals can cause damage to the tissues in the shin.
- Signs and symptoms include inflammation, and pain with walking.

## SUGGESTED SOLUTIONS

- For specific solutions that may prevent injuries to the Ankle/Foot, please see the columns labelled “Ankle” and “Foot” in the Summary of Solutions on pages 89 & 90.

# FOOT

**Direct Risk Factors:**
Static Postures
Vibration

**A Tailer may stand on a hard, vibrating surface continuously throughout the shift.**

## BACKGROUND INFORMATION

- There are a number of small muscles in the base of the foot, as well as a tough band that attaches to the heel bone and runs down towards the toes. This band is called the plantar fascia, and is responsible for producing the arch in our feet.

## DIRECT RISK FACTORS

### *Static Postures*

- While standing, the weight of the body loads the plantar fascia. If the duration of standing is excessive, and recovery is not adequate, the fascia may deform to the point of injury.

### *Vibration (whole body)*

- Vibrating floors can increase the loading on the foot. Factors like vibration level and vibration frequency increase the amount of loading on the foot, and could lead to irritation. The longer the Tailer is exposed to vibration, the greater the risk of injury.

## INDIRECT RISK FACTORS

### *Workstation Design*

**Floor Surfaces**

- Loading on the foot is increased when floor surfaces are rigid with no shock absorption. This can add to the effect of static postures.

### *Work Organisation*

**Task Variability**

- Loading on the foot is increased due to little task variability. Because the Tailer works at one workstation, the same movements (e.g., standing, walking) are repeated throughout the entire shift.

## CONSEQUENCES

- Continual standing may cause damage to the plantar fascia.
- Signs and symptoms include pain and stiffness at the base of the heel, initially in the morning. As problems progress the pain may become chronic.

## SUGGESTED SOLUTIONS

- For specific solutions that may prevent injuries to the Foot, please see the column labelled "Ankle/Foot" in the Summary of Solutions on pages 89 & 90.
- For exercises that can help to prevent ***foot*** injuries, see the ***Foot section of the Body Manual.***

# Summary of Body Parts at Risk

## NECK

- A Tailer may look to the side frequently to monitor lumber coming to the workstation.

## NECK/SHOULDER

- A Tailer may work repetitively with the arms away from the body while sorting lumber, discarding waste wood, and operating controls.

## ELBOW/WRIST

- A Tailer may grip repeatedly, and use forearm muscles to turn pieces and discard waste wood.

## LOW BACK

- A Tailer may bend forward repeatedly when sorting and handling lumber, manually transferring boards, and clearing jam-ups.

## ANKLE/FOOT

- A Tailer may activate foot pedals frequently while sorting lumber.

## FOOT

- A Tailer may stand on a hard, vibrating surface continuously throughout the shift.

# Risk Factors by Body Part

| Direct Risk Factors | Neck | Neck/ Shoulder | Shoulder | Elbow/ Wrist | Wrist | Wrist/ Hand | Low Back | Hip | Knee | Ankle/ Foot | Foot |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Force** | | ✓ | | ✓ | | | ✓ | | | | |
| **Repetition** | ✓ | ✓ | | ✓ | | | ✓ | | | ✓ | |
| **Awkward Postures** | ✓ | ✓ | | ✓ | | | ✓ | | | ✓ | |
| **Static Postures** | | | | | | | | | | | ✓ |
| **Contact Stress** | | | | | | | | | | | |
| **Vibration – Whole body*** | | | | | | | | | | | ✓ |
| **Vibration - Hand Transmitted*** | | | | | | | | | | | |

| Indirect Risk Factors | | Neck | Neck/ Shoulder | Shoulder | Elbow/ Wrist | Wrist | Wrist/ Hand | Low Back | Hip | Knee | Ankle/ Foot | Foot |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Duration*** | Duration | ✓ | ✓ | | ✓ | | | ✓ | | | ✓ | ✓ |
| **Workstation Design** | Working Reaches | | ✓ | | | | | | | | | |
| | Working Heights | | ✓ | | | | | ✓ | | | ✓ | |
| | Seating | | | | | | | | | | | |
| | Floor Surfaces | | | | | | | | | | | ✓ |
| | Size and Shape | | | | ✓ | | | | | | | |
| | Load Condition and Weight Distribution | | | | ✓ | | | | | | | |
| | Container, Tool and Equipment Handles | | | | | | | | | | | |
| **Environmental Conditions** | Heat Exposure | ♦ | ♦ | ♦ | ♦ | ♦ | ♦ | ♦ | ♦ | ♦ | ♦ | ♦ |
| | Cold Exposure | ♦ | ♦ | ♦ | ♦ | ♦ | ♦ | ♦ | ♦ | ♦ | ♦ | ♦ |
| | Lighting | ♦ | ♦ | ♦ | ♦ | ♦ | ♦ | ♦ | ♦ | ♦ | ♦ | ♦ |
| | Noise | ♦ | ♦ | ♦ | ♦ | ♦ | ♦ | ♦ | ♦ | ♦ | ♦ | ♦ |
| | Vibration** | ♦ | ♦ | ♦ | ♦ | ♦ | ♦ | ♦ | ♦ | ♦ | ♦ | ♦ |
| **Work Organisation** | Work-Recovery Cycles | ♦ | ♦ | ♦ | ♦ | ♦ | ♦ | ♦ | ♦ | ♦ | ♦ | ♦ |
| | Task Variability | ✓ ♦ | ✓ ♦ | ✓ ♦ | ✓ ♦ | ♦ | ♦ | ✓ ♦ | ♦ | ♦ | ✓ ♦ | ✓ ♦ |
| | Work Rate | ♦ | ♦ | ♦ | ♦ | ♦ | ♦ | ♦ | ♦ | ♦ | ♦ | ♦ |

** Extended exposure to <u>any</u> risk factor can increase the likelihood of injury. For solutions designed to decrease the duration of exposure to any risk factor please refer to the Work Organisation section of the General Risk Factor Solutions Manual*

*** Vibration is categorised under both direct and indirect risk factors. Vibration can directly increase the likelihood of injury to the back and wrist as well as indirectly (environmental conditions) promote injuries in other parts of the body.*

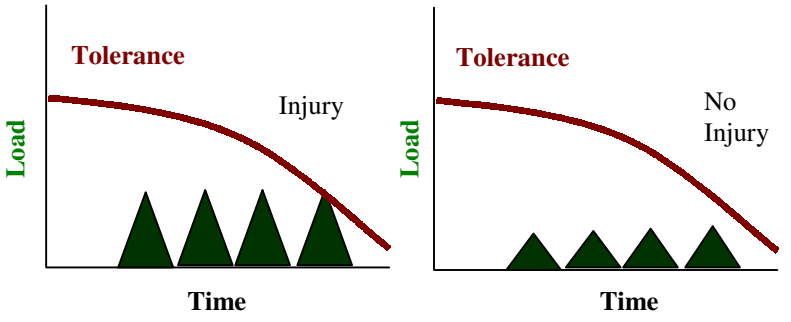
= Indicates that the risk factor was assessed and was not found to be a contributor to the body part problem.

♦ = Indicates that the risk factor assessed is commonly found in sawmills, and may need to be addressed at your mill. See the appropriate section of the General Risk Factor Solutions Manual for more information.

✓ = Indicates that the risk factor was assessed as a contributor to the body part problem. Please see the Summary of Solutions Table on pages 89 & 90 for specific problem/solution information. Additional information on some risk factors can be found in the General Risk Factor Solutions Manual.

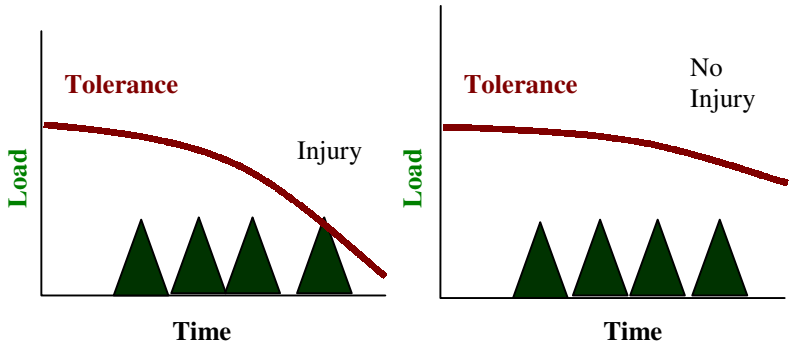
# Injury Prevention

*Injuries are prevented by …*
*Decreasing loads and increasing tissue tolerances*




Injuries may be avoided by decreasing the size of the loads on the tissue.

***Example – using a torque multiplier wrench to loosen bolts.***




Injuries may be avoided by increasing tissue tolerances, and allowing the body to endure more loading.

***Example – using maintenance exercises to strengthen tissues.***

# Suggested Solutions

The previous page explains how injuries may be prevented by decreasing the load on a tissue or by increasing the tissue tolerances. The Injury Prevention section of the Work Manual provides possible solutions that can be implemented to decrease the size of the loads on the tissues.

Each of the solutions described in the Work Manual has a risk control icon. The Risk Control Key provides guidelines on how to distinguish between different types of risk controls. Generally, engineering, administrative, and work practice controls are considered more effective than the use of personal protective equipment to decrease the risk of musculoskeletal injuries.

The focus of the Injury Prevention section is on solutions developed following the ergonomic investigation of the Tailer job. The solutions are presented under the headings of Workstation Design, Characteristics of Objects Being Handled, Environmental Conditions, and Work Organisation.

The Summary of Solutions table provides a quick reference guide to solutions for specific body part problems.

Please note that the information provided in the Body Manual addresses the issue of injury prevention in terms of increasing tissue tolerances through exercise. This information is not provided in the Work Manual.

# Risk Control Key

Risk control measures (solutions) are commonly grouped into four categories:

E

## ENGINEERING CONTROLS

These include physical changes to workstations, equipment, materials, production facilities, or any other relevant aspect of the work environment, that reduce or prevent exposure to risk factors.

A

## ADMINISTRATIVE CONTROLS

These include any change in procedure that significantly limits daily exposure to risk factors, by control or manipulation of the work schedule or manner in which work is performed. Administrative controls include, but are not limited to, job rotation, rest breaks, alternative tasks, job enlargement, redesign of work methods, and adjustment of work pace or output. Some models of risk control include work practice controls within this category.

WP

## WORK PRACTICE CONTROLS

These include techniques used to perform the tasks of a job, such as reaching, gripping, using tools and equipment, or discarding objects, etc. Education and training are an integral part of work practice controls.

PPE

## PERSONAL PROTECTIVE EQUIPMENT

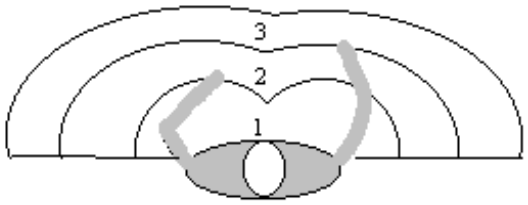
These are devices worn by a worker to reduce the risk of injury, including gloves, kneepads, hearing protection, and leather aprons.

**On the following pages, the icons next to the solution options indicate the type of risk control.**

# Workstation Design

## WORKING REACHES

A working reach that is too far for the worker will require stressful shoulder, elbow, wrist, and back postures. Reaching to the side, behind, or too far in front of the body can put stress on the smaller muscles. Ideally, working reaches should be within a normal reach envelope, as laid out below, with the controls and materials that are handled most often closest to the body. It is also ideal to have controls that perform similar or combined functions grouped together to decrease awkward postures that may otherwise occur.




1 = Controls/items most frequently used
2 = Controls/items less frequently used
3 = Controls/items least frequently used

Generally, the most frequently used items should be placed within a forearm's reach, with less frequently used items placed within a comfortable arm's reach, and infrequently used items placed within a fully extended arm's reach. For more specific recommendations on working reaches, please consult anthropometric tables or an ergonomist.

***Standing work***

WP

To minimise loading on the low back and neck/shoulder, pulling, pushing, and lifting of wood should be performed while standing. With both feet planted on the floor, the Tailer has more stability and can recruit the larger muscle groups of the legs to assist with manual material handling. Sitting will increase the amount of reaching necessary, place increased stress on the muscle groups of the upper body, and increase the risk of injury.

Use of a sit/stand stool is appropriate when handling smaller, lighter boards, and during downtime.

***Place control panel in front of or beside worker***

E

To reduce awkward postures of the neck/shoulder, avoid situating control panels behind the worker. Reaching backward repeatedly is an unnatural movement of the shoulder joint. A control panel in front of, or beside, the operator allows the worker to view wood pieces and operate controls without reaching backwards.

## WORKING HEIGHTS

A working height that is too high for the worker will require stressful shoulder and arm postures, while a height that is too low will require stressful bending of the neck and trunk. The height of a work surface should allow room to change position and move the legs and feet (WCB Draft Ergonomic Regulations, 1994).

The ideal workstation is height adjustable, allowing a large percentage of the population to adjust the work surface height to suit their dimensions

To determine the appropriate work height specific for the Tailer, identify the body part of most concern. If the main concern is the:

**Neck -** minimise forward bending of the neck by increasing working height.
**Shoulders -** minimise elevation of the arms by lowering working height.
**Low Back -** minimise forward bending of the back by increasing working height.

For more specific guidelines on matching the working heights with the tasks performed please consult anthropometric tables or an ergonomist.

### *Height of transfer deck*

E

Locating the transfer deck at approximately hip height would allow the Tailer to use muscles of the upper and lower body together when handling lumber. This combination reduces loading on the upper body (neck/shoulder, elbow/wrist), and may also reduce loading on the low back from repeated bending.

### *Platform*

E

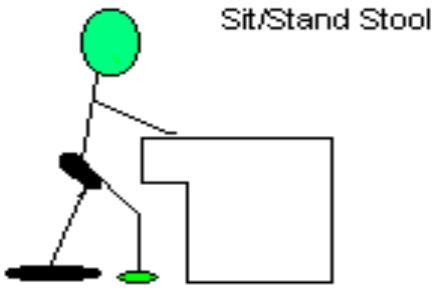
The following solution relates to Tailer workstations where there is relatively little walking along the length of the transfer deck:

If more than one worker uses the Tailer workstation, individual (portable) platforms may be built to allow each individual to work at a comfortable height. A more permanent solution would be a height adjustable (e.g., pneumatic, mechanical) platform for workers to stand on, which would also allow each operator to work at his/her preferred height. This setup reduces loading on the upper body (neck/shoulder, elbow/wrist), and may also reduce loading on the low back from repeated bending to work at low heights.

***Sit/stand stool***

E
WP

In order to minimise fatigue in the lower extremities, sit/stand stools can be provided. Sit/stand stools are preferred over regular stools, as the design makes it easier to alternate between sitting and standing, and allows the larger muscles of the lower extremities to be recruited when handling objects. If sit/stand stools are not possible, foot rests or foot rails can be provided to encourage frequent changes in posture. Please note that sit stand stools are not recommended if handling (lifting, turning) heavy wood.



## FLOOR SURFACES

### *Anti-fatigue matting*

E

In order to minimise fatigue in the lower extremities, anti-fatigue matting can be installed. The use of anti-fatigue matting in the work area will help to increase comfort and reduce muscle fatigue. The cushioned surface encourages continuous micro-movements of the feet, which minimises blood pooling in the feet and legs and the associated discomfort. In addition, anti-fatigue matting may also aid in damping vibration levels.

Anti-fatigue matting is a practical solution when a worker spends a majority of their time in one area, and the matting does not hinder the safety of the worker or the performance of the task.

### *Anti-fatigue insoles*

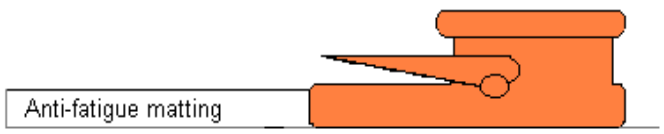
PPE

If a worker must stand in several different areas for long periods of time, anti-fatigue insoles in work boots can prevent foot discomfort. The cushioned surface of the insole can absorb repeated impact from walking on metal catwalks, and may aid in damping vibration while standing in one spot.

### *Recessed foot pedals*

E

In order to minimise awkward postures of the ankle, recess foot pedals into anti-fatigue matting to decrease the height of the foot pedal base. To recess foot pedals, and provide a more comfortable standing surface in the process, position anti-fatigue matting as close as possible to the foot pedal base. If the pedals are stationary, cut the matting to surround the front of the foot pedal. For moveable foot pedals, place the matting as close to the base of the foot pedal as possible. The height of the matting should not exceed the base of the foot pedal (see diagram below). It is important to ensure pedals are kept clean of debris and are well maintained.



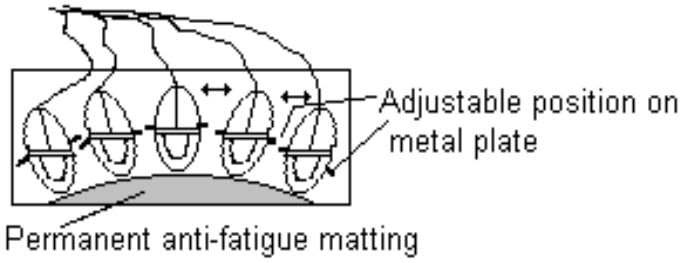
***Moveable foot pedals***

E
WP

In order to reduce awkward postures of the lower extremities (legs) and low back, allow operators to choose the most appropriate position for the pedals, based on their body dimensions and the workstation design.

Securing the foot pedals may be required or desirable. Three solutions include:

1) Providing moveable foot pedals on a metal plate. The foot pedals are positioned in slide tracks cut into the metal, which allow pedals to move into the desired positions. The pedals are then fastened into place. The operator is able to move the set of foot pedals to any desired position in the workstation.




2) Providing several positions on the floor where clips or nails may be used to secure foot pedals. If this option is considered, make sure each possible position is highly visible to all operators, to prevent tripping or injuries.

3) Providing a physical link (e.g., a metal bar) between two foot pedals with the same function. This solution is most appropriate where a worker may move to manipulate lumber but still needs to operate the foot pedals.

## ADDITIONAL WORKSTATION DESIGN OPTIONS

### *Convex mirror*

E

The Tailer has to monitor the flow of product coming into and going out of the workstation. Repetitive neck twisting is required for this task, placing strain on the neck muscles and putting the worker at risk for injury. To decrease this motion, install a convex mirror to give an overall view of work areas. Only when a problem occurs does the operator have to turn their head to assess the corrective action necessary.

*Mirrors increase the range of view for the worker, reducing awkward postures and decreasing the risk of injury*

.

# Additional Work Practices

***Stretches***

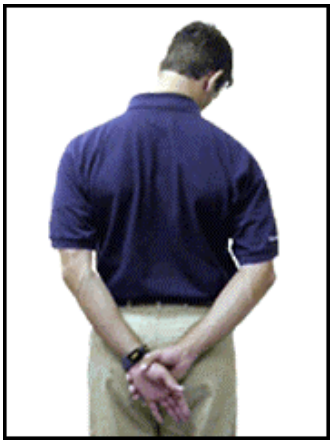
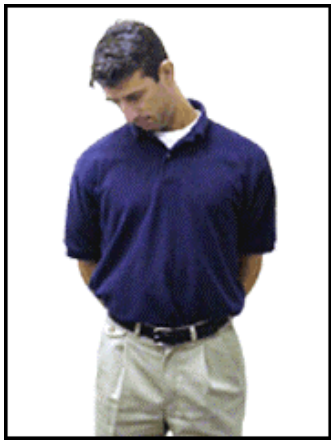
WP The following stretches can be done as a warm-up before the shift, as well as before every break. Stretches marked with an asterisk (*) are also beneficial after any prolonged office work. See additional stretches in the Body Manual.

## Chin Tuck

With your head upright, tuck chin in. You should feel a gentle stretch, in the back of the neck. Hold for 20 seconds and then relax. Repeat 3 times.

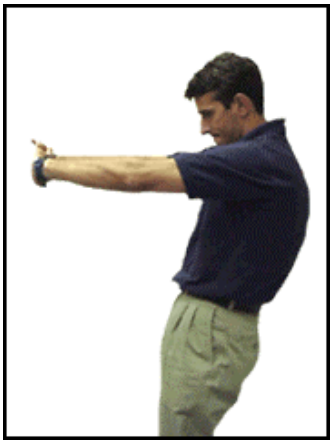

## Neck Stretch

Turn the head slightly to one side and reach for the ground with the ground behind you with the opposite arm. Hold for 10 seconds. Repeat 3 times on each side.

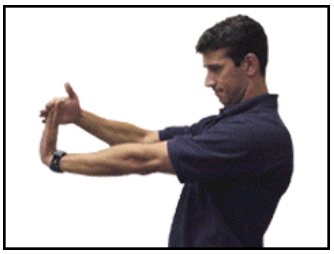



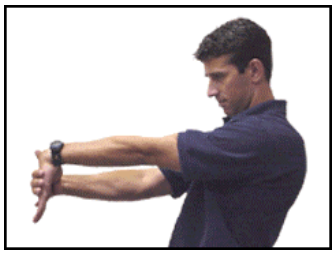
## Upper Back & Chest Stretch

Place the hands together in front of the body and push them outwards. Bring the arms behind the body and squeeze the shoulder blades together while pressing the shoulders down and keeping the chin tucked in. Repeat 5 times.



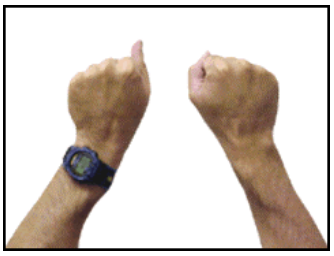

## Wrist Flexor and Extensor Stretch

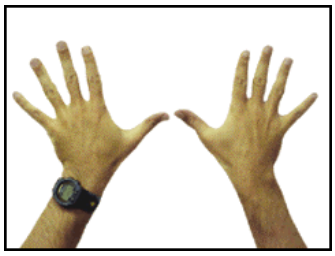




With your arm extended and fingers pointing up, gently pull hand towards your body until you feel a mild stretch in the forearm. (**Note:** do not stretch to the point where you feel pain or tingling). Hold for 15 – 30 seconds. Repeat with fingers pointing down. Repeat with the other arm.

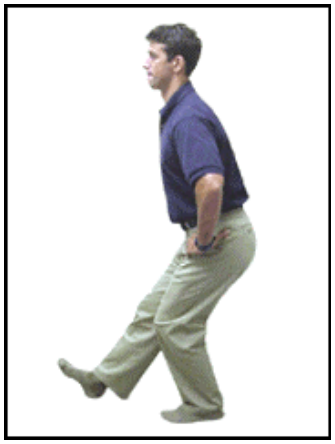
## Hands and Fingers Stretch





Clench both fists and hold for 3 seconds. Then open your hands and spread fingers apart. Hold for 3 seconds. Repeat.

## Hamstring Stretch



Place one foot in front of the other and squat down. Hold for 5 seconds. Repeat 3 times with each leg.

***Have an extra Tailer during peak work loads***

A

In order to reduce the frequency of handling lumber, and therefore reduce loading on the neck/shoulder, elbow/wrist, back, and ankle consider having two people at workstations that handle large amounts of lumber, or during peak hours.

***Manual material handling***

WP

The following work practices refer specifically to manual material handling tasks. These tasks include lifting, lowering, pushing, pulling, carrying, and holding objects.

- Use the entire body, especially the large muscle groups of the lower body, to perform a movement.
- To reduce loading on the soft tissues of the back, lift heavy objects (e.g., logs or cants) with a neutral back posture while maintaining the 3-point curve (the natural "S" shaped curve of the back – see the Injury Education section for more information). Do not use pelvic tilt to position the trunk for lifting.
- Do not twist while holding or moving a load. This places the back in a weaker posture that can lead to injury.
- When possible, balance loads being carried on each side of the body. This minimises loading on the soft tissues of the back and hips.
- When lifting, carrying, or holding objects, keep them as close to the body as possible. The farther the load is away from the body, the more stress it puts on the back and shoulders.

# Characteristics of Objects Being Handled

## LOAD CONDITION AND WEIGHT DISTRIBUTION

***Pike pole use***

WP

In order to reduce loading on the neck/shoulder and back when handling lumber with a pike pole, pick the appropriate pike pole for the job. The pike pole should be longer than the distance from the operator to the object to be retrieved. This extra distance will prevent the pike pole from striking the operator if the pike pole detaches from the object, and will also give the operator some extra grip length if the pike pole pulls away from the operator. Two hands should be used when handling the pike pole. Once the sharp end of the pike pole is stuck in the lumber, only pull on it twice before removing it from the wood. Repeat this process until the lumber is uncrossed or the jam is cleared. Also, keep the body in a strong posture by keeping arms close to the body, with elbows bent and wrists straight.

# Environmental Conditions

Please refer to the General Risk Factor Solutions Manual for solutions regarding environmental conditions.

# Work Organisation

***Job rotation***

A

To reduce loading on the body parts of concern, the Tailer can be rotated to other job positions that have different physical and mental demands. By rotating to jobs that have different physical demands, working muscles get a chance to recover and repair, decreasing the risk of injury. Job rotation is more effective if it occurs throughout the shift, for example, every hour or every two hours. The duration of exposure to risk has a large effect on the amount of time required for the tissue to recover.

Please refer to the General Risk Factor Solutions Manual for solutions regarding work organisation risk factors.

# Summary of Solutions

Refer to the table below to help determine which solution alternatives will aid in addressing risk factors in the particular body parts of concern.

| | | Injury Prevention Potential | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **SOLUTIONS** | **Page** | Neck | Neck/ Shoulder | Shoulder | Elbow/Wrist | Wrist | Wrist/ Hand | Low Back | Hip | Knee | Ankle/Foot | Foot |
| **Standing work** | **77** | | **F** | | | | | **F** | | | | |
| **Place control panel in front of or beside worker** | **78** | | **A** | | | | | | | | | |
| **Height of transfer deck** | **79** | | **F** | | **F** | | | **A R** | | | | |
| **Platform** | **79** | | **F** | | **F** | | | **A R** | | | | |
| **Sit/stand stool** | **80** | | | | | | | | | | | **S** |
| **Anti-fatigue matting** | **81** | | | | | | | | | | | **S V** |
| **Anti-fatigue insoles** | **81** | | | | | | | | | | | **S V** |
| **Recessed foot pedals** | **81** | | | | | | | | | | **A** | |
| **Moveable foot pedals** | **82** | | | | | | | **A** | | | **A** | |
| **Convex mirror** | **83** | **A R** | | | | | | | | | | |
| **Stretches** | **84** | directly reduces risk of injury to the body | | | | | | | | | | |
| **Have an extra Tailer during peak work loads** | **86** | | **R** | | **R** | | | **R** | | | **R** | |

## Direct Risk Factors

**F** = *Force* **R** = *Repetition* **A** = *Awkward Postures*
**S** = *Static Postures* **C** = *Contact Stress* **V** = *Vibration*

# Summary of Solutions

Refer to the table below to help determine which solution alternatives will aid in addressing risk factors in the particular body parts of concern.

| | | Injury Prevention Potential | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **SOLUTIONS** | **Page** | Neck | Neck/ Shoulder | Shoulder | Elbow/Wrist | Wrist | Wrist/ Hand | Low Back | Hip | Knee | Ankle/Foot | Foot |
| **Manual material handling** | **86** | | **F** | | | | | **F**<br>**A** | | | | |
| **Pike pole use** | **87** | | **F** | | | | | **F** | | | | |
| **Job rotation** | **88** ◆ | indirectly reduces risk of injury to the body | | | | | | | | | | |
| **Heat Exposure** | ◆ | indirectly reduces risk of injury to the body | | | | | | | | | | |
| **Cold Exposure** | ◆ | indirectly reduces risk of injury to the body | | | | | | | | | | |
| **Lighting** | ◆ | indirectly reduces risk of injury to the body | | | | | | | | | | |
| **Noise** | ◆ | indirectly reduces risk of injury to the body | | | | | | | | | | |
| **Vibration** | ◆ | directly reduces risk of injury to the back and wrist | | | | | | | | | | |
| **Rest breaks** | ◆ | indirectly reduces risk of injury to the body | | | | | | | | | | |
| **Task Rotation** | ◆ | indirectly reduces risk of injury to the body | | | | | | | | | | |
| **Work Pace** | ◆ | indirectly reduces risk of injury to the body | | | | | | | | | | |
| **Scheduling** | ◆ | indirectly reduces risk of injury to the body | | | | | | | | | | |

### Direct Risk Factors

**F** = *Force* **R** = *Repetition* **A** = *Awkward Postures*
**S** = *Static Postures* **C** = *Contact Stress* **V** = *Vibration*
◆ = *See General Risk Factor Solutions Manual*

# TAILER MSI SAFETY GUIDE

**OBJECTIVE:**
**To identify ergonomic risks involved in the Tailer job and to reduce the potential for musculoskeletal injuries.**
More detailed information about risk reducing recommendations can be found in the Work Manual for the Tailer.

| CHECK IF THIS APPLIES | ACTIVITY OF RISK | DIRECT RISK FACTOR(S) | POTENTIAL HAZARDS | SUGGESTED SOLUTIONS |
|---|---|---|---|---|
| | **Neck**<br><br>A Tailer may look to the side frequently to monitor lumber coming to the workstation. | **Repetition**<br><br>**Awkward Postures** | • When the head is repeatedly turned to the side, the muscles of the neck are subjected to repeated stress with little time for recovery. If the repetitive stress is excessive, and recovery is not adequate, the tissues can fatigue to the point of injury.<br>• Neck muscles are required to turn the head to the side. The further the head is turned to the side, the greater the load on the muscles and tendons. | • Refer to the "Chin Tuck" and "Neck Stretch" in the *Stretches for the Tailer* section of the Injury Prevention section of the Work Manual.<br>• For exercises that can help prevent ***Neck*** injuries, ***see the Neck section of the Body Manual***. |

| CHECK IF THIS APPLIES | ACTIVITY OF RISK | DIRECT RISK FACTOR(S) | POTENTIAL HAZARDS | SUGGESTED SOLUTIONS |
|---|---|---|---|---|
| | **Neck/Shoulder**<br><br>A Tailer may work repetitively with the arms away from the body while sorting lumber, discarding waste wood, and operating controls. | **Force**<br><br>**Repetition**<br><br>**Awkward Postures** | • The rotator cuff stabilises the shoulder joint when lumber is pushed, pulled, and manipulated. The heavier the object, or the larger the force required, the greater the load on the rotator cuff.<br>• If the force placed on the rotator cuff exceeds the tissue tolerances, injury may occur.<br>• When the arms are repeatedly lifted, the muscles of the neck and shoulder are subjected to repeated stress with little or no time for recovery. If the repetitive stress is excessive, and recovery is not adequate, the tissues may fatigue to the point of injury.<br>• Neck and shoulder muscles must support the weight of the arms when they are away from the body. The farther away the arms are from the body, the greater the load on the muscles and tendons. | • **Standing Work:** To minimise loading on the neck/shoulder and low back, pulling, pushing, and lifting of wood should be performed while standing. With both feet planted on the floor, you have more stability and can recruit the larger muscle groups of the legs to assist with manual material handling.<br>• **Sitting Work:** Sitting increases the amount of reaching necessary, places increased stress on the muscle groups of the upper body, increasing the risk of injury. |

| CHECK IF THIS APPLIES | ACTIVITY OF RISK | DIRECT RISK FACTOR(S) | POTENTIAL HAZARDS | SUGGESTED SOLUTIONS |
|---|---|---|---|---|
| | **Neck/Shoulder (continued)** | | | • **Pike pole use:** To reduce loading on the shoulder and back when handling lumber on the end of pike poles, pick the appropriate pike pole for the job. The pike pole should be longer than the distance from the operator to the object to be retrieved. This extra distance will prevent the pike pole from striking you if the pike pole detaches from the object, and will also give you some extra grip length if the pike pole pulls away. Two hands should be used when handling the pike pole. Once the sharp end of the pike pole is stuck in the lumber, only pull on it twice before removing it from the wood. Repeat this process until the lumber is uncrossed or the jam is cleared. Also, keep the body in a strong posture by keeping arms close to the body, with elbows bent and wrists straight.<br>• Refer to the **Manual Material Handling Tips** suggestions in the Low Back section below.<br>• For exercises that can help prevent ***Neck*** and ***Shoulder*** injuries, ***see the Neck and Shoulder sections of the Body Manual***. |

| CHECK IF THIS APPLIES | ACTIVITY OF RISK | DIRECT RISK FACTOR(S) | POTENTIAL HAZARDS | SUGGESTED SOLUTIONS |
|---|---|---|---|---|
| | **Elbow/Wrist**<br><br>A Tailer may grip repeatedly, and use forearm muscles to turn pieces and discard waste wood. | **Force**<br><br>**Repetition**<br><br>**Awkward Postures** | • Gripping an object requires activation of the forearm muscles, which generates tension at the tendon/bone connection of the elbow. The harder that an object must be gripped, the greater the load on the tendon/bone connection.<br>• Repeated stress to the elbow without adequate rest could slowly fatigue tissues to the point of injury.<br>• The position of the wrist affects how much muscle tension needs to be generated. There is an optimal wrist position where the forearm muscles work efficiently. This occurs when the wrist is in its natural relaxed (neutral) position. Bending the wrist forward or backward deviates from this position, and the forearm muscles have to work harder to maintain the grip. Consequently, gripping objects with the wrist bent increases the tension generated by muscles, and could lead to tissue fatigue at the tendon/bone connection. | • Refer to the "Wrist Circles" and "Flexor and Extensor Stretch" in the *Stretches for the Tailer* of the Injury Prevention section of the Work Manual.<br>• For exercises that can help prevent ***Elbow*** and ***Wrist*** injuries, ***see the Elbow and Wrist sections of the Body Manual***. |

| CHECK IF THIS APPLIES | ACTIVITY OF RISK | DIRECT RISK FACTOR(S) | POTENTIAL HAZARDS | SUGGESTED SOLUTIONS |
|---|---|---|---|---|
| | **Low Back**<br><br>A Tailer may bend forward repeatedly when sorting and handling lumber, manually transferring boards, and clearing jam-ups. | **Force**<br><br>**Repetition**<br><br>**Awkward Postures** | • Lifting increases the loading on the spine. Weight held in the hands is transmitted to the low back. The greater the weight, the greater the loading on the structures of the low back.<br>• Repeated forward bending and lifting can gradually fatigue the structures of the low back. If the repetitive stress is excessive, and recovery is not adequate, the disc walls may fatigue to the point of injury.<br>• Back muscles must support the weight of the upper body when leaning forward. Increased bending of the back increases the loading on the spine and increases the pressure on the walls of the discs. | • **Manual Material Handling Tips** (for lifting, lowering, pushing, pulling, carrying, and holding objects) to reduce force and awkward postures of the back and shoulder:<br>  • Use the entire body, especially the large muscle groups of the lower body, to perform a movement.<br>  • Lift heavy objects with a neutral back posture while maintaining the 3-point curve (the natural "S" shaped curve of the back. Do not use pelvic tilt to position the trunk for lifting.<br>  • Do not twist while holding or moving a load. This places the back in a weaker posture that can lead to injury.<br>  • When lifting, lowering, carrying, or holding objects, keep them as close to the body as possible. The farther the load is away from the body, the more stress it puts on the back.<br>  • Refer to the **Standing Work** and **Pike Pole use** suggestions in the Neck/Shoulder section above<br>  • For exercises that can help prevent ***Back*** injuries, ***see the Back section of the Body Manual***. |

| CHECK IF THIS APPLIES | ACTIVITY OF RISK | DIRECT RISK FACTOR(S) | POTENTIAL HAZARDS | SUGGESTED SOLUTIONS |
|---|---|---|---|---|
| | **Ankle/Foot**<br><br>A Tailer may activate foot pedals frequently while sorting lumber. | **Repetition** | • Repetitive use of foot pedals may gradually cause small tears in the muscle on the front of the shin. If the repetitive stress is excessive, and recovery is not adequate, the small tears in the muscle on the front of the shin may progress to a more significant problem.<br>• Repetitive use of foot pedals can cause tissue in the foot to deform and breakdown over time. If the tissue deformation is excessive and recovery not adequate, an injury may occur. | • For exercises that can help prevent ***Foot*** injuries, ***see the Foot section of the Body Manual***. |
| | | **Awkward Postures** | • Lifting the foot to activate a foot pedal puts the ankle into an awkward posture, which increases the loading in the muscle on the front of the shin. The further away from the neutral posture the ankle is, the greater the loading to this muscle. If the shoes worn are rigid or heavy, the loading is also increased.<br>• Pressing down on a foot pedal while the ankle is bent leads to increased loading on the plantar fascia. | |

| CHECK IF THIS APPLIES | ACTIVITY OF RISK | DIRECT RISK FACTOR(S) | POTENTIAL HAZARDS | SUGGESTED SOLUTIONS |
|---|---|---|---|---|
| | **Foot**<br><br>A Tailer may stand on a hard, vibrating surface continuously throughout the shift. | **Static Posture**<br><br>**Vibration** | • While standing, the weight of the body loads the plantar fascia. If the duration of standing is excessive, and recovery is not adequate, the fascia may deform to the point of injury.<br>• Vibrating floors can increase the loading on the foot. Factors like vibration level and vibration frequency increase the amount of loading on the foot, and could lead to irritation. The longer the Tailer is exposed to vibration, the greater the risk of injury. | • If a worker must stand in several different areas for long periods of time, in order to minimise fatigue in the lower extremities, it may be useful to insert anti-fatigue insoles in work boots. The cushioned surface of the insole can absorb repeated impact from walking on metal catwalks, and may aid in damping vibration while standing in one spot.<br>• For exercises that can help prevent ***Foot*** injuries, ***see the Foot section of the Body Manual***. |