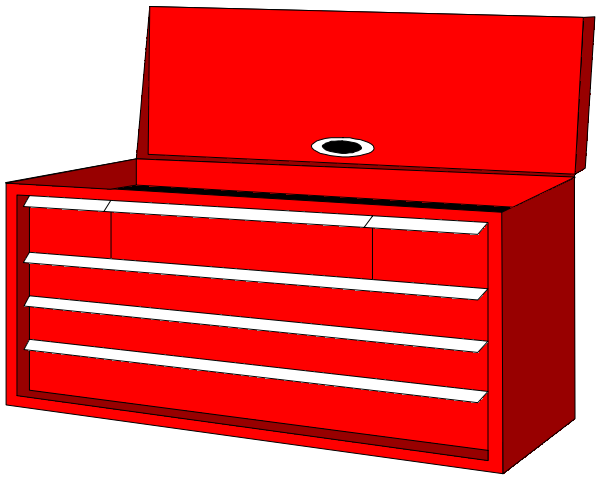
Industrial Musculoskeletal Injury Reduction Program

Common Industry Jobs (CIJs)

Slipman 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

SLIPMAN TOOL KIT
Table of Contents

Overview
Slipman

Job Summary

A Slipman is responsible for feeding logs into a sawmill. The tasks of a Slipman include guiding logs down a slip, feeding either a jackladder or a sidelift, removing bark, and may include running lines out to pull logs in, and cutting bundle wires. Refer to the Physical Demands Analysis for more details.

Physical Demands

The physical demands of a Slipman job may include:

a) Repetitive neck flexion when guiding and feeding logs into the mill
b) Repetitive forceful pushing and pulling using pike poles when guiding and feeding logs into the mill
c) Repetitive and forceful gripping of pike poles when guiding and feeding logs into the mill, and possibly gripping bolt cutters when cutting bundle lines

Mental Demands

Some experience is helpful in keeping a slip organised to avoid log cross-ups and jams.

Major Variations

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

a) Type of infeed equipment: jackladder or sidelift
b) Layout of a slip: straight or slightly bent
c) Type of flow control devices used to counteract current: pump, lines that attached to bundle wires, lines with boom chains

Minor Variations

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

a) Some Slipmen are responsible for cutting bundle wires. Some workplaces use manual bolt cutters and some others use pneumatic bolt cutters.
b) Some mills rotate workers between other jobs in the boom. For information on other jobs, refer to the appropriate tool kits.
c) How the workers use their body may be slightly different. This tool kit will review body mechanics and highlight good techniques used.

Physical Demands Analysis
Slipman

PDA General Instructions: Slipman

This Physical Demands Analysis (PDA) identifies the physical demands of the Slipman job as assessed by IMIRP ergonomists. The information reported was collected from a sample Slipmans in the BC Sawmill Industry. Where possible, state-of-the-art equipment and techniques were used in data collection and analysis to increase accuracy. However, some information is based on third party comments that are often subjective and not subject to verification.

Subsequent changes to the work process may reduce the validity of any pre-existing physical demands analysis. The IMIRP Society accepts no responsibility for the use or misuse of the Physical Demands Analysis, or for the accuracy of the PDA as it applies to any specific workplace.

To make the PDA specific to your workplace, determine which of the tasks identified are present in your mill. For each section, check off the items (e.g., tasks, tools, etc.) listed that reflect the Slipman job at your mill.

Rehabilitation professionals are encouraged to verify and update critical information through the client and through workplace sources to ensure that the content (e.g., tasks, weights of objects handled, etc.) accurately reflects the job.

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 Supervisor 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.

PDA Table of Contents

Physical Demands Analysis
Slipman

Task List

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

Guides logs down slip

A Slipman guides logs down a slip by pushing and pulling on a pike pole.

Does this task occur at your mill?

☐ Yes ☐ No

A Slipman could be required to work on both a deck and logs

Does this task occur at your mill?

☐ Yes ☐ No

A Slipman organises logs to prevent jams or cross-ups.

Does this task occur at your mill?

☐ Yes ☐ No

Runs out lines

When the current is flowing away from the jackladder or side lift, a Slipman is required to run lines out.

Does this task occur at your mill?

☐ Yes ☐ No

Heavy boom chains (16 kg –32 kg) may be attached to lines at some mills.

Does this apply to your mill?

☐ Yes ☐ No

Lane flow developers may be used to counteract currents at some mills.

Does this apply to your mill?

☐ Yes ☐ No

Feeds logs into mill

At some mills, a Slipman may manually feed logs into a jackladder using a pike pole.

Does this task occur at your mill?

☐ Yes ☐ No

At some mills, a Slipman may manually feed logs into a side lift using a pike pole.

Does this task occur at your mill?

☐ Yes ☐ No

At some mills, a Slipman may use a grappler to mechanically feed logs into a jackladder.

To understand the physical demands of this job, please refer to the **Grapple Operator Tool Kit**

Does this task occur at your mill?

☐ Yes ☐ No

Cuts bundle wires

At some mills, a Slipman may cut bundle wires with a bolt cutter.

Does this task occur at your mill?

☐ **Yes** ☐ **No**

After cutting the bundle wires, a Slipman will then carry wires over to a dock to be recycled.

Does this task occur at your mill?

☐ **Yes** ☐ **No**

A Slipman may also be required to clear bark from in front of the jackladder or side lift, and perform general clean-up duties.

Company Profile

Company Name:_____ Division:_____

Number of Employees: _____ Turnover in last 12 months: +/- _____ or ____ %

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

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

Work Organisation

Task Description

The table below contains a list of tasks performed on an everyday basis by a Slipman.

Indicate each of the tasks performed by placing a check mark (✓) in the far left column.

Note the corresponding values for the percentage of the shift spent performing the task (Percent of Shift) as found during the ergonomic investigation. The Comments section may be used to elaborate on the task description (e.g., variations between mills, frequencies, cycle times, etc.).

	Task	Percent of Shift				Comments
		Rarely 0 to 5%	Occasionally 6 to 33%	Frequently 34 to 66%	Constantly 67 to 100%	
	Guides logs down slip		✓		✓	• *For jackladder, 60% of shift.* • *For side lift, 15% of shift*
	Runs out lines	✓				
	Feeds jackladder *Feeds side lift*		✓		✓	
	Cuts bundle wires		✓			
	Removes bark	✓				
	Cleans up	✓				
	Other:					

Organisational Factors

The table below contains a list of organisational factors for a Slipman. For each of the items input the necessary information to reflect the situation at your mill.

For the last item, if the job has scheduled job rotation (i.e., rotate from one job to another during a shift) check 'Yes' and then write in the jobs the worker rotates to and how often these rotations occur. If you do not have job rotation for this job, check 'No'.

Length of shift	☐ *8 hours* ☐
Formal breaks	☐ *Two 10 minute breaks & 30 minutes for lunch* ☐
Informal breaks	☐ *Yes, taken as required* ☐
Work pace	☐ *300 logs per shift* ☐ *1000 logs per shift* ☐
Work pace control	☐ *Self-paced*
Job rotation ☐ Yes *(Check one)* ☐ No	If **Yes:** Rotation with what job(s):_____ _____ How often: (e.g., every 2 hours)_____

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, which apply to the workstation at your mill.

For the **Seating** section, first indicate whether seating is present at the workstation and then continue by elaborating on the features of the seating.

Workstation Characteristics	
Flooring	*Check all that apply* ☐ Cement ☐ Wood ☐ Rubber Matting ☐ Metal ☐ Other (e.g., tile, carpet) _____
Displays	*Check all that apply* ☐ Lights on Console ☐ Mirrors ☐ Video Monitors ☐ Computer Monitors ☐ None ☐ Scrolling Display ☐ Signal Lights ☐ Other _____
Seating: ☐ Yes *(Check one)* ☐ No	☐ Sit/stand ☐ Office Height of seat: _____cm ☐ Industrial ☐ In-house Design Depth of seat: _____cm Width of seat: _____cm
	Check all that apply ☐ Armrests ☐ Backrest ☐ Swivel Seat ☐ Slide track ☐ Castors #_____ ☐ Lumbar support ☐ Foot rest Covering type: _____ Seat adjustable? ☐ Yes ☐ No If yes, adjustable: ☐ Height ☐ Armrests ☐ Backrest ☐ Forward tilt

Equipment & Machinery Controls

The table below contains a list of the types of controls used by a Slipman.

Indicate the controls which are present at your mill by placing a check mark (✓) in the far left column.

Indicate their corresponding functions by checking off the applicable box(es). The Comments section may contain information that describes variations between mills.

	Type of Control	Function	Frequency	Comments
	Push button	• *Lock-out jackladder*	*1/shift*	
	Pull cord	• *Start and/or stop side lift*	*1/min*	
	Kick board	• *Start and/or stop side lift*	*1/min*	
	Paddle switch	• *Start and/or stop control*	*3-4/min*	
	Other:			

Physical Demands

Whole Body Physical Demands

Identify each of the physical demands required by a Slipman, by placing a check mark (✓) in the far left column.

The Comments section may contain information relating to duration, frequencies and other variations in the physical demands.

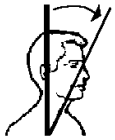
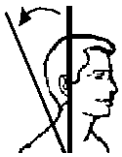
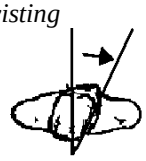
	Physical Demands	Tasks or Activity	Percent of Shift				Comments
			Rarely 0 to 5%	Occasionally 6 to 33%	Frequently 34 to 66%	Constantly 67 to 100%	
	Walking	☐ *Guiding logs* ☐ *Running out lines*			✓		• *More for jackladder*
	Sitting						*Not Applicable*
	Standing	☐ *Feeding logs into jackladder* ☐ *Feeding logs into side lift*			✓		• *More for side lift*
	Climbing (stairs)						*Not Applicable*
	Climbing (other)						*Not Applicable*
	Balancing	☐ *Walking on logs*		✓			• *More for jackladder*
	Kneeling/ Crouching	☐ *Cutting bundle wires*	✓				
	Other:						

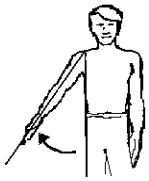
Body Postures

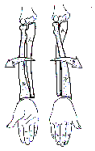
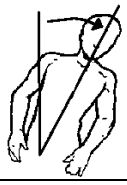
The table below outlines the body postures held or repeated throughout the shift by a Slipman.

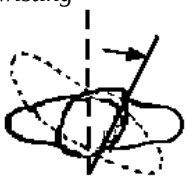
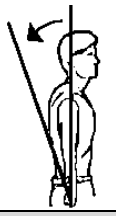
For each of the postures identified, indicate whether it occurs by placing a check mark (✓) in the far left column.

The Comments section may contain information relating to duration, frequencies, and other variations in posture.

	Body Posture	Task(s)	Percent of Shift				Comments
			Rarely 0 to 5%	Occasionally 6 to 33%	Frequently 34 to 66%	Constantly 67 to 100%	
Neck							
	Flexion 	• *Feeding side lift*		✓			
	Extension 						*Not Applicable*
	Twisting 						*Not Applicable*

Body Posture		Task(s)	Percent of Shift				Comments
			Rarely 0 to 5%	Occasionally 6 to 33%	Frequently 34 to 66%	Constantly 67 to 100%	
Shoulder							
	Flexion 	• *Guiding logs down slip* • *Feeding jackladder and side lift*			✓		
	Abduction 	• *Guiding logs down slip* • *Feeding jackladder and side lift*			✓		
	Extension 						*Not Applicable*

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 						*Not Applicable*
Wrist							
	Flexion 						*Not Applicable*
	Extension 						*Not Applicable*
	Ulnar Deviation 	• *Using pike pole to guide logs down slip* • *Using pike pole to feed jackladder and side lift*			✓		
	Radial Deviation 						*Not Applicable*
Back							
	Flexion 	• *Bending to cut bundle wires*	✓				
	Lateral Flexion 						*Not Applicable*

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							
	Twisting 						*Not Applicable*
	Extension 						*Not Applicable*
Other:							

Hand Grips

The table below contains a list of the common types of hand grips (i.e., how objects are held) used by a Slipman.

For each of the hand grips, indicate which types of grips are used at your mill by placing a check mark (✓) in the far left column.

The Comments section may contain information relating to duration, frequencies, hand used, etc.

	Type	Task(s)	Percent of Shift				Comments
			Rarely 0 to 5%	Occasionally 6 to 33%	Frequently 34 to 66%	Constantly 67 to 100%	
	Power 	• *Using pike pole to guide logs down slip*		✓			• *Workers constant use pike poles*
	Power 	• *Using pike pole to feed jackladder and side lift*			✓		• *Workers constantly use pike pole*
	Power 	• *Using bolt cutters to cut bundle wires*	✓				
	Pinch 						*Not Applicable*
	Hook 						*Not Applicable*
	Precision 						*Not Applicable*
	Other:						

Manual Material Handling

The table below contains a list of manual material handling tasks (e.g., pushing, pulling, lifting, lowering, and carrying) performed by a Slipman.

Indicate which tasks are performed by placing a check mark (✓) in the far left column. Fill in the weight (or force) required to move the objects (may have to estimate).

The Comments section may contain information relating to duration, frequencies, and details regarding characteristics of the object handled.

	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 on pike pole to guide and feed logs	*90 (estimated)*			✓		• *The weight of push varies depending on size of log and obstructions (other logs in way)*
	Pulling on pike pole to guide and feed log	*90 (estimated)*			✓		• *The weight of pull varies depending on size of log and obstructions (other logs in way)*
	Lifting and lowering boom chains	*16 - 32*	✓				• *Occurs only at places that have boom chains attached to lines*
	Lifting and carrying boom chains attached to lines when running-out lines	*16 - 32*	✓				• *Occurs only at places that have boom chains attached to lines*
	Lifting and carrying bolt cutters when cutting bundle wires	*6.8*	✓				• *Occurs only at places that cut wires with bolt cutters*
	Carrying pike pole when guiding and feeding logs	*1.4*				✓	• *Carried most of the day*
	Other:						

Hand Tools

Indicate the hand tools used by a Slipman at your mill by placing a check mark (✓) in the far left column. Determine the weight of the hand tool and enter it in the appropriate column.

The Comments section may contain information relating to duration and frequencies of use.

Type of Tool	Task(s)	Weight of Tool (kg)	Percent of Shift				Comments
			Rarely 0 to 5%	Occasionally 6 to 33%	Frequently 34 to 66%	Constantly 67 to 100%	
Pike pole	• *Guiding and feeding logs*	*1.5*				✓	
Bolt cutters	• *Cutting bundle wires*	*6.8*	✓				• *Occurs only at places the cut bundle wires with bolt cutters*
Peevee	• *Guiding logs*	*5.3*	✓				• *Used to help unjam logs*
Other:							

Environmental Conditions

Work Environment

The table below contains a list of environmental conditions that may be of concern at the Slipman job.

Vibration occurs when the body is in contact with a vibrating object or surface such as a tool, a seat, or the floor. If vibration occurs at this job, check 'Yes' and then mark whether the vibration is whole body and/or hand transmitted and the path through the body by which the vibration is transmitted. If vibration does not occur at this job, check 'No'.

If possible, indicate the appropriate value for the noise and lighting levels at your mill for the Slipman. For the lighting level, include the location of the measurements within the workstation.

Factor	
Vibration ☐ Yes *(Check one)* ☐ No	☐ Whole body ☐ Seat ☐ Floor
	☐ Hand transmitted ☐ Tool ☐ Other: _____

Noise level	*Range found: 77.1 – 81.1 dB* *Mill Specific:*
Lighting level	*Range found: 1.15 – 86 klux* *Mill Specific:*
Other:	

Location of Workstation

The table below contains a list of the type of work environments a workstation may be located in.

For the workstation, indicate which of the following types of work environments apply with a check mark (✓) in the left column.

For example, the workstation may be inside the main building but exposed to the outside via a doorway that is always open and has both a fan and a heater. In this situation all three, 'Inside exposed', 'Fan' and 'Heater', would be checked for this workstation.

	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.

For your mill, 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 Slipman job at your mill, indicate which of the PPE items are required with a check mark (✓).

	Gloves 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 at your mill.

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.

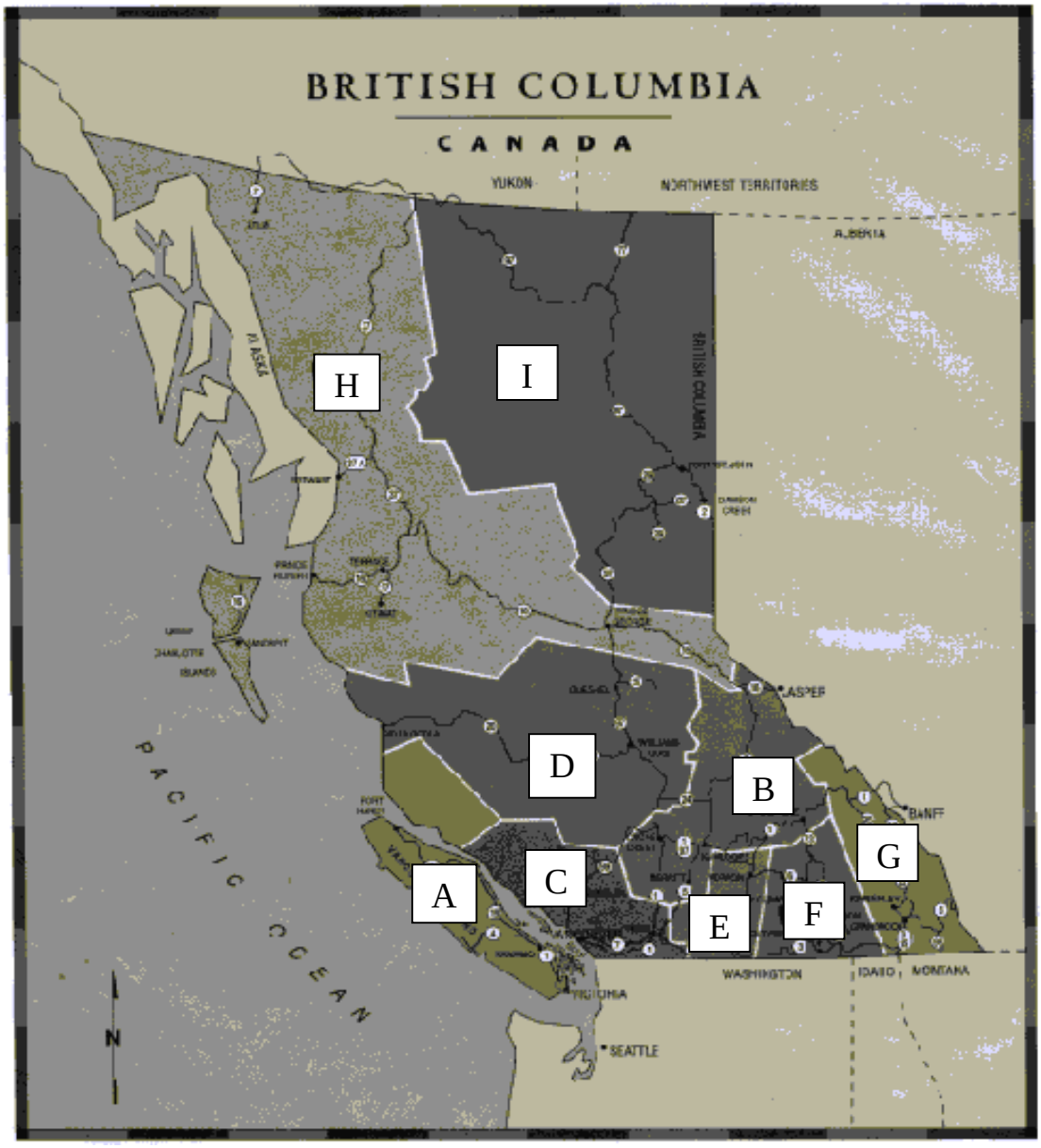
For the lightest species handled, enter the lb./board foot value, the multiple for the smallest size of wood, and the shortest length of this wood. Multiply these values together to determine the weight of the board in pounds.

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
Slipman

Purpose

The Risk Factor Identification Checklist for a Slipman 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 – Slipman

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.

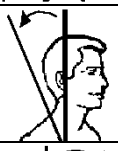
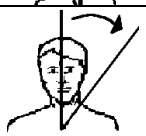
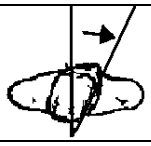
Static Postures: Static loading (sustained exertions) is physical effort (body postures) that is held, requiring muscle contraction for more than a short time.

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.

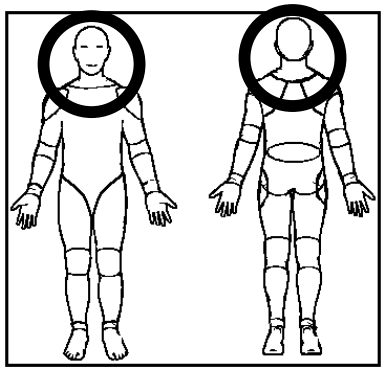
Awkward Postures: Awkward postures occur when there is a deviation from a power working posture. Some examples of awkward postures typically include reaching behind, twisting, working overhead, and forward or backward bending.

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 down and up)			S O	
Ask the worker: Do you spend a large percentage of the day performing one action or task? (e.g., feeding logs into mill)			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., looking down at logs)			S O	
Awkward Posture				
Flexion 			S O	
Extension 			S O	
Lateral Bending 			S O	
Rotation 			S O	

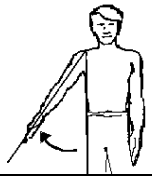
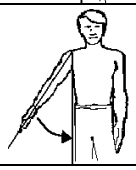
Please indicate whether the following direct risk factors were identified at the **NECK**.		
Direct Risk Factors	Repetition	☐Yes ☐No
	Static Posture	☐Yes ☐No
	Awkward Posture	☐Yes ☐No
In the **Injury Statistics** investigation, were there injury reports for the Neck or Head/Eye or Upper Back? (see Worksheet 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



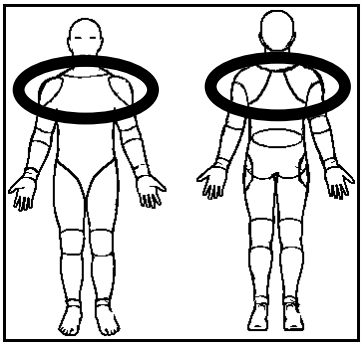
Body parts within the circled area will be classified as NECK issues.

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., pushing/pulling on pike pole to guide logs)			S O	
Ask the worker: Do you spend a large percentage of the day performing one action or task? (e.g., feeding logs into mill)			S O	
Static Posture				
Ask the worker: Do tasks require your shoulders to be maintained in a fixed or static posture? (e.g., holding the arm away from the body)			S O	
Ask the worker: Do you hold parts, tools, or objects for long periods? (e.g., pike pole)			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



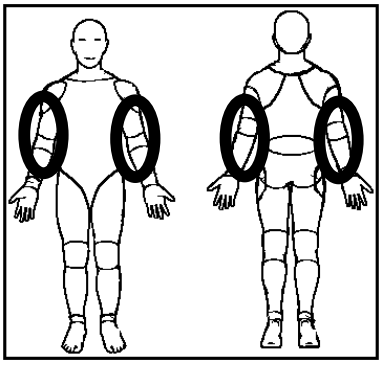
Body parts within the circled area will be classified as SHOULDER issues.

ELBOW

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

Static Posture	N	Y		Comments:
Ask the worker: Do tasks require your hand and arm to be maintained in a fixed or static posture?			S O	
Ask the worker: Do you apply constant pressure on controls/objects with your hand? (e.g., pushing on the end of a pike pole with hand)			S O	
Ask the worker: Do you hold parts, tools, or objects for long periods? (e.g., pike pole)			S 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 O	
Vibration				
Ask the worker: Is vibration transmitted to your hand through a tool or piece of equipment? (e.g., grinder)			S 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



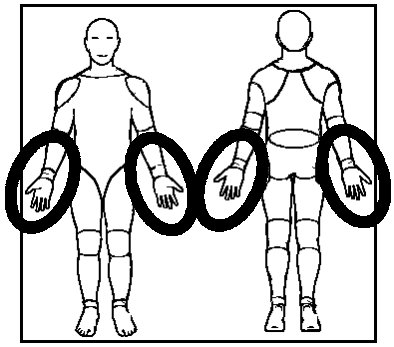
Body parts within the circled area will be classified as ELBOW issues.

WRIST/HAND

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

Static Posture		N	Y		Comments:
Ask the worker: Do tasks require any part of your arm or hand to be maintained in a fixed or static posture?				S O	
Ask the worker: Do you apply constant pressure on controls/objects with your hand?				S O	
Ask the worker: Do you hold parts, tools, or objects for long periods? (e.g., pike pole)				S 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? (e.g., hand tools that dig into the palm of the hand)				S O	
Ask the worker: Do you use your hand like a hammer for striking?				S O	
Awkward Posture					
Flexion				S O	
Extension				S O	
Ulnar Deviation				S O	
Radial Deviation				S O	
Vibration					
Ask the worker: Is vibration transmitted to your hand through a tool or piece of equipment? (e.g., grinder)				S O	

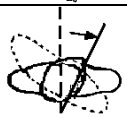
Please indicate whether the following direct risk factors were identified at the **WRIST/HAND**.		
Direct Risk Factors	Force	☐Yes ☐No
	Repetition	☐Yes ☐No
	Static Posture	☐Yes ☐No
	Contact Stress	☐Yes ☐No
	Awkward Posture	☐Yes ☐No
	Vibration	☐Yes ☐No
In the **Injury Statistics** investigation, were there 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



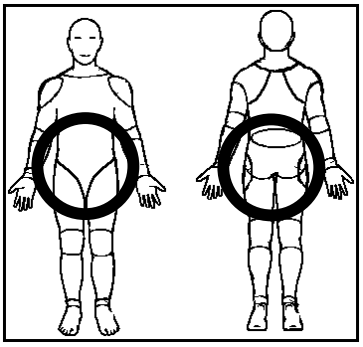
Body parts within the circled area will be classified as WRIST issues.

LOW BACK OR HIP/THIGH

Force	N	Y		Comments:
Is forceful physical handling performed? Such as: 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., bending over to feed logs into mill)			S O	
Ask the worker: Do you spend a large percentage of the day performing one action or task? (e.g., feeding logs into mill)			S O	
Static Posture				
Ask the worker: Do tasks require your trunk and upper body to be maintained in a fixed or static posture? (e.g., bending forward to cut bundle straps)			S O	
Are workers required to sit or stand in a stationary position for long periods of time during the shift?			S 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., workstation that digs into the hip or thigh)			S O	

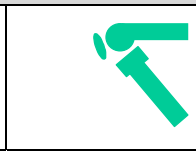
Awkward Posture		N	Y		Comments:
Flexion				S O	
Extension				S O	
Lateral Bending				S O	
Twisting				S O	
Vibration					
Ask the worker: Is your whole body exposed to vibration for significant portions of the work shift? (e.g., standing on vibrating surface)				S O	

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

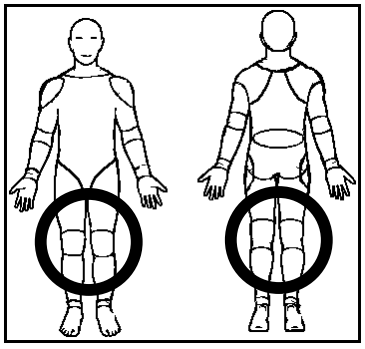


Body parts within the circled area will be classified as LOW BACK issues.

KNEE

Repetition	N	Y		Comments:
Are identical or similar motions performed over and over again?			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)			S O	
Are workers required to sit or stand in a stationary position for long periods of time during the shift?			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)?			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

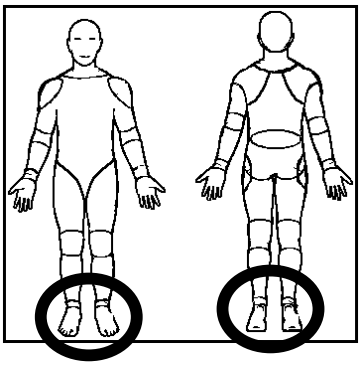


Body parts within the circled area will be classified as KNEE issues.

ANKLE/FOOT

Repetition	N	Y		Comments:
Are identical or similar motions performed over and over again? (e.g., walking on uneven ground)			S O	
Static Posture				
Are workers required to stand in a stationary position for long periods of time during the shift?			S O	
Awkward Posture				
Flexion 			S O	
Extension 			S O	
Vibration				
Ask the worker: Is your whole body exposed to vibration for significant portions of the work shift? (e.g., standing on vibrating surface)			S 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?			S O	
Are there problems handling a load due to its fragile, unbalanced, or non-rigid conditions?			S O	
Ask the worker: Do you experience situations where mechanical aids or equipment are not readily available to assist with manipulating an object? (e.g., hoists)			S O	
Are handles for tools and equipment inappropriate in terms of size or shape? (e.g., hand tools)			S 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 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 O	

ENVIRONMENTAL CONDITIONS

Temperature				
Ask the worker: Are your hands or arms exposed to cold from exhaust air, cold liquids or solids?			S 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 O	
Lighting				
Ask the worker: Do you assume awkward postures to overcome problems associated with glare, inadequate lighting, or poor visibility?			S O	

ENVIRONMENTAL CONDITIONS [CONTINUED]

Noise	N	Y		Comments:
Have there been complaints on the level of noise in the work area?			S O	
Ask the worker: Are there any distracting or annoying noises at the workstation?			S O	

WORK ORGANISATION

	N	Y		Comments:
Is the work externally-paced or controlled by a machine or the process?			S O	
Do peak workloads or sudden increases in pace occur with the tasks?			S 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 O	
Ask the worker: Are there indications of excessive fatigue or adverse health effects due to shiftwork?			S 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 O	
Ask the worker: Are tasks in a job rotation program similar to one another, and therefore not providing a variation in movements?			S O	

Work Manual

Industrial
Musculoskeletal
Injury
Reduction
Program

Slipman

This Work Manual contains information about the body parts found to be at risk of musculoskeletal injury (MSI) for the Slipman (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
Slipman

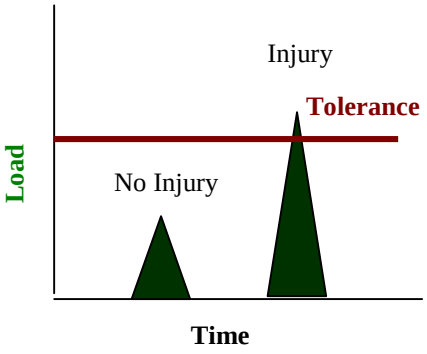
Disclaimer

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

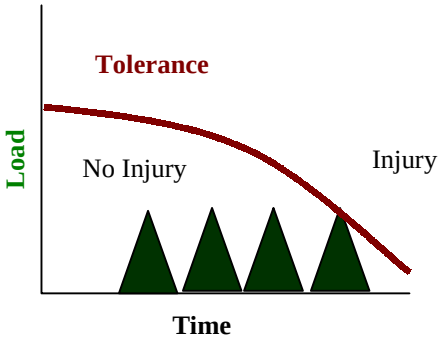
Injuries occur when …
Loads exceed tissue tolerances



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.

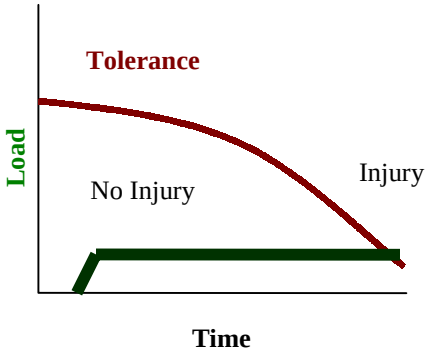
Example – a worker going over on their ankle and spraining it.



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 Slipman 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 Slipman. 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.

NECK

Direct Risk Factors:
Awkward Postures
Static Postures
Repetition

A Slipman must hold the head forward in order to guide logs up the slipway, and to cut the bands on loads.

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

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.
- Neck muscles must support the weight of the head while in a forward position. The more the neck is bent, the greater the load on the muscles and tendons.

Static Postures

- When the neck is held still in a forward position, the muscles of the neck must remain tense to support the weight of the head. With no time allowed for recovery, the constant state of tension in the neck muscles may cause fatigue. If the constant stress is sufficient, and recovery is not adequate, the tissues may fatigue to the point of injury.

Repetition

- When the head is repeatedly bent forward, 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.

INDIRECT RISK FACTORS

Workstation Design

Working Heights

- A Slipman keeps the neck in a bent position because the worker has to look down for long periods when feeding logs into mill. The added height of the platform for the side lift increases the loading on the neck muscles by increasing neck bending.

CONSEQUENCES

- When the head is held in a forward bent 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 78 & 79.
- For exercises that can help to prevent ***neck*** injuries, see the ***Neck section of the Body Manual.***

NECK/SHOULDER

Direct Risk Factors:
Force
Repetition

A Slipman must pull on logs with a pike pole in order to guide logs into the mill.

BACKGROUND INFORMATION

- The neck and shoulder regions work together to produce certain movements, or to hold certain postures. The larger muscles of the neck and upper back (e.g., trapezius) move the shoulders, and the larger muscles of the shoulders (e.g., deltoids) move the arms.

DIRECT RISK FACTORS

Force

- Neck and shoulder muscles support the weight of objects held in the hands. The heavier the object, the greater the load on the muscles and tendons.

Repetition

- When workers repeatedly pull on logs, the muscles of the neck and shoulder 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.

INDIRECT RISK FACTORS

Workstation Design

Additional Workstation Design Options

- The type of infeed equipment used will determine how much effort is required to load logs. Side lifts may cause problems when only one side of the log catches on chair.
- The slip or raceway layout can effect the amount of force necessary to guide logs. Straight slips or raceways allow logs to flow straighter, producing less jams and cross-ups.
- The flow control device used to counteract the effects of currents will determine how easy it is to guide and feed logs.

CONSEQUENCES

- Forceful and repeated pulling on logs can lead to neck and/or shoulder strain.
- Signs and symptoms of neck and shoulder tissue injury include pain, tenderness, muscle spasm in the neck/shoulder area, and headaches.

SUGGESTED SOLUTIONS

- For specific solutions that may prevent injuries to the Neck/Shoulder, please see the column labelled "Neck/Shoulder" in the Summary of Solutions on pages 78 & 79.
- To help prevent ***neck*** discomfort, see the upper trapezius stretch in the ***Neck section of the Body Manual.***

SHOULDER

Direct Risk Factors:
Force
Awkward Postures
Repetition

A Slipman must push and pull with pike poles in order to guide logs into the mill.

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.

DIRECT RISK FACTORS

Force

- The rotator cuff stabilises the shoulder joint when objects are pushed and pulled. 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.

Awkward Postures

- The rotator cuff stabilises the shoulder joint when the arms are away from the body. The farther away the arms are from the body, the greater the load on the rotator cuff.

Repetition

- When the arms are repeatedly raised, the rotator cuff is subjected to repeated stress with little time for recovery. If the repetitive stress is excessive, and recovery is not adequate, the tissues may fatigue to the point of injury.

INDIRECT RISK FACTORS

Workstation Design

Additional Workstation Design Options

- The type of infeed equipment used will determine how much effort is required to load logs. Side lifts may cause problems when only one side of the log catches on chair.
- The slip or raceway layout can effect the amount of force necessary to guide logs. Straight slips or raceways allow logs to flow straighter, producing less jams and cross-ups.
- The flow control device used to counteract the effects of currents will determine how easy it is to guide and feed logs.

CONSEQUENCES

- When using the arms to push and pull logs, the rotator cuff 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 Shoulder, please see the column labelled “Shoulder” in the Summary of Solutions on pages 78 & 79.
- For exercises that can help to prevent ***shoulder*** injuries, see the ***Shoulder section of the Body Manual.***

ELBOW/WRIST

Direct Risk Factors:
Force
Awkward Postures
Repetition

A Slipman must grip hand tools in order to guide logs into the mill, and cut banding wire.

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.

Awkward Postures

- 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) or too small (e.g., narrow tool handles) could increase the tension generated by muscles, and lead to tissue fatigue at the tendon/bone connection.

- The position of the wrist also 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.

Repetition

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

INDIRECT RISK FACTORS

Characteristics of Objects Being Handled

Container, Tool, and Equipment Handles

- The type of bolt cutters will determine the force required to cut bundle wires. Some workplaces use pneumatic bolt cutters, or another type of power cutter, to reduce grip force.
- The type and size of gloves worn can affect grip force. Gloves with slippery surfaces, or gloves that are too big or too small, increase the effort required to grip.

Environmental Conditions

Cold Exposure

- Grip force is affected by temperature. Loss of tactile feel that occurs when hands get cold causes over-gripping. Gloves are used to keep hands warm.

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

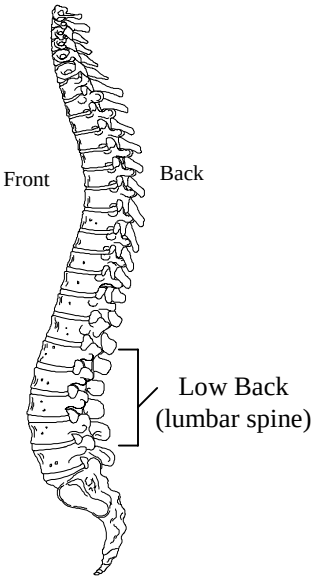
- For specific solutions that may prevent injuries to the Elbow/Wrist, please see the column labelled “Elbow/Wrist” in the Summary of Solutions on pages 78 & 79.
- For exercises that can help to prevent ***elbow*** injuries, see the ***Elbow section of the Body Manual.***

LOW BACK

Direct Risk Factors:
Force
Awkward Postures
Repetition

A Slipman must bend forward and to the side in order to guide logs into the mill.

Neutral Spine



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.

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.

Awkward Postures

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

Repetition

- Repeated forward and side bending 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.

INDIRECT RISK FACTORS

Workstation Design

Additional Workstation Design Options

- The type of infeed equipment used will determine how much effort is required to load logs. Side lifts may cause problems when only one side of the log catches on chair.
- The slip or raceway layout can effect the amount of force necessary to guide logs. Straight slips or raceways allow logs to flow straighter, producing less jams and cross-ups.
- The flow control device used to counteract the effects of currents will determine how easy it is to guide and feed logs.

CONSEQUENCES

- Repeatedly bending forward and to the side 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 78 & 79.
- For exercises that can help to prevent ***back*** injuries, see the ***Back section of the Body Manual.***

HIP

Direct Risk Factors:
Force
Repetition

A Slipman must forcefully pull on logs in order to guide them into the mill.

BACKGROUND INFORMATION

- The hip is designed for stability, as a result of the architecture of the bones. Muscles also contribute to the stability of the hip joint. Range of motion in the hip joint is primarily determined by the flexibility of muscles and soft tissues in this region.

DIRECT RISK FACTORS

Force

- Pulling sideways on a log with a pike pole loads the muscles in one hip. The greater the pull, the greater the loading on the hip muscles.

Repetition

- Repeated pulling to one side of the body can lead to muscle imbalance in the hips. The larger the muscle imbalance, the greater the loading on one hip.

INDIRECT RISK FACTORS

Workstation Design

Additional Workstation Design Options

- The type of infeed equipment used will determine how much effort is required to load logs. Side lifts may cause problems when only one side of the log catches on chair.
- The slip or raceway layout can effect the amount of force necessary to guide logs. Straight slips or raceways allow logs to flow straighter, producing less jams and cross-ups.
- The flow control device used to counteract the effects of currents will determine how easy it is to guide and feed logs.

CONSEQUENCES

- Repeated pulling to one side of the body can lead to muscle imbalance at the hip. This muscle imbalance may lead to excessive loading, which may cause degenerative changes in the hip, and possibly the knee and low back.
- Signs and symptoms include pain in the area around the hip joint and stiffness to one side. Muscle weakness in the affected side may also be noticed.

SUGGESTED SOLUTIONS

- For specific solutions that may prevent injuries to the Hip, please see the column labelled “Hip” in the Summary of Solutions on pages 78 & 79.

Summary of Body Parts at Risk

NECK

- A Slipman must hold the head forward in order to guide logs up the slipway, and to cut the bands on loads.

NECK/SHOULDER

- A Slipman must pull on logs with a pike pole in order to guide logs into the mill.

SHOULDER

- A Slipman must push and pull with pike poles in order to guide logs into the mill.

ELBOW/WRIST

- A Slipman must grip hand tools in order to guide logs into the mill, and cut banding wire.

LOW BACK

- A Slipman must bend forward and to the side in order to guide logs into the mill.

HIP

- A Slipman must forcefully pull on logs in order to guide them into the mill.

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											
Characteristics of Objects Being Handled	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	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦

***** *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.*

****** *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.*

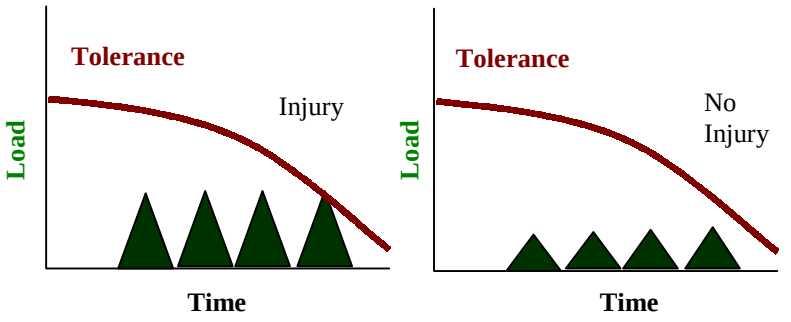
☐ = Indicates that the risk factor was assessed and was not found to be a contributor to the body part problem.

♦ = 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 78 & 79 for specific problem/solution information. Additional information on some risk factors can be found in the General Risk Factor Solutions Manual.

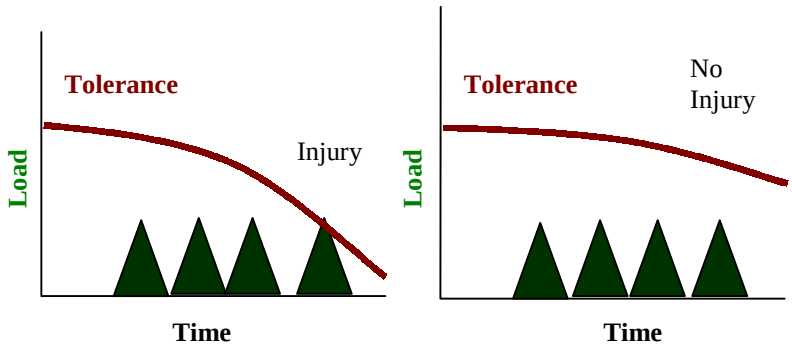
Injury Prevention

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 Slipman 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

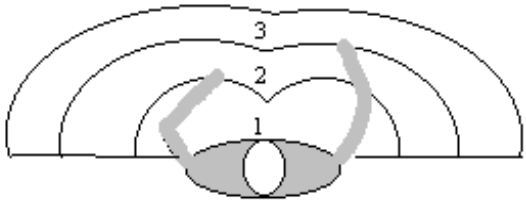
PERSONAL PROTECTIVE EQUIPMENT
These are devices worn by a worker to reduce the risk of injury, including gloves, kneepads, hearing protection, and leather aprons.

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.

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 height specific for the Slipman workstation, 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.

Platform height

E — To reduce neck bending, keep the deck platform height as low as possible. The jackladder log infeed device appears to be less stressful on the neck because the deck is at water level. The side lift, with its platform above water level, puts the neck in a more awkward posture for long duration.

Ear muffs

PPE — To reduce the loading on neck muscles, avoid wearing earmuffs. Instead, use earplugs, or custom fitted ear pieces if more protection is needed.

Look down with eyes

WP — To reduce neck bending, look down with the eyes. To maintain good postural alignment and decrease loading on tissue from the head forward posture, perform the wall exercise in the Body Manual for the Back.

ADDITIONAL WORKSTATION DESIGN OPTIONS

Log Infeed Device

E

Improved log infeed devices can reduce the force required to feed logs into the mill. Jackladders were observed to require less force to load logs than side lifts. Another alternative may be to use a peco crane to mechanically feed logs. Some mills use a grapple operator to mechanically feed jackladders.

Slip Layout

E

To reduce the force required to guide and feed logs, design the slip to allow logs to flow straight down. Straight slips or raceways appear to cause less cross-ups and jams than slips with bends.

Flow Control Device

E

To reduce the force required to guide and feed logs, use a flow control device to counteract the effects of current. A number of mills have designed unique solutions to this problem. Some mills use a pump to generate current. Other mills use lines to pull logs towards the Slipman. Of the systems observed, lines with boom chains appeared to work the best. The flexibility in placing the boom chain allows the worker to turn the logs if desired. Lines that attach to bundle wires can pull logs off line, increasing cross-ups.

Note that using a boom chain attached to lines requires workers to carry heavy (16 kg) chains over unstable logs.

Characteristics of Objects Being Handled

LOAD CONDITION AND WEIGHT DISTRIBUTION

Keep back straight

WP

To increase back tolerances, push and pull on the pike pole with a straight back. Also try to maintain a straight back when cutting bundle wires. To enhance recovery, stretch back muscles using the hanging stretch found in the Body Manual for the Back.

Alternate sides

WP

To reduce repeated stress to the hip, alternate sides when pulling on pike poles. This will help avoid developing muscle imbalance in the hips. To ensure muscle balance in the hips, use the side lying leg lift exercise found in the Body Manual for the Back. To help keep the hip muscles loose, use the hip extensor stretch found in the Body Manual for the Back.

CONTAINER, TOOL AND EQUIPMENT HANDLES

Wrap tools

E

In order to reduce the force required to grip hand tools, increase the friction between the tool handles and the operator's glove. Due to the smooth, slippery surface of metal or wooden tool handles (e.g., pike pole, picaroon) a Slipman must use a higher grip force in order to maintain control of the tool. This can put the elbow, and possibly the wrist and hand, at risk of injury. Wrapping the tool handles with foam, rubber, medical/athletic tape, or modifying the surface using other friction increasing material (e.g., gritty paint if plastic substances are not allowed) would increase the friction between the handle and the Slipman's glove, decreasing the grip forces required.

Rubber palmed gloves

PPE

In order to reduce grip forces required by the Slipman, the operator should wear thin, close fitting gloves with a "sticky" palm surface to increase the friction between the gloves and the tool handles.

Bolt cutters

E To reduce the grip force required to cut bundle wires, replace manual bolt cutters with pneumatic bolt cutters or another type of power cutter.

Use the whole body

WP To reduce the stress on the shoulder when guiding and feeding logs, keep hands in line with the shoulder joint when pulling, and place the butt-end of the pike pole at the top of the hip and use the legs to generate force when pushing. Encourage the use of both sides of the body to support the pike pole.

Environmental Conditions

Proper fitting gloves

PPE To reduce the grip force required with hand tools, provide workers with gloves that have rubber palms. Workers should also be provided with a good supply of dry gloves for wet, cold weather. Glove liners may be useful in keeping the hands warm.

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

Work Organisation

Rotate positions

A To reduce exposure to repeated stress, encourage workers to rotate to other positions on the boom.

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
Platform height	**74**		**F A**	**F A**	**F**			**F A**	**F**			
Ear muffs	**74**	**F**										
Look down with eyes	**74**	**R A**										
Log Infeed Device	**75**		**F A**	**F A**	**F**			**F A**	**F**			
Slip Layout	**75**		**F A R**	**F A R**	**F**			**F A R**				
Flow Control Device	**75**		**F A R**	**F A R**	**F**			**F A R**				
Keep back straight	**76**							**F A**				
Alternate sides	**76**							**F R**	**F R**			
Wrap tools	**76**				**F**							
Rubber palmed gloves	**76**				**F**							
Bolt cutters	**77**			**F A**	**F A**							
Use the whole body	**77**		**F**	**F**	**F**			**F**				

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
Proper fitting gloves	**77**				**F**							
Rotate positions	**77**	**R**	**R**	**R**	**R**			**R**	**R**			
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										
Job Rotation	◆	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*

SLIPMAN MSI SAFETY GUIDE

OBJECTIVE: To identify ergonomic risks involved in the Slipman 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 Slipman.

CHECK IF THIS APPLIES	ACTIVITY OF RISK	ERGONOMIC RISK FACTOR(S)	POTENTIAL HAZARDS	SUGGESTED SOLUTIONS
	Neck A Slipman must hold the head forward in order to guide logs up the slipway, and to cut the bands on loads.	**Awkward Postures** **Static Postures** **Repetition**	• 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. • Neck muscles must support the weight of the head while in a forward position. The more the neck is bent, the greater the load on the muscles and tendons. • When the neck is held still in a forward position, the muscles of the neck must remain tense to support the weight of the head. With no time allowed for recovery, the constant state of tension in the neck muscles may cause fatigue. If the constant stress is sufficient, and recovery is not adequate, the tissues may fatigue to the point of injury. • When the head is repeatedly bent forward, 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.	• To reduce neck bending, look down with eyes. • To reduce the loading on neck muscles, avoid wearing ear muffs. Use ear plugs, or custom fitted ear pieces if more protection is needed, to reduce loading on the neck. • For exercises that can help prevent ***neck*** injuries, ***see the neck section of the Body Manual***.

CHECK IF THIS APPLIES	ACTIVITY OF RISK	ERGONOMIC RISK FACTOR(S)	POTENTIAL HAZARDS	SUGGESTED SOLUTIONS
	Neck/Shoulder A Slipman must pull on logs with a pike pole in order to guide logs into the mill.	**Force** **Repetition**	• Neck and shoulder muscles support the weight of objects held in the hands. The heavier the object, the greater the load on the muscles and tendons. • When workers repeatedly pull on logs, the muscles of the neck and shoulder 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.	• To reduce stress on the shoulder, keep hands in line with the shoulder joint when pulling. • Place the butt-end of the pike pole at the top of the hip and use the legs to generate force when pushing. • Encourage the use of both sides of the body to support the pike pole. • For exercises that can help prevent ***neck*** and ***shoulder*** injuries, ***see the neck and shoulder sections of the Body Manual***.
	Shoulder A Slipman must push and pull with pike poles in order to guide logs into the mill.	**Force** **Awkward Postures** **Repetition**	• The rotator cuff stabilises the shoulder joint when objects are pushed and pulled. 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. • The rotator cuff stabilises the shoulder joint when the arms are away from the body. The farther away the arms are from the body, the greater the load on the rotator cuff. • When the arms are repeatedly raised, the rotator cuff is subjected to repeated stress with little time for recovery. If the repetitive stress is excessive, and recovery is not adequate, the tissues may fatigue to the point of injury.	

CHECK IF THIS APPLIES	ACTIVITY OF RISK	ERGONOMIC RISK FACTOR(S)	POTENTIAL HAZARDS	SUGGESTED SOLUTIONS
	Elbow/Wrist A Slipman must grip hand tools in order to guide logs into the mill, and cut banding wire.	**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. • The width of an object affects how much muscle tension needs to be generated. Using either an overly large or a small grip requires more muscle force, and can lead to tissue fatigue at the tendon/bone connection.	• To reduce grip force required to prevent slipping, provide workers with gloves that have rubber palms. • To reduce grip force when using a pike pole, place the butt-end of the pike pole at the top of the hip, and use legs to generate force. • Encourage the use of both sides of the body to support the pike pole. • To reduce grip force when moving crossed-up logs, use the pike pole as a crow bar to increase leverage. • For exercises that can help prevent ***elbow*** and ***wrist*** injuries, ***see the elbow and wrist sections of the Body Manual***.
		Awkward Postures	• The position of the wrist also affects how much muscle tension needs to be generated. Gripping objects with the wrist bent increases the tension generated by muscles.	
		Repetition	• Repeated stress to the elbow without adequate rest could fatigue tissues to the point of injury.	

CHECK IF THIS APPLIES	ACTIVITY OF RISK	ERGONOMIC RISK FACTOR(S)	POTENTIAL HAZARDS	SUGGESTED SOLUTIONS
	Low Back A Slipman must bend forward and to the side in order to guide logs into the mill.	**Force** **Awkward Postures** **Repetition**	• 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. • 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 the pressure on the walls of the discs. • 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.	• To reduce force on back when pushing pike pole, place the butt-end of the pike pole at the top of the hip, and use legs to generate force. • Encourage the use of both sides of the body to support the pike pole. • To increase back tolerances, push and pull on pike pole with a straight back. • Try to maintain a straight back when cutting bundle wires. • For exercises that can help prevent ***low back*** injuries, ***see the back section of the Body Manual***.
	Hip A Slipman must forcefully pull on logs in order to guide them into the mill.	**Force** **Repetition**	• Pulling sideways on a log with a pike pole loads the muscles in one hip. The greater the pull, the greater the loading on the hip muscles. • Repeated pulling to one side of the body can lead to muscle imbalance in the hips. The larger the muscle imbalance, the greater the loading on one hip.	• To reduce repeated stress to the hip, alternate sides when pulling on pike poles. This will help avoid developing muscle imbalance in the hips. • For exercises that can help prevent ***hip*** and ***low back*** injuries, ***see the hip and back sections of the Body Manual.***