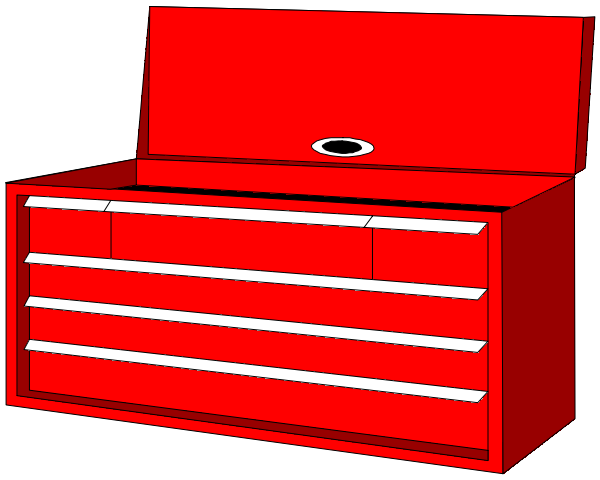
Industrial Musculoskeletal Injury Reduction Program

Common Industry Jobs (CIJs)

Log Scaler 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

LOG SCALER TOOL KIT
Table of Contents

Overview
Log Scaler

Job Summary

A Log Scaler tracks the quantity and quality of wood entering the mill. A Log Scaler is responsible for scaling logs, weighing trucks, checking quality, cleaning, and possibly shovelling snow. Refer to the Physical Demands Analysis for more detail.

Physical Demands

The physical demands of the Log Scaler may include:

a) Forceful movements of the elbow/wrist and hip
b) Repetitive movements of the neck, elbow/wrist, low back, and hip
c) Awkward postures of the neck, elbow/wrist, and low back
d) Walking and standing on uneven, muddy, and slippery terrain
e) Climbing over logs and crouching
f) Carrying a hand-held computer and scaling stick

Mental Demands

A Log Scaler uses their expertise in identifying log species and defects in order to help grade logs. Experience and good vision are an asset for a Log Scaler.

Major Variations

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

1) Some mills use:
   a) One person scaling
   b) Two person scaling

Minor Variations

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

1) When scaling, some mills place one or both ends of the logs on top of skids or other logs
2) When scaling, some mills attach the grading crayon to the end of the scaling stick
3) When weighing trucks, the position of the computer monitor will determine the amount of neck flexion and/or rotation

Physical Demands Analysis
Log Scaler

PDA General Instructions: Log Scaler

This Physical Demands Analysis (PDA) identifies the physical demands of the Log Scaler job as assessed by IMIRP ergonomists. The information reported was collected from a sample of Log Scalers 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 Log Scaler 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
Log Scaler

Task List

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

Scale logs

A Log Scaler checks logs to determine length (using a measuring tape), width (using a measuring stick), and quality. One or two Log Scalers can complete this task.

Does this task occur at your mill?

One person log scaling

☐ Yes ☐ No

Two person log scaling

☐ Yes ☐ No

A Log Scaler enters log information into a hand-held computer.

Does this task occur at your mill?

☐ Yes ☐ No

Weigh trucks

A Log Scaler weighs trucks to determine the weight of the logs, and then tags the load.

Does this task occur at your mill?

☐ Yes ☐ No

Check quality

A Log Scaler checks the quality of logs. This may require bucking logs with a chainsaw to look for defects.

Does this task occur at your mill?

☐ Yes ☐ No

Clean-up

A Log Scaler cleans the shack periodically.

Does this task occur at your mill?

☐ Yes ☐ No

Cleaning computer area

Shovel snow

A Log Scaler shovels snow from the truck scale when required.

Does this task occur at your mill?

☐ Yes ☐ No

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 Log Scaler.

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

Check marks (✓) in the Percent of Shift columns correspond to percentages 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%	
	Scale logs (1 person)			✓		• *2 to 3 loads per shift* • *1.5 to 2 hours per load* • *25 seconds per log*
	(2 person)			✓		• *4 to 5 loads per shift* • *1.5 hours per load* • *15 seconds per log*
	Weigh trucks			✓		• *50 to 150 trucks per shift* • *10 minutes per truck* • *Percent of Shift may be 'Occasionally" with fewer trucks*
	Check quality	✓				• *Varies from 1 to 2 times per shift to 1 to 2 times per week* • *10 to 15 minutes per log*
	Clean-up	✓				• *2 hours per week.*
	Shovel snow		✓			• *Up to 2 hours at a time in winter time*
	Other:					

Organisational Factors

The table below contains a list of organisational factors for a Log Scaler. 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.* ☐ *Two 15 minute breaks* ☐ *One 30 minute lunch break*
Informal breaks	☐ *Yes – amount of time varies depending on the amount of work to be done that day* ☐
Work pace	☐ *Scales 2 to 3 loads per day* ☐ *Scales 4 to 5 loads per day* ☐
	☐ *Weighs 50 to 100 trucks per day* ☐ *Weighs 100 to 150 trucks per day* ☐
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)_____

Workstation Characteristics

Dimensions & Layout

Indicate the specified dimensions of the workstation to the nearest centimetre. Please refer to Figure 1 for the measurement locations.

Workstation Dimensions	
(A) Monitor height	cm
(B) Table height	cm
(C) Seat height	cm
(D) Weigh scale display height	cm

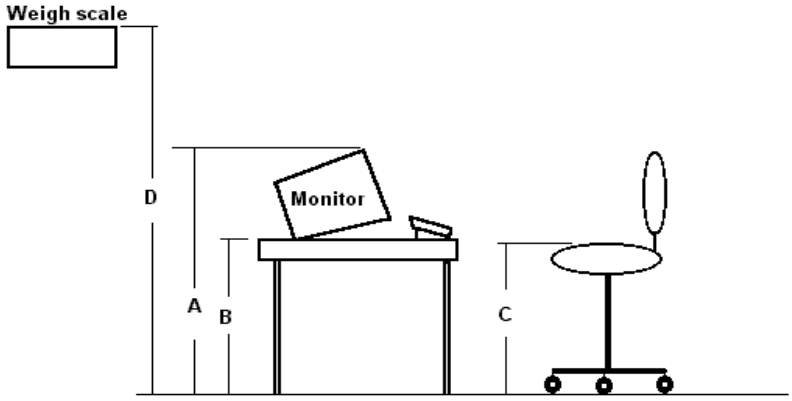


Figure 1: Truck Weigh Station

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 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 ☐ Foot rest ☐ Lumbar support ☐ Castors # _____ 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 Log Scaler.

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

	Type of Control	Function	Frequency	Comments
	Finger push buttons for hand-held computer	• *Enter data for each log scaled*	*600 times per shift*	
	Computer keyboard	• *Enter data for each log truck*	*50 to 150 times per shift*	
	Other:			

Physical Demands

Whole Body Physical Demands

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

Check marks (✓) in the Percent of TASK columns correspond to percentages found during the ergonomic investigation. The Comments section may contain information relating to duration, frequencies and other variations in the physical demands.

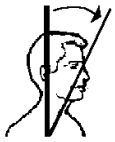
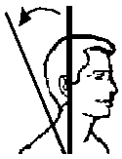
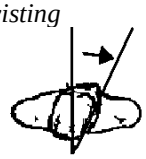
	Physical Demands	Tasks	Percent of TASK				Comments
			Rarely 0 to 5%	Occasionally 6 to 33%	Frequently 34 to 66%	Constantly 67 to 100%	
	Walking	• *Scale logs (1 person)*			✓		• *10 seconds per cyclelog*
		• *Scale logs (2 person)*		✓			• *3 seconds per cycle*
	Sitting	• *Weigh trucks*		✓			• *If chair is available*
				✓			• *Sitting in shack during rest breaks* • *Amount of time sitting varies in a day*
	Standing	• *Weigh trucks*				✓	• *If no chair is available at computer station*
		• *Scale logs (1 person)*		✓			
		• *Scale logs (2 person)*			✓		
	Climbing (logs)	• *Scale logs (1 person)*		✓			• *2 seconds per cycle if logs are elevated on skids*
		• *Scale logs (2 person)*		✓			• *2 seconds per cycle if logs are elevated on skids*
	Balancing						*Not Applicable*
	Kneeling/ Crouching	• *Scale logs (1 person)*		✓			• *Depends on worker technique, and height of logs being scaled*
		• *Scale logs (2 person)*			✓		• *Depends on worker technique, and height of logs being scaled*
	Other:						

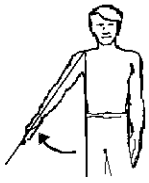
Body Postures

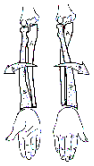
The table below outlines the body postures held or repeated throughout the shift by a Log Scaler.

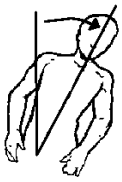
For each of the postures identified, indicate whether it occurs by placing a check mark (✓) in the far left column.

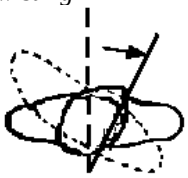
Check marks (✓) in the Percent of TASK columns correspond to percentages found during the ergonomic investigation. The Comments section may contain information relating to duration, frequencies, and other variations in posture.

	Body Posture	Task(s)	Percent of TASK				Comments
			Rarely 0 to 5%	Occasionally 6 to 33%	Frequently 34 to 66%	Constantly 67 to 100%	
Neck							
	Flexion 	• *Scale logs (1 person)*		✓			• *Looking at hand-held computer* • *2 to 3 loads per shift* • *200 logs per load* • *4 seconds per log*
		• *Scale logs (2 person)*			✓		• *Looking at hand-held computer* • *2 to 3 loads per shift* • *200 logs per load* • *4 seconds per log*
		• *Weigh trucks*		✓			• *Looking at keyboard and monitor when entering data* • *50 –150 times per shift for 1 minute* • *Depends on location of computer monitor*
	Extension 	• *Scale logs (2 person)*		✓			• *Looking up the length of the log* • *4 to 5 loads per shift* • *200 logs per load* • *1 second per log*
		• *Weigh trucks*		✓			• *Tagging loads with stapler* • *50 to 150 trucks per day* • *1 to 2 times per truck* • *2 seconds per log*
	Twisting 	• *Scale logs (2 person)*	✓				• *Looking up the length of the log and communicating with partner* • *4 to 5 loads per shift* • *200 logs per load* • *0.5 second per log*
		• *Weigh trucks*		✓			• *Viewing trucks* • *Depends on location of scale*
		• *Weigh trucks*		✓			• *Viewing computer monitor* • *Depends on location of computer monitor*

Body Posture	Task(s)	Percent of TASK				Comments
		Rarely 0 to 5%	Occasionally 6 to 33%	Frequently 34 to 66%	Constantly 67 to 100%	
Shoulder						
Flexion 	• *Scale logs (1 person)*		✓			• *Checking lengths, and hooking and unhooking tape measure* • *45 to 90 degrees* • *2 to 3 loads per shift* • *200 logs per load* • *1 to 2 seconds per log* • *Arm hangs down; no muscle contraction required*
	• *Scale logs (2 person)*		✓			• *Checking lengths, and hooking and unhooking tape measure* • *45 to 90 degrees* • *2 to 3 loads per shift* • *200 logs per load* • *1 to 2 seconds per log* • *Arm hangs down; no muscle contraction required*
	• *Weigh trucks*	✓				• *Tagging loads with stapler above shoulders* • *50 to 150 trucks per day* • *1 to 2 times per truck* • *2 seconds per log*
Abduction 	• *Scale logs (1 person)*	✓				• *Checking widths* • *2 to 3 loads per shift* • *200 logs per load* • *0.5 seconds per log*
	• *Scale logs (2 person)*	✓				• *Checking widths* • *4 to 5 loads per shift* • *200 logs per load* • *0.5 seconds per log*
Extension 	• *Scale logs (1 person)*	✓				• *Pulling back tape* • *Only for Log Scalers that use one tape measure*

Body Posture	Task(s)	Percent of TASK				Comments
		Rarely 0 to 5%	Occasionally 6 to 33%	Frequently 34 to 66%	Constantly 67 to 100%	
Forearm						
	Rotation 	• *Scale logs (1 person)*		✓			• *Checking log widths* • *2 to 3 loads per shift* • *200 logs per load* • *1 second per log*
		• *Scale logs (2 person)*		✓			• *Checking log widths* • *3 to 4 loads per shift* • *200 logs per load* • *1 second per log*
Wrist						
	Flexion 						*Not Applicable*
	Extension 	• *Weigh trucks*		✓			• *Entering data into computer* • *50 to 150 times per shift* • *1 minute per time*
	Ulnar Deviation 	• *Scale logs (1 person)*		✓			• *Checking log lengths and widths* • *2 to 3 loads per shift* • *200 logs per load* • *1 to 2 seconds per log* • *Depends on work technique*
		• *Scale logs (2 person)*		✓			• *Checking log lengths and widths* • *3 to 4 loads per shift* • *200 logs per load* • *1 to 2 seconds per log* • *Depends on work technique*
	Radial Deviation 	• *Scale logs (1 person)*		✓			• *Checking log widths* • *2 to 3 loads per shift* • *200 logs per load* • *1 second per log* • *Depends on work technique*
		• *Scale logs (2 person)*		✓			• *Checking log widths* • *3 to 4 loads per shift* • *200 logs per load* • *1 second per log* • *Depends on worker technique*

Body Posture	Task(s)	Percent of TASK				Comments
		Rarely 0 to 5%	Occasionally 6 to 33%	Frequently 34 to 66%	Constantly 67 to 100%	
Back						
Flexion 	• *Scale logs (1 person)*		✓			• *Checking log lengths and widths, and hooking and unhooking tape measure* • *Depends on height of logs, worker height, and work technique* • *2 to 3 loads per shift* • *200 logs per load* • *1 to 2 seconds per log*
	• *Scale logs (2 person)*		✓			• *Checking log lengths and widths, and hooking and unhooking tape measure* • *Depends on height of logs, worker height, and work technique* • *3 to 4 loads per shift* • *200 logs per load* • *1 to 2 seconds per log*
Lateral Flexion 	• *Scale logs (1 person)*		✓			• *Checking log lengths and widths, and hooking and unhooking tape measure* • *Depends on height of logs, worker height, and work technique* • *2 to 3 loads per shift* • *200 logs per load* • *1 to 2 seconds per log*
	• *Scale logs (2 person)*		✓			• *Checking log lengths and widths, and hooking and unhooking tape measure* • *Depends on height of logs, worker height, and work technique* • *3 to 4 loads per shift* • *200 logs per load* • *1 to 2 seconds per log*

Body Posture		Task(s)	Percent of TASK				Comments
			Rarely 0 to 5%	Occasionally 6 to 33%	Frequently 34 to 66%	Constantly 67 to 100%	
Back							
	Twisting 						*Not Applicable*
	Extension 	• *Weigh trucks*		✓			• *Tagging loads with stapler* • *50 to 150 trucks per shift* • *1 to 2 times per truck* • *2 seconds per time*
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 Log Scaler.

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.

Check marks (✓) in the Percent of TASK columns correspond to percentages found during the ergonomic investigation. The Comments section may contain information relating to duration, frequencies, hand used, etc.

	Type	Task(s)	Percent of TASK				Comments
			Rarely 0 to 5%	Occasionally 6 to 33%	Frequently 34 to 66%	Constantly 67 to 100%	
	Power 	• *Scale logs (1 person)*				✓	• *Using scale stick to measure log width* • *Scaling stick width 2 cm* • *2 to 3 loads per shift* • *200 logs per load* • *15 to 20 seconds per log*
		• *Scale logs (2 person)*			✓		• *Using scale stick to measure log width* • *Scaling stick width 2 cm* • *3 to 4 loads per shift* • *200 logs per load* • *5 seconds per log*
		• *Weigh trucks*	✓				• *Tagging loads with stapler* • *50 to150 trucks per day* • *1 to 2 times per truck* • *1 second per time*
	Pinch 	• *Scale logs (1 person)*		✓			• *Using measuring tape to measure log length* • *2 to 3 loads per shift* • *200 logs per load* • *1 second per log*
		• *Scale logs (2 person)*		✓			• *Using measuring tape to measure log length* • *3 to 4 loads per shift* • *200 logs per load* • *1 second per log*

Type	Task(s)	Percent of TASK				Comments
		Rarely 0 to 5%	Occasionally 6 to 33%	Frequently 34 to 66%	Constantly 67 to 100%	
	Hook 	• *Scale logs (1 and 2 person)*				✓	• *Holding onto hand-held computer* • *Computer width 10 to 16 cm*
	Precision 						*Not Applicable*
	Other:						*Not Applicable*

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 Log Scaler.

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

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

	Task Description	Weight (kg)	Percent of TASK				Comments
			Rarely 0 to 5%	Occasionally 6 to 33%	Frequently 34 to 66%	Constantly 67 to 100%	
	Scale logs • *Carrying hand-held computer*	*0.7 to 0.8*				✓	• *Continuously holds computer when scaling*
	Scale logs • *Carrying scaling stick*	*0.4 to 0.5*				✓	• *Continuously holds scaling stick when scaling*
	Other:						

Hand Tools

Indicate the hand tools used by a Log Scaler 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.

Check marks (✓) in the Percent of TASK columns correspond to percentages found during the ergonomic investigation. The Comments section may contain information relating to duration and frequencies of use.

	Type of Tool	Task(s)	Weight (kg)	Percent of TASK				Comments
				Rarely 0 to 5%	Occasionally 6 to 33%	Frequently 34 to 66%	Constantly 67 to 100%	
	Scaling stick	• *Scale logs (1 and 2 person)*	*0.4 to 0.5*				✓	• *Checking log width*
	Hand-held computer	• *Scale logs (1 and 2 person)*	*0.7 to 0.8*				✓	• *Entering data into hand-held computer*
	Shovel	• *Shovel snow*	*1.2 to 3.3*				✓	• *Shovelling snow from truck scale* • *Up to 2 hours per shift in wintertime*
	Broom	• *Clean-up*	*1.3*				✓	• *Cleaning-up scaling shack* • *2 hours per week*
	Chainsaw	• *Check quality*				✓		• *Bucking logs looking for defects*
	Marking crayon	• *Scale logs*			✓			• *Marking logs*
	Measuring tape	• *Scale logs*	*0.4 to 0.6*				✓	• *Checking log lengths* • *Some Log Scalers carry two measuring tapes*
	Other:							

Environmental Conditions

Work Environment

The table below contains a list of environmental conditions that may be of concern at the Log Scaler 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 Log Scaler. 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 (dB)	*Range found: 72.7 to 80.5* *Mill Specific:*
Lighting level (klux)	*Range found: 2 to 256 (log scaling yard)* *Mill Specific:*
Temperature (^{o}C)	*See Regional Temperatures on the next page*

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 Log Scaler 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.

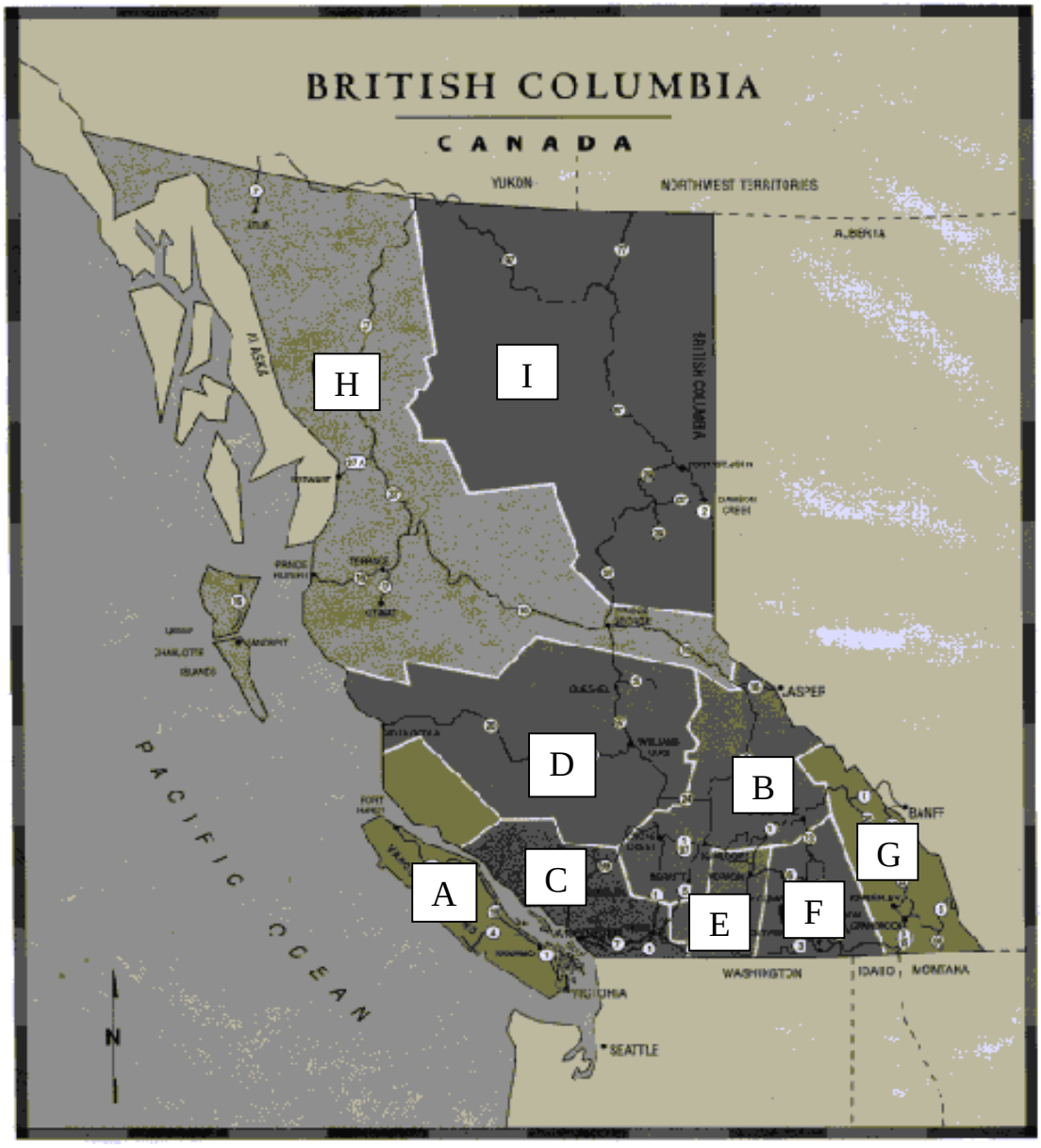
For the lightest species handled, enter the lb./board foot value, the multiple for the smallest size of wood, and the shortest length of this wood. Multiply these values together to determine the weight of the board in pounds.

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
Log Scaler

Purpose

The Risk Factor Identification Checklist for a Log Scaler 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 – Log Scaler

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.

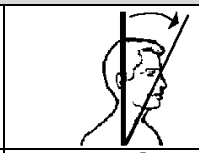
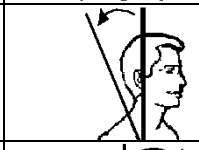
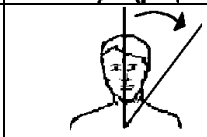
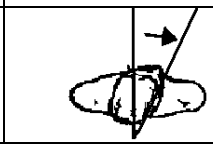
Static Postures: Static loading (sustained exertions) is physical effort (body postures) that is held, requiring muscle contraction for more than a short time.

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.

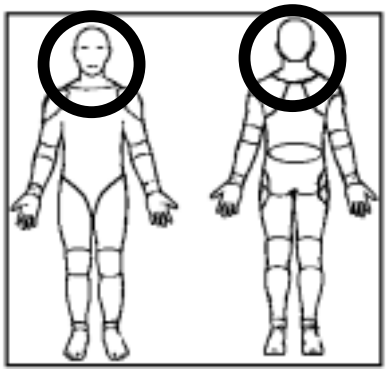
Awkward Postures: Awkward postures occur when there is a deviation from a power working posture. Some examples of awkward postures typically include reaching behind, twisting, working overhead, and forward or backward bending.

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 up or down frequently)			S O	
Ask the worker: Do you spend a large percentage of the day performing one action or task? (e.g., checking board widths)			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 for long periods)			S O	
Awkward Posture				
Flexion 			S O	
Extension 			S O	
Lateral Bending 			S O	
Rotation 			S O	

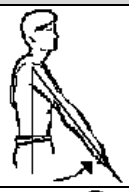
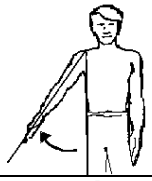
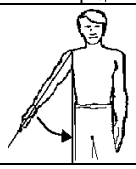
Please indicate whether the following direct risk factors were identified at the **NECK**.		
Direct Risk Factors	Repetition	☐Yes ☐No
	Static Posture	☐Yes ☐No
	Awkward Posture	☐Yes ☐No
In the **Injury Statistics** investigation, were there injury reports for the Neck or Head/Eye or Upper Back? (see Worksheet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



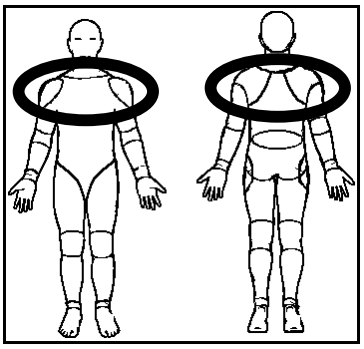
Body parts within the circled area will be classified as NECK issues.

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., checking board widths)			S O	
Ask the worker: Do you spend a large percentage of the day performing one action or task? (e.g., scaling or weighing trucks)			S O	
Static Posture				
Ask the worker: Do tasks require your shoulders to be maintained in a fixed or static posture? (e.g., holding hand-held computer to view)			S O	
Ask the worker: Do you hold parts, tools, or objects for long periods? (e.g., hand-held computer)			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



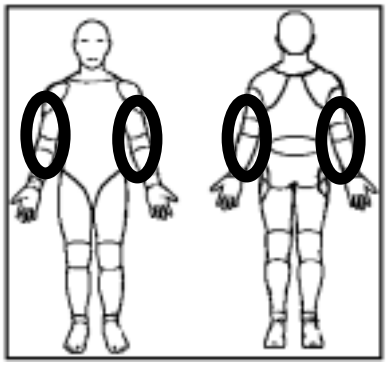
Body parts within the circled area will be classified as SHOULDER issues.

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., stapler) 			S O	
Are objects handled in a pinch grip? (e.g., grip used to hold measuring tape) 			S O	
Are objects handled in a hook grip? (e.g., grip used to carry a chainsaw) 			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?			S O	
Ask the worker: Do you spend a large percentage of the day performing one action or task? (e.g., scaling or weighing trucks)			S O	

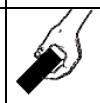
Static Posture	N	Y		Comments:
Ask the worker: Do tasks require your hand and arm to be maintained in a fixed or static posture?			S O	
Ask the worker: Do you apply constant pressure on controls/objects with your hand?			S O	
Ask the worker: Do you hold parts, tools, or objects for long periods? (e.g., measuring tape)			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., metal edges of consoles or workstation digging into elbow)			S O	
Vibration				
Ask the worker: Is vibration transmitted to your hand through a tool or piece of equipment? (e.g., chainsaw)			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



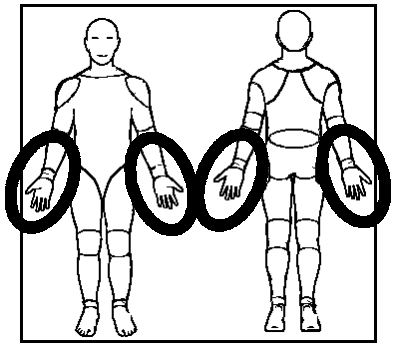
Body parts within the circled area will be classified as ELBOW issues.

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., stapler) 			S O	
Are objects handled in a pinch grip? (e.g., grip used to hold tape measure) 			S O	
Are objects handled in a hook grip? (e.g., grip used to carry a chainsaw) 			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?			S O	
Ask the worker: Do you spend a large percentage of the day performing one action or task? (e.g., scaling or weighing trucks)			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?				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? (e.g., striking a control with your hand)				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., chainsaw)				S O	

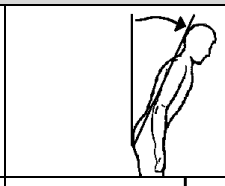
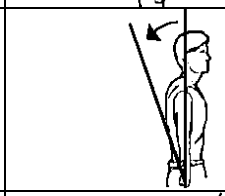
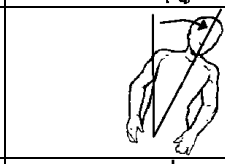
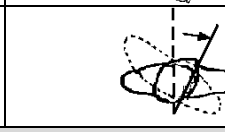
Please indicate whether the following direct risk factors were identified at the **WRIST/HAND**.		
Direct Risk Factors	Force	☐Yes ☐No
	Repetition	☐Yes ☐No
	Static Posture	☐Yes ☐No
	Contact Stress	☐Yes ☐No
	Awkward Posture	☐Yes ☐No
	Vibration	☐Yes ☐No
In the **Injury Statistics** investigation, were there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



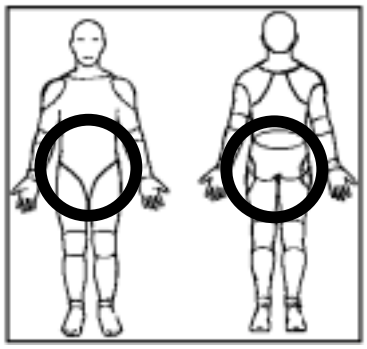
Body parts within the circled area will be classified as WRIST issues.

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., checking board widths)			S O	
Ask the worker: Do you spend a large percentage of the day performing one action or task? (e.g., scaling or weighing trucks)			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., marking logs)			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 weigh shack)			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?			S O	

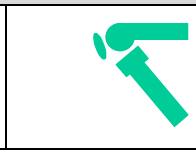
Awkward Posture		N	Y		Comments:
Flexion				S O	
Extension				S O	
Lateral Bending				S O	
Twisting				S O	
Vibration					
Ask the worker: Is your whole body exposed to vibration for significant portions of the work shift?				S O	

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

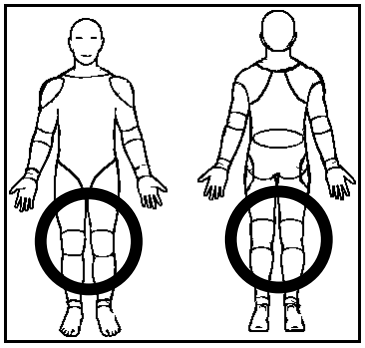


Body parts within the circled area will be classified as LOW BACK issues.

KNEE

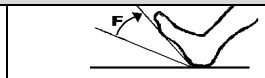
Repetition	N	Y		Comments:
Are identical or similar motions performed over and over again?			S O	
Static Posture				
Ask the worker: Do tasks require you to maintain your knee(s) in a fixed or static posture? (e.g., kneeling)			S O	
Are workers required to sit or stand in a stationary position for long periods of time during the shift? (e.g., standing in weigh shack)			S O	
Do workers kneel (with one or both knees)? (e.g., cleaning weigh shack, marking low-level logs)			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 hard surfaces)			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

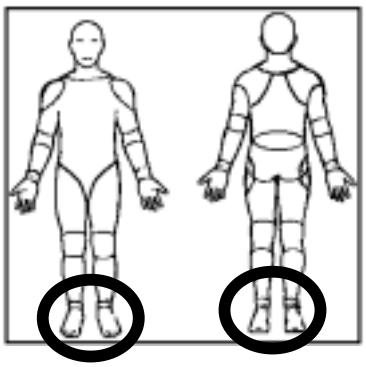


Body parts within the circled area will be classified as KNEE issues.

ANKLE/FOOT

Repetition	N	Y		Comments:
Are identical or similar motions performed over and over again? (e.g., walking on uneven surfaces)			S O	
Static Posture				
Are workers required to stand in a stationary position for long periods of time during the shift? (e.g., standing in weigh shack)			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?			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?			S O	
Are handles for tools and equipment inappropriate in terms of size or shape?			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? (e.g., horns)			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

Log Scaler

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

Log Scaler

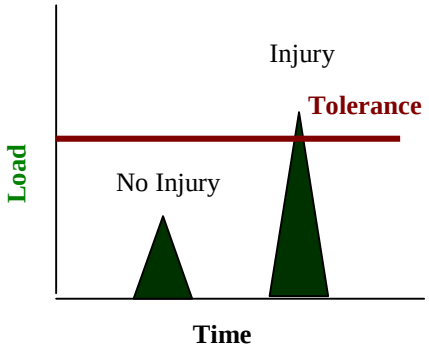
Disclaimer

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

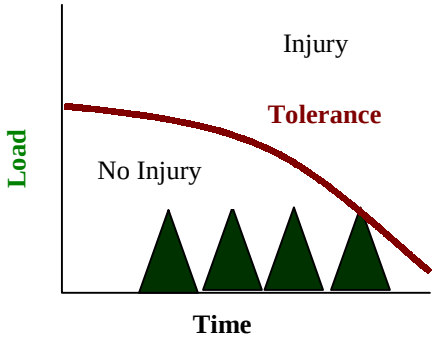
Injuries occur when …
Loads exceed tissue tolerances



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.

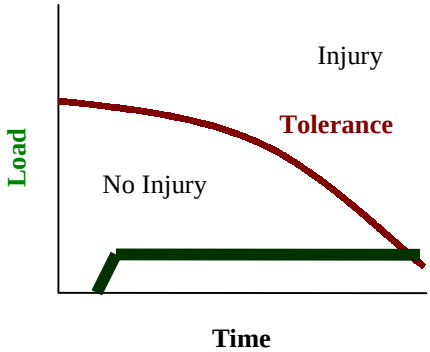
Example – a worker going over on their ankle and spraining it.



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 Log Scaler 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 Log Scaler. 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
Repetition

A Log Scaler may bend the neck forward in order to enter data into a hand-held computer when scaling, and to enter data into an office computer when weighing trucks.

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

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

- Loading on the neck muscles is increased because a Log Scaler has to look down at the hand-held computer when entering data, bend their necks to check logs during scaling, and look down at the computer monitor and keyboard when entering data during truck weighing.

CONSEQUENCES

- When the head is held in a forward position, 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 79 & 80.
- For exercises that can help to prevent ***neck*** injuries, see the ***Neck section of the Body Manual.***

ELBOW/WRIST

Direct Risk Factors:
Force
Awkward Postures

A Log Scaler may grip a hand-held computer when entering data during scaling.

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 could increase the tension generated by muscles, and lead to tissue fatigue at the tendon/bone connection.

- Continuously gripping without adequate rest could slowly fatigue tissues to the point of injury.

INDIRECT RISK FACTORS

Characteristics of Objects Being Handled

Size and Shape

- Loading on forearm tissue is increased with heavier hand-held computers.

Container, Tool, and Equipment Handles

- Loading on forearm tissue is increased for hand-held computers with wide handles.

CONSEQUENCES

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

SUGGESTED SOLUTIONS

- For specific solutions that may prevent injuries to the Elbow, please see the column labelled “Elbow/Wrist” in the Summary of Solutions on pages 79 & 80.
- For exercises that can help to prevent ***elbow*** injuries, see the ***Elbow section of the Body Manual.***

ELBOW/WRIST

Direct Risk Factors:
Force
Awkward Postures
Repetition

A Log Scaler may forcefully squeeze the stapler handle in order to tag loads after weighing trucks.

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 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 deviates from this position, and the forearm muscles have to work harder to 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

Workstation Design

Working Heights

- Loading on the forearm tissue is increased because the wrist is bent when stapling. The wrist is bent because the load being tagged is above shoulder height.

Characteristics of Objects Being Handled

Container, Tool, and Equipment Handles

- Loading on the forearm tissue is increased because the force required to squeeze the stapler handle is high. The gripping force is high because the staple has to penetrate into the log.

Work Organisation

Task Variability

- Loading on the forearm tissue is more repetitive in workplaces that assign one person to weighing trucks.

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

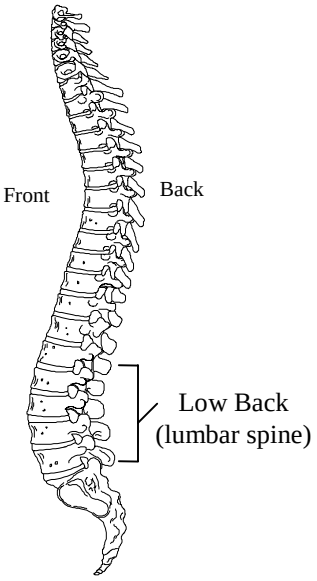
- For specific solutions that may prevent injuries to the Elbow/Wrist, please see the column labelled “Elbow/Wrist” in the Summary of Solutions on pages 79 & 80.
- For exercises that can help to prevent ***elbow*** injuries, see the ***Elbow section of the Body Manual.***

LOW BACK

Direct Risk Factors:
Awkward Postures
Repetition

A Log Scaler may bend forward in order to check log length and width, mark a log, and hook and unhook a tape measure during scaling.

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

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.

Repetition

- Repeated forward 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

Working Heights

- Loading on the low back is increased because most logs scaled are below knee level.

Environmental Conditions

Cold Exposure

- Loading on the discs is increased because working in cold conditions without warming up the muscles in the legs and the hips results in more bending at the back than the hips.

Work Organisation

Task Variability

- Loading on the back is increased in workplaces that have low task variability. Some workplaces assign one person to scaling and another to weighing trucks. Other workplaces have workers switch between log scaling and weighing trucks to decrease the exposure of back bending associated with scaling.

CONSEQUENCES

- Repeatedly bending forward 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 79 & 80.
- For exercises that can help to prevent ***back*** injuries, see the ***Back section of the Body Manual.***

HIP

Direct Risk Factors:
Force
Repetition

A Log Scaler may repeatedly walk on uneven, muddy, and slippery terrain in order to scale logs.

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

- Muscles are used to stabilise the hip during walking. Walking on uneven, muddy, or slippery terrain increases the amount of work required by the muscles to stabilise the hip.

Repetition

- Repeated walking on uneven, muddy, slippery terrain can fatigue the muscles in the hip. If the repetitive stress is excessive, and recovery is not adequate, the hips can gradually tighten and cause discomfort.
- If the hips become tight, a Log Scaler may start to bend at the back to compensate, possibly leading to back problems.

INDIRECT RISK FACTORS

Workstation Design

Floor Surfaces

- Loading on hip muscles is increased when walking on uneven, muddy, and slippery terrain, and climbing over logs. During wet and cold seasons, conditions in the log yard deteriorate.

CONSEQUENCES

- Repeated walking on poor terrain can strain muscles in the hip.
- Signs and symptoms include pain, tightness, and weakness in the hip joint.

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 79 & 80.

Summary of Body Parts at Risk

NECK

- A Log Scaler may bend the neck forward in order to enter data into a hand-held computer when scaling, and to enter data into an office computer when weighing trucks.

ELBOW/WRIST

- A Log Scaler may grip a hand-held computer when entering data during scaling.

- A Log Scaler may forcefully squeeze the stapler handle in order to tag loads after weighing trucks.

LOW BACK

- A Log Scaler may bend forward in order to check log length and width, mark a log, and hook and unhook a tape measure during scaling.

HIP

- A Log Scaler may repeatedly walk on uneven, muddy, and slippery terrain in order to scale logs.

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.*

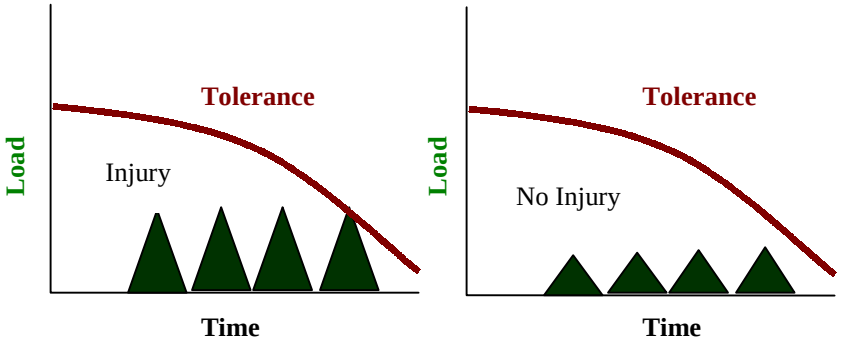
= Indicates that the risk factor was assessed and was not found to be a contributor to the body part problem.

♦ = 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 79 & 80 for specific problem/solution information. Additional information on some risk factors can be found in the General Risk Factor Solutions Manual.

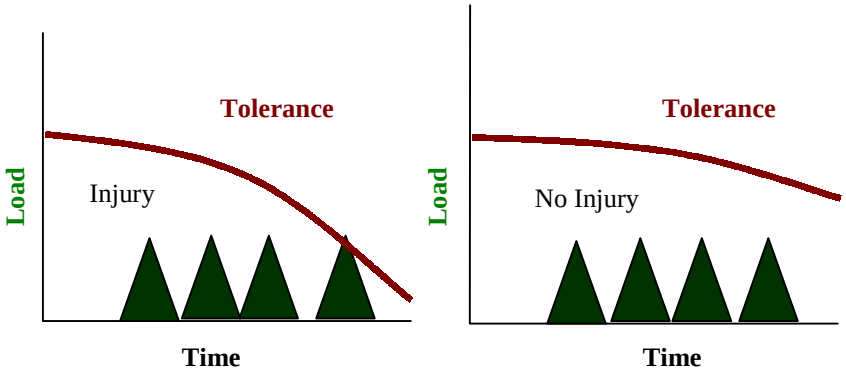
Injury Prevention

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 Log Scaler 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

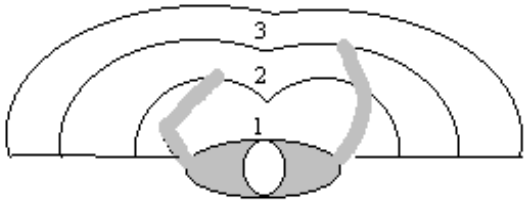
PERSONAL PROTECTIVE EQUIPMENT
These are devices worn by a worker to reduce the risk of injury, including gloves, kneepads, hearing protection, and leather aprons.

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 work height specific for the Log Scaler, 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.

Logs on skids

A To reduce loading to the back while scaling, minimise back bending by having logs placed on top of other logs or skids.

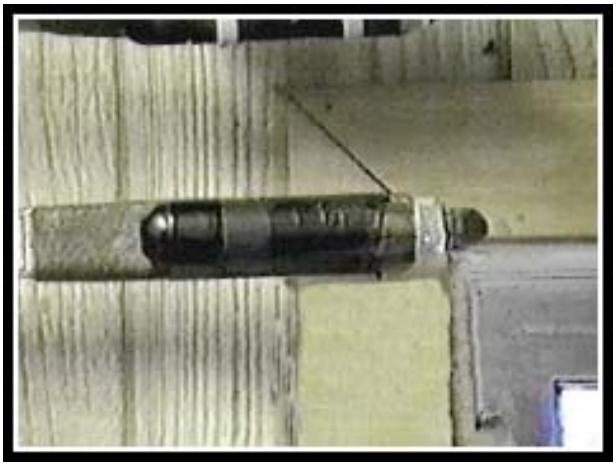
Placing log ends on top of other logs reduces back bending and decreases risk of injury.

Logs laying flat on ground increases back bending and increases risk of injury.

Marker on end of scaling stick

E

To reduce back bending while marking logs, attach the grading crayon on the end of the scaling stick.



Taping the grading crayon to the end of the scaling stick reduces back bending and decreases risk of injury.

Golfer's lift

WP

To reduce loading the back, encourage workers to bend at the hips and brace the upper body with the arms, or bend down using a golfer's lift. To perform the golfer's lift, bend forward while balancing on one leg, and use the other leg to counter balance (see below to the left).

Golfer's lift keeps the back in a stronger position and decreases risk of injury.

Stooping over increases stress to the back and increases risk of injury.

Warm-up and stretch hips and legs muscles

WP

To reduce back bending, warm up and stretch the muscles in the hip and legs on cold days. Refer to the *Back section of the Body Manual* to improve hip and hamstring flexibility.

High visibility display and easy access buttons

E

To minimise neck flexion while scaling, purchase hand-held computers with a highly visible display, and easy access buttons.

Adjustable monitor stand

E

To minimise neck flexion while weighing trucks, place computer monitor in front of the body at the appropriate height. The top of the monitor should be at eye height. Adjustable monitor stands are useful if counter space is limited.

Earplugs

PPE

To minimise loading on the neck, workers should be encouraged to wear lighter earplugs instead of heavier earmuffs. If more protection is required, custom fitted earpieces can be worn.

Wall exercise

WP

To minimise loading on the neck from degenerative postural changes, use the wall exercise in the *Neck section of the Body Manual.*

FLOOR SURFACES

Level log yard

A To minimise the muscle force required for stabilising the hips, have the log yard periodically levelled. If the yard becomes muddy, use sand to help soak up the moisture.

Boots with spikes

PPE To reduce slipping on ice, workers should be encouraged to wear boots with spikes when the ground is icy. Work boots should have good tread and provide good support to avoid causing foot problems.

Characteristics of Objects Being Handled

SIZE AND SHAPE

Lightweight hand-held computers

E To reduce loading on forearm tissue, purchase hand-held computers that are lightweight.

Lightweight batteries

E To reduce the weight of computers, install Lithium batteries instead of Nickel-Cadmium batteries.

CONTAINER, TOOL AND EQUIPMENT HANDLES

Computer with small grip width

E

To reduce loading on forearm tissue, improve grip posture by using computers with smaller grip width.

Smaller computer with narrow grip reduces force required to grip and decreases risk of injury.

Larger and heavier computer increases the force required to grip and increases risk of injury.

Grip straps

E

To reduce grip force, computers can be placed in a carrying case with a hand strap, or a grip strap can be fastened to the back of the computer. Carrying cases may reduce display visibility and button access.

Using a carrying case can reduce force required, decreasing risk of injury.

Carrying cases should not reduce display visibility or button access.

Staple hammer or pneumatic staple gun

E
WP

To reduce grip force required to staple tag to load, avoid using manual staple guns that require a lot of force. Use staple hammers or pneumatic staple guns with light trigger activation.

Forearm stretch

WP

To enhance recovery from stress, stretch forearm muscles by using the exercise found in the *Elbow section of the Body Manual.*

Environmental Conditions

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

Review the sections dealing with heat and cold exposure. In particular, look at controls dealing with clothing, shelters, and fluid replacement.

Work Organisation

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
Logs on skids	**73**							**A R**				
Marker on end of scaling stick	**74**							**A R**				
Golfer's lift	**74**							**A R**				
Warm-up and stretch hips and legs muscles	**75**							**A**				
High visibility display and easy access buttons	**75**	**A**										
Adjustable monitor stand	**75**	**A**										
Earplugs	**75**	**F**										
Wall exercise	**75**	**A**										
Level log yard	**76**								**F**			
Boots with spikes	**76**								**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
Lightweight hand-held computers	**76**				**F**							
Lightweight hand-held computers	**76**				**F**							
Computer with small grip width	**77**				**A**							
Grip straps	**77**				**F**							
Staple hammer or pneumatic staple gun	**78**				**F**							
Forearm stretch	**78**											
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*
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◆ = *See General Risk Factor Solutions Manual*

LOG SCALER MSI SAFETY GUIDE

OBJECTIVE: To identify ergonomic risks involved in scaling logs and weighing trucks and to reduce the potential for musculoskeletal injuries. More detailed information about risk reducing recommendations can be found in the Work Manual for the Log Scaler.

CHECK IF THIS APPLIES	ACTIVITY OF RISK	DIRECT RISK FACTOR(S)	POTENTIAL HAZARDS	SUGGESTED SOLUTIONS
	Neck A Log Scaler may bend the neck forward in order to enter data into a hand-held computer when scaling, and to enter data into an office computer when weighing trucks.	**Awkward Postures** **Repetition**	• Neck muscles must support the weight of the head while in a forward position. The more the neck bends, the greater the load on the muscles and tendons. • 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 minimise neck flexion while weighing trucks, place computer monitor in front of the body at the appropriate height. The top of the monitor should be at eye level. • To minimise neck flexion while scaling, hold the computer at shoulder height when entering data. • To minimise loading on the neck, workers should be encouraged to wear lighter earplugs instead of heavier earmuffs. If more protection is required, custom fitted earpieces can be worn. • 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
	Elbow/Wrist A Log Scaler may grip a hand-held computer when entering data during scaling	**Force** **Awkward Posture**	• 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. 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 could increase the tension generated by muscles, and lead to tissue fatigue at the tendon/bone connection. • Continuously gripping without adequate rest could slowly fatigue tissues to the point of injury.	• To reduce grip force, computers can be placed in a carrying case with a hand strap, or a grip strap can be fastened to the back of the computer. Carrying cases may reduce display visibility and button access. • To enhance recovery from stress, stretch forearm muscles by using the exercise found in ***the Elbow section of the Body Manual.***

CHECK IF THIS APPLIES	ACTIVITY OF RISK	DIRECT RISK FACTOR(S)	POTENTIAL HAZARDS	SUGGESTED SOLUTIONS
	Elbow/Wrist A Log Scaler may forcefully squeeze the stapler handle in order to tag loads after weighing trucks.	**Force** **Awkward Postures** **Repetition**	• 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 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 deviates from this position, and the forearm muscles have to work harder to 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. • Repeated stress to the elbow without adequate rest could slowly fatigue tissues to the point of injury.	• To decrease loading from gripping, alternate holding the computer between hands. • To enhance recovery from stress, stretch forearm muscles by using the exercise found in ***the Elbow section of the Body Manual***.

CHECK IF THIS APPLIES	ACTIVITY OF RISK	ERGONOMIC RISK FACTOR(S)	POTENTIAL HAZARDS	SUGGESTED SOLUTIONS
	Low Back A Log Scaler may bend forward in order to check log length and width, mark a log, and hook and unhook a tape measure during scaling.	**Awkward Postures** **Repetition**	• 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. • Repeated forward 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.	• To reduce loading on the back, encourage workers to bend at the hips and brace the upper body with the arms, or bend down using a golfer's lift. To perform a golfer's lift, bend over while balancing on one leg, and counter-balance using the other leg. • To reduce back bending, warm up and stretch the muscles in the hip and legs on cold days. ***Refer to the Back section of the Body Manual*** to improve hip and hamstring flexibility. • 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
	Hip A Log Scaler may repeatedly walk on uneven, muddy, and slippery terrain in order to scale logs.	**Force** **Repetition**	• Muscles are used to stabilise the hip during walking. Walking on uneven, muddy, or slippery terrain increase the amount of work required by the muscles to stabilise the hip. • Repeated walking on uneven, muddy, slippery terrain can fatigue the muscles in the hip. If the repetitive stress is excessive, and recovery is not adequate, the hips can gradually tighten and cause discomfort. • If the hips become tight, a Log Scaler may start to bend at the back to compensate, possibly leading to back problems.	• To reduce slipping on ice, workers should be encouraged to wear boots with spikes when the ground is icy. Work boots should provide good support to avoid causing foot problems.