Appendix (A)

Ergonomic Survey Tools

The **caution zone checklist** can be used as a screening tool for typical work activities. Typical work activities are those that are a regular and foreseeable part of the job and occur on more than one day per week, and more frequently than one week per year. The checklist determines if a typical work activity has ergonomic stressors present for sufficient duration. A work activity is considered a 'caution zone' if one or more boxes are checked in the checklist below.

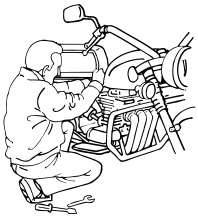
A work activity that is found to be a "caution zone job" should be evaluated further using the Follow -up check list (of this appendix) or the JR/PD found in appendix B of OPNAVINST 5100.23F, Chapter 23.

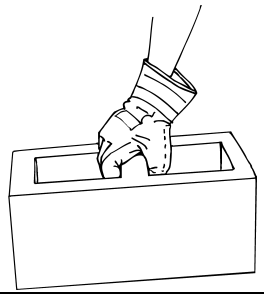
Jobs not found to be 'caution zone jobs' should be periodically reevaluated to determine if changes in the work environment have created new ergonomic stressors.

Job Position Evaluated:	Date:	No. of employees in these jobs?	Employee Name	Reviewer Name

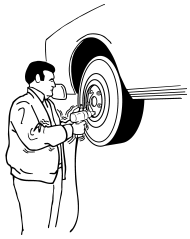
Caution Zone Checklist

Source: Washington State Department of Labor and Industries (WISHA) Use one sheet for each position evaluated.

Movements or postures that are a regular and foreseeable part of the job, occurring more than one day per week, and more frequently than one week per year.	If done in this job position ✓ the box		
Awkward Posture		**Comments/Observations**	
	**1.** Working with the hand(s) above the head, or the elbow(s) above the shoulders more than 2 hours total per day.	☐	
	**2.** Working with the neck or back bent more than 30 degrees (without support and without the ability to vary posture) more than 2 hours total per day.	☐	
	**3.** Squatting more than 2 hours total per day.	☐	

	**4.** Kneeling more than 2 hours total per day.	☐	
High Hand Force			**Comments/Observations**
	**5.** Pinching an unsupported object(s) weighing 2 or more pounds per hand, or pinching with a force of 4 or more pounds per hand, more than 2 hours per day (comparable to pinching half a ream of paper).	☐	
	**6.** Gripping an unsupported objects(s) weighing 10 or more pounds per hand, or gripping with a force of 10 or more pounds per hand, more than 2 hours total per day (comparable to clamping light duty automotive jumper cables onto a battery).	☐	
Highly Repetitive Motion			**Comments/Observations**
	**7.** Repeating the same motion with the neck, shoulders, elbows, wrists, or hands (excluding keying activities) with little or no variation every few seconds, more than 2 hours total per day.	☐	
	**8.** Performing intensive keying more than 4 hours total per day.	☐	
Repeated Impact			**Comments/Observations**
	**9.** Using the hand (heel/base of palm) or knee as a hammer more than 10 times per hour, more than 2 hours total per day.	☐	

Heavy, Frequent or Awkward Lifting (A simple scale can be used to determine the weight of materials)			**Comments/Observations**
	**10.** Lifting object weighing more than 75 pounds once per day or more than 55 pounds more than 10 times per day.	☐	
	**11.** Lifting objects weighing more than 10 pounds if done more than twice per minute, more than 2 hours total per day.	☐	
	**12.** Lifting objects weighing more than 25 pounds above the shoulders, below the knees or at arms length more than 25 times per day.	☐	

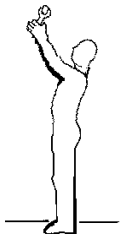
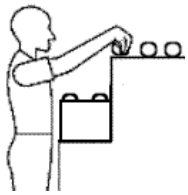
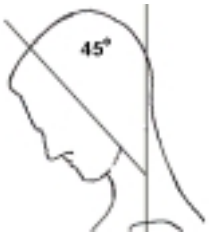
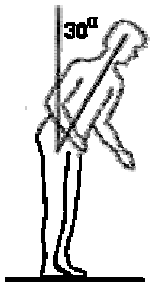
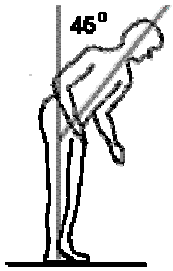
Moderate to High Hand- Arm Vibration (Closely estimate or obtain the vibration value of the tool in use)	**Comments/Observations**		
	**13.** Using impact wrenches, carpet strippers, chain saws, percussive tools (jack hammers, scalers, riveting or chipping hammers) or other tools that typically have high vibration levels, more than 30 minutes total per day.	☐	
	**14.** Using grinders, sanders, jigsaws or other hand tools that typically have moderate vibration levels more than 2 hours total per day.	☐	

For each “caution zone job" identified, find any physical risk factors that apply using the Follow-up checklist. Reading across the page, determine if all of the conditions are present in the work activities. If they are, a WMSD hazard exists and must be reduced below the hazard level or to the degree technologically and economically feasible

Follow-up Physical Risk Factor Check List

Source: Washington State Department of Labor and Industries (WISHA)

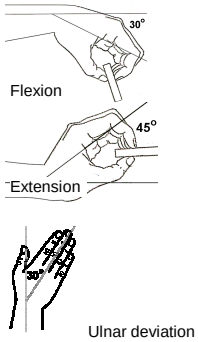
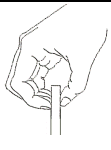
Awkward Posture

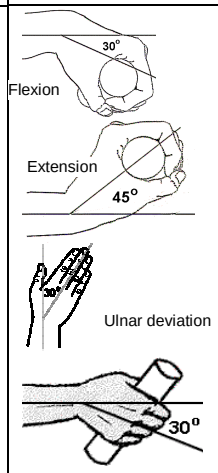
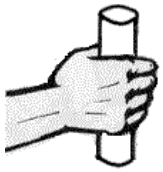
Body Part	Physical Risk Factor	Duration	Visual Aid	Check (✓) here if this is a WMSD hazard
Shoulders	Working with the hand(s) above the head or the elbow(s) above the shoulder(s)	More than 4 hours total per day		❑
	Repetitively raising the hand(s) above the head or the elbow(s) above the shoulder(s) more than once per minute	More than 4 hours total per day		❑
Neck	Working with the neck bent more than 45º (without support or the ability to vary posture)	More than 4 hours total per day		❑
Back	Working with the back bent forward more than 30º (without support, or the ability to vary posture)	More than 4 hours total per day		❑
	Working with the back bent forward more than 45º (without support or the ability to vary posture)	More than 2 hours total per day		❑

Awkward Posture (continued)

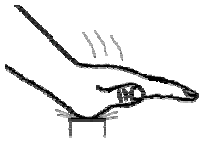
Body Part	Physical Risk Factor	Duration	Visual Aid	Check (✓) here if this is a WMSD hazard
Knees	Squatting	More than 4 hours total per day		❑
	Kneeling	More than 4 hours total per day		❑ ❑

High Hand Force

Body Part	Physical Risk Factor	Combined with	Duration	Visual Aid	Check (✓) here if this is a WMSD hazard
Arms, wrists, hands	Pinching an unsupported object(s) weighing 2 or more pounds per hand, or pinching with a force of 4 or more pounds per hand (comparable to pinching half a ream of paper)	Highly repetitive motion	More than 3 hours total per day		❑
		Wrists bent in flexion 30° or more, or in extension 45° or more, or in ulnar deviation 30° or more	More than 3 hours total per day		❑
		No other risk factors	More than 4 hours total per day		❑

High Hand Forces					
Body Part	**Physical Risk Factor**	**Combined with**	**Duration**	**Visual Aid**	Check (✓) here if this is a WMSD hazard
Arms, wrists, hands	Gripping an unsupported object(s) weighing 10 or more pounds per hand, or gripping with a force of 10 pounds or more per hand (comparable to clamping light duty automotive jumper cables onto a battery)	Highly repetitive motion	More than 3 hours total per day		❑
		Wrists bent in flexion 30° or more, or in extension 45° or more, or in ulnar deviation 30° or more	More than 3 hours total per day		❑
		No other risk factors	More than 4 hours total per day		❑

Highly Repetitive Motion				
Body Part	**Physical Risk Factor**	**Combined with**	**Duration**	Check (✓) here if this is a WMSD hazard
Neck, shoulders, elbows, wrists, hands	Using the same motion with little or no variation every few seconds (excluding keying activities)	No other risk factors	More than 6 hours total per day	❑
	Using the same motion with little or no variation every few seconds (excluding keying activities)	Wrists bent in flexion 30° or more, or in extension 45° or more, or in ulnar deviation 30° or more **AND** High, forceful exertions with the hand(s)	More than 2 hours total per day	❑
	Intensive keying	Awkward posture, including wrists bent in flexion 30° or more, or in extension 45° or more, or in ulnar deviation 30° or more	More than 4 hours total per day	❑
		No other risk factors	More than 7 hours total per day	❑

Repeated Impact				
Body Part	**Physical Risk Factor**	**Duration**	**Visual Aid**	Check (✓) here if this is a WMSD hazard
Hands	Using the hand (heel/base of palm) as a hammer more than once per minute	More than 2 hours total per day		❑
Knees	Using the knee as a hammer more than once per minute	More than 2 hours total per day		❑

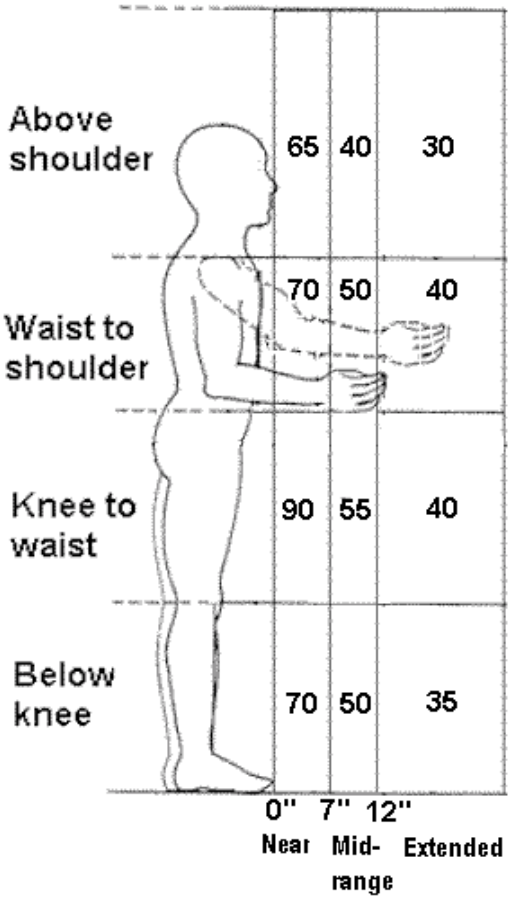
Heavy, Frequent or Awkward Lifting

This analysis only pertains if you have "caution zone jobs" where employees lift 10 lbs. or more

Step 1 **Find out the actual weight of objects that the employee lifts.**

Actual Weight = _____ lbs.

Step 2 **Determine the Unadjusted Weight Limit.** Where are the employee's hands when they begin to lift or lower the object? Mark that spot on the diagram below. The number in that box is the Unadjusted Weight Limit in pounds.



Unadjusted Weight Limit: _____ lbs.

Step 3 **Find the Limit Reduction Modifier.** Find out how many times the employee lifts per minute and the total number of hours per day spent lifting. Use this information to look up the Limit Reduction Modifier in the table below.

How many lifts per minute?	For how many hours per day?		
	1 hr or less	1 hr to 2 hrs	2 hrs or more
1 lift every 2-5 mins.	1.0	0.95	0.85
1 lift every min	0.95	0.9	0.75
2-3 lifts every min	0.9	0.85	0.65
4-5 lifts every min	0.85	0.7	0.45
6-7 lifts every min	0.75	0.5	0.25
8-9 lifts every min	0.6	0.35	0.15
10+ lifts every min	0.3	0.2	0.0

Note: For lifting done less than once every five minutes, use 1.0

Limit Reduction Modifier: ____._____

Step 4 **Calculate the Weight Limit.** Start by copying the Unadjusted Weight Limit from Step 2.

Unadjusted Weight Limit: = _____ lbs.

If the employee twists more than 45 degrees while lifting, reduce the Unadjusted Weight Limit by multiplying by 0.85. Otherwise, use the Unadjusted Weight Limit

Twisting Adjustment: = _____.____

Adjusted Weight Limit: = _____ lbs.

Multiply the Adjusted Weight Limit by the Limit Reduction Modifier from Step 3 to get the Weight Limit. **X**

Limit Reduction Modifier: _____.___

Weight Limit: = _____ lbs.

Step 5 **Is this a hazard?** Compare the Weight Limit calculated in Step 4 with the Actual Weight lifted from Step 1. If the Actual Weight lifted is greater than the Weight Limit calculated, then the lifting is a WMSD hazard and must be reduced below the hazard level or to the degree technologically and economically feasible.

Note: If the job involves lifts of objects with a number of different weights and/or from a number of different locations, use Steps 1 through 5 above to:

1. Analyze the two worst case lifts -- the heaviest object lifted and the lift done in the most awkward posture.
1. Analyze the most commonly performed lift. In Step 3, use the frequency and duration for <u>all</u> of the lifting done in a typical workday.

Hand-Arm Vibration

Use the instructions below to determine if a hand-arm vibration hazard exists.

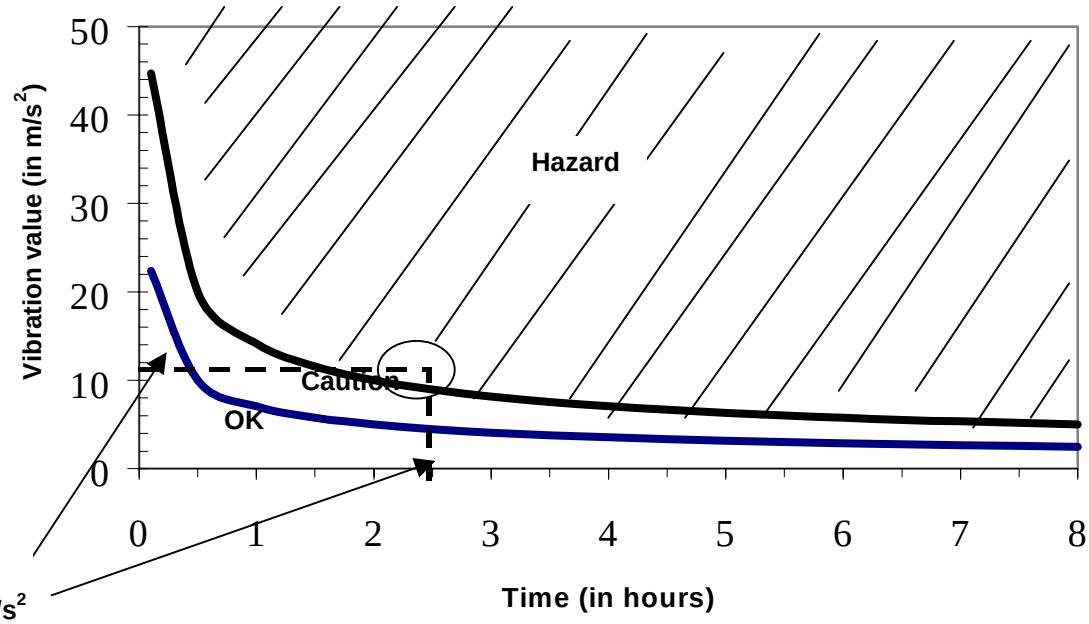
Step 1. Find the vibration value for the tool. (Get it from the manufacturer, look it up at this web site: http://umetech.niwl.se/vibration/HAVHome.html, or you may measure the vibration yourself). The vibration value will be in units of meters per second squared (m/s^2). On the graph below find the point on the left side that is equal to the vibration value.

Note: You can also link to this web site through the L&I WISHA Services Ergonomics web site: http://www.lni.wa.gov/wisha/ergo

Step 2. Find out how many total hours per day the employee is using the tool and find that point on the bottom of the graph.

Step 3. Trace a line in from each of these two points until they cross.

Step 4. If that point lies in the crosshatched "Hazard" area above the upper curve, then the vibration hazard must be reduced below the hazard level or to the degree technologically and economically feasible. If the point lies between the two curves in the "Caution" area, then the job remains as a "Caution Zone Job." If it falls in the "OK" area below the bottom curve, then no further steps are required.



Example:
An impact wrench with a **vibration value of 12 m/s^2** is used for **2½ hours** total per day. The exposure level is in the Hazard area. The vibration must be reduced below the hazard level or to the degree technologically and economically feasible.

Note: The caution limit curve (bottom) is based on an 8-hour energy-equivalent frequency- weighted acceleration value of 2.5 m/s^2. The hazard limit curve (top) is based on an 8-hour energy-equivalent frequency- weighted acceleration value of 5 m/s^2.