ERGONOMICS DEMONSTRATION PROJECT

Government Agency

December 2001

Department of LABOR AND INDUSTRIES

INTRODUCTION

As an employer with 50 or more FTEs, the Washington State Department of Ecology needs to comply with the hazard analysis and awareness education component of the ergonomics rule by July 1, 2003. Ergonomics staff from the Department of Labor and Industries met with Ecology's safety officers to invite their participation in a demonstration project in March 2001.

The demonstration project intended to show that employers would be able to perform caution zone job (CZJ) assessments with similar findings as L&I ergonomics staff without being trained as ergonomists and without having to contract out such service. The CZJ assessment results were comparable.

The nature of the jobs involved does not limit this finding to state government employers.

PROJECT DESIGN

The Department of Ecology originally selected four jobs that they considered to be of greatest concern: warehouse worker, accountant, Washington Conservation Corps (WCC) member (limited to brush cutting activities), and a laboratory worker. Ultimately, two laboratory jobs (microbiologist and metals lab technician) were evaluated rather than just one.

L&I provided a training session for Ecology's safety officers and about a dozen supervisors and managers from the work areas to be evaluated. Training included how to identify caution zone job and hazard zone job risk factors, and practice exercises. L&I developed supplemental material to help Ecology managers and supervisors assess caution zone jobs (see CZJ Supplemental Form Attachment). This three-hour training session covered material similar to the L&I "Implementing Ergonomics for Employers" Workshop.

At the end of the training session, the trained group was asked to complete a caution zone job checklist for the specific job under their leadership. They were encouraged to reassess and revise them as necessary after observing actual work during the next week.

L&I ergonomics personnel independently observed and assessed the five selected jobs. For those jobs identified as caution zone jobs, L&I conducted further analysis using Appendix B of the ergonomics rule to determine if hazards existed in these jobs.

RESULTS

There was high agreement between the employer and L&I. By evaluating the five jobs according to the fourteen caution zone risk factors, there was 96% agreement out of the possible 70 possible points of agreement/disagreement. Two points of disagreement came about simply due to one evaluator classifying the exposure as a high vibration tool verses the L&I evaluator accurately classifying the exposure as a moderate vibration tool. [NOTE: The Supplemental

CZJ Assessment Form presents neck bent and back bent as separate categories, thus listing 15 possible risk factors to be considered for each job. Agreement remained at 96% based on 75 possible points of agreement.]

Department of Ecology supervisors or safety personnel indicated that three of the five jobs were caution zone jobs, whereas L&I ergonomics staff indicated two of those jobs, with potential for the third job, depending on the variety of tasks, to be caution zone jobs. The caution zone jobs were: warehouse worker 2, WCC member, and potentially the accountant. Further analysis of the caution zone jobs by L&I indicated that two of the jobs reached hazard levels of exposure, the warehouse worker 2 and the WA Conservation Corps member. L&I staff did not identify any caution zone jobs that were not identified by Ecology supervisors or safety personnel.

DISCUSSION

This section will address the qualifying criteria for each of the identified caution zone jobs as well as the determinants for hazards. Some control recommendations to reduce exposures when they exceed the hazard level are provided. Control measures are not required for caution zone jobs that do not exceed the hazard level. If there are hazardous exposures, any control measures that reduce the exposures below the hazard level as described by the rule can be used.

A. WAREHOUSE WORKER 2

The warehouse worker 2 position is a CZJ because of these exposures:

- Heavy lifting—lifting objects weighing more than 75 pounds more than once per day or lifting more than 55 pounds more than 10 times per day. (This exposure occurs when lifting computer monitors. The large 21" monitor weighs 80 whereas the smaller 19" monitors weigh approximately 70 pounds.)

- Awkward lifting—lifting objects weighing more than 25 pounds above the shoulders, below the knees or at arms length more than 25 times per day. (This occurs when lifting cartons of copier paper as the worker delivers them to different locations.)

The job is a HZJ because of the lifting exposure involving the computer monitors, but not from the cartons of paper. This was determined by using the lifting calculator from Appendix B of the WAC 296-62-05174. Forty pounds is the weight limit for the computer monitor lift using these parameters: over 12 inches away, between knees and waist height,

frequency factor of 1.0, and without twisting. See Lifting Hazard Analysis #1 and #2 in the attachments.

Control Recommendations:

Photo courtesy of Southworth Products

- Always team lift the 21" computer monitors
- Use an adjustable lift cart to transport the computer monitors to their destinations. Utilize a slide between the workstation and the adjusted cart surface to eliminate unnecessary lifting.
- Always lift 19" monitors with hands close to the body. This lift will not be hazardous unless the lift requires an average hand placement beyond 7" from the tips of the toes. This may more likely occur when the monitor is in a carton.
- Continue phasing in lightweight flat monitor screens, as is current practice.

B. WA CONSERVATION CORPS WORKER—(Scope limited to brush cutting activities)

Washington Conservation Corps (WCC) members perform a variety of outdoor job tasks that often vary according to the season. The brush cutting task was analyzed to see if it by itself qualified the WCC field crewmember's job as a caution zone job. Other types of tasks may also make it a caution zone job. Those other tasks should also be assessed for WMSD risk factor exposures.

The WCC job is a CZJ because of these exposures:

- neck bent >30 degrees for more than 2 hrs. of the workday (particularly with tall workers using the hand-held brush cutter tool).
- forceful gripping (over 10 pounds of force) of hand(s) for more than 2 hrs. of the workday (workers indicate that the left hand exerts greater than 10 pounds of force on the control button to use the brush cutter).
- moderate vibration exposure for more than 2 hrs. of the workday.

The job is a HZJ because of this exposure:

- combined risk factor of forceful gripping with more than 10 pounds of force (left hand using control button) with highly repetitive motions for more than 3 hrs. of the workday

The job is not a hazard due to vibration exposure. The specific brush cutters used by the WCC crew are the STIHL FS 85 and, infrequently, the FS 550 brush cutters. Vibration levels were obtained from the manufacturer. These vibration values, using 8 hours of tool use, indicate the exposures to be below even the caution level of exposure. (See Vibration Hazard Analysis attachment for details.)

Control Recommendations:

- Use a walk-behind style of brush cutter to reduce the repetitive aspect of the task (shoulders and elbows motions). This was a WCC supervisor suggestion. He indicated he had seen another WCC crew use one.

Note: Using this alternative tool may still require forceful gripping of the handles/ controls that would restrict its use to a 4 hour time limit. However, this type of tool has the capability to clear much larger areas than the handheld types for the same time period. Even if a crew shares one walk-behind brush cutter, others can still used handheld models for 3 hours or under.

Photo courtesy of Country Home Products

- Limit use of hand-held brush cutter tool to 3 hours.
- Rotate to other types of tasks (not with same risk factor exposures) for other portions of the workday

L&I does not endorse any particular manufacturer for these items. Pictures are offered as examples of available controls. Approximate cost for a walk behind brush cutter is $1400-$1700, with higher cost for more features.

C. ACCOUNTANT

The accountant position can be a CZJ because of this exposure:

- neck bent >30 degrees for more than 2 hrs. of the workday. Neck bending occurs during writing activities while using the desk surface. The exposure time will differ according to the amount of writing each accountant performs as part of his/her task responsibilities. Some accountant positions involve more writing than others. Thus, some accountant positions can reach CZJ status while others will not. The accountant is likely to move in and out of a bent neck posture throughout the workday. However, the total duration of time spent with the neck bent is what determines caution zone job status.

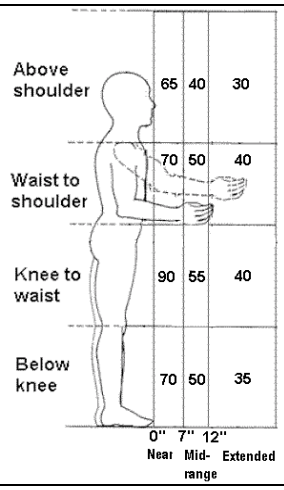
The job is NOT a HZJ.

Neck bending does not meet the additional criteria requirement to meet the hazard level. Neck bending is not >45 degrees, nor does it exceed 4 hours of duration.

Lifting Hazard Analysis 1

Employer:	Job Name:	Analysis Date:
Dept. of Ecology	Warehouse worker 2	8/07/01

Heavy, Frequent or Awkward Lifting — WMSD Hazard # 20

Step	Result
1. **Find out the** actual weight **of objects that the employee lifts.**	**80 lbs**
2. Unadjusted Weight Limit**. Where are the employee's hands when they begin to lift or lower the object? The number in the box is the Unadjusted Weight Limit in pounds.** 	**40** (over 12" away and between knees and waist)
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**	1.0
4. If the employee twists more than 45 degrees while lifting, reduce the Unadjusted Weight Limit by multiplying by 0.85. (Otherwise = 1)	**1.00**
Weight Limit = (Result 2) X (Result 3) X (Result 4)	**40 lbs**
5. Is this a hazard? Compare the Weight Limit calculated above 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.	**5. YES**

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 min	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 5 minutes, use 1.0

Discussion:

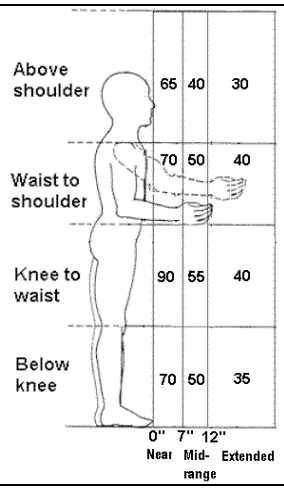
A hazard is present for 80 lb. (21" computer monitor) lifts without a torso twist and with the above indicated parameters.

The 19" monitor comes in a large 26"x26"x26" box and weighs approximately 70 lbs. Even if it is handled in a closer range (7"-12" away from the body) and the other parameters remain as indicated above, it still exceeds the corresponding 55 lb. weight limit, and is still a hazard. The only way to have an acceptable 1-person lift for 70-80 lb. objects is for the hand placement to be close to the body (up to 7" away) and for the frequency rate to remain very low.

Lifting Hazard Analysis 2

Employer:	Job Name:	Analysis Date:
Dept. of Ecology	Warehouse worker 2	8/07/01

Heavy, Frequent or Awkward Lifting **WMSD Hazard # 20**

Step	Result
1. **Find out the** actual weight **of objects that the employee lifts.**	**55 lbs**
2. Unadjusted Weight Limit**. Where are the employee's hands when they begin to lift or lower the object? The number in the box is the Unadjusted Weight Limit in pounds.** 	**70** (from floor or from lower tiers of pallet or cart)
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**	**0.85**
4. If the employee twists more than 45 degrees while lifting, reduce the Unadjusted Weight Limit by multiplying by 0.85. (Otherwise = 1)	**1.00**
Weight Limit = (Result 2) X (Result 3) X (Result 4)	**60 lbs**
5. Is this a hazard? Compare the Weight Limit calculated above 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.	**5. NO**

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 min	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 5 minutes, use 1.0

Discussion:

The worker consistently used good body mechanics demonstrating lifts without twisting and with loads held close to his body.

Thus, lifting loads using these parameters (without twisting, at a rate of 4-5 lifts/min and in locations—at either below knee height or waist to shoulder height and close to the body), is NOT a hazard. The box weight is under the 60 lb. weight limit.

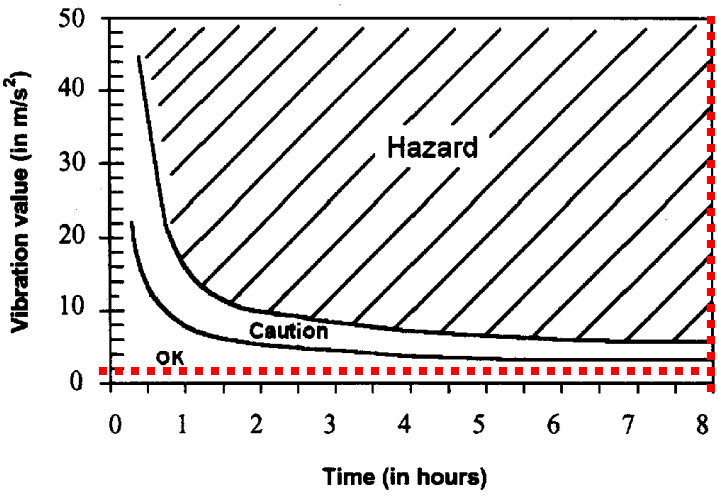
Vibration Hazard Analysis

Dept. of Ecology | WA Conservation Corp | 9

Employer:	Job Name:	Analysis Date:
Dept. of Ecology	WA Conservation Corp	8/27/01

Step	Result
1. **Find the vibration value for the tool. The vibration value will be in units of meters per second squared (m/s^2). On the graph find the point on the left side that is equal to the vibration value.**	**1. 2.30 m/s^2**
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.**	**2. 8.00 hrs**

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



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**	**4. OK**

Discussion:

STIHL FS 85 brushcutting tool: Left hand 2.3 m/s^2; Right hand 2.1 m/s^2

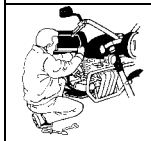
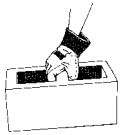
The worker may perform brushcutting activities from 4 hrs. per day to nearly 10 hrs. per day. Since it is not in the hazard zone using the longest available time in the chart (8 hrs.), it is not going to be a hazard to use it for shorter periods of time. The FS 85 is a low vibration tool and is not problematic based on its vibration level.

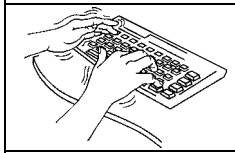
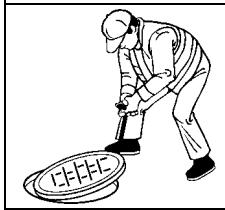
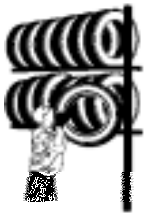
STIHL FS 550 tool: Left hand 3.4 m/ m/s^2 ; Right hand 2.4 m/ m/s^2 (FS 550 is not used very frequently). If the FS 550 tool is used for 5-8 hrs. a day, the exposure reaches the caution zone level only, not the hazard level. If the workers use the STIHL 550 tool for 5 or more hours each day, the employer is required to provide employee education on the Ergonomics rule and to review the job annually.

_____CZJ Supplemental Form

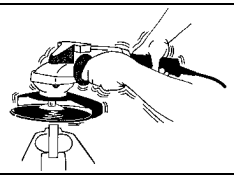
Job Title: _____

Consider the things you do you for your job during a typical day. Is the job pretty similar day to day? _____

Risk Factor Questions— **D.** **"Do you have to work…**	Check only if YES to column 1	Total time duration of the risk factor: **"Do you think the total amount of time …**	Check only if YES to column 3	Activities of concern	Write "**NO"** if risk factor does not meet CZJ exposure criteria
 1. …with your hands overhead or your elbows above shoulder height?"		…your hands would be in that position is more than 2 hrs of your workday?			
 2a. … with your neck bent down more than 30 degrees?"		…you spend in that position is more than 2 hours of your workday?			
 2b. … with your back bent forward more than 30 degrees?"		…you spend in that position day is more than 2 hours of your workday?			
 3. Do you have to squat for more than 2 hours per workday to do your job?					
 4. Do you have to kneel for more than 2 hours per workday to do your job?					
 5. …using a pinch--applying 4 pounds of force or pinch an unsupported object weighing at least 2 pounds (in 1 hand) or over 4 pounds (using both hands)?		…you spend pinching like that is more than 2 hours of your workday?			
 6. …using your hand(s) in a grip—applying over 10 pounds of force or gripping an unsupported object weighing over 10 pounds (in 1 hand) or over 20 pounds (using both hands)		…you spend gripping like that is more than 2 hours of your workday?			

Risk Factor Questions— **E.** **"Do you have to work…**	Check only if YES to column 1	Total time duration of the risk factor: **"Do you think the total amount of time …**	Check only if YES to column 3	Activities of concern	Write "**NO"** if risk factor does not meet CZJ exposure criteria
 7. …repeating the same motion every few seconds with your neck or shoulders or elbows or wrists or hands (excluding intensive keying activities) with little or no variation?		…you perform those motions is over 2 hours of your workday?			
 8. Do you do intensive keying for more than 4 hours per workday? (intermittent keying with paperwork, thinking, or reading does not count)					
 9. …using your hand (heel/base of your palm) or your knee as a hammer more than 10 times per hour?		Does this happen in more than 2 different hours of your workday?			
 10. Do you have to lift objects weighing more than 75 pounds once a day OR 55 pounds more than 10 times per day?					
 11. Do you have to lift objects weighing more than 10 pounds more than 2X/minute?		…you are lifting like this is over 2 hours of your workday?			
 12. Do you have to lift objects weighing more than 25 pounds in awkward positions (specifically—above your shoulders, below your knees, or at arms length)?		Do you do lift like this more than 25 times in your workday?			

_____ CZJ Supplemental Form

Risk Factor Questions—	Check only if YES to column 1	Total time duration of the risk factor:	Check only if YES to column 3	Activities of concern	Write "**NO"** if risk factor does not meet CZJ exposure criteria
 13. Do you use high vibration tools like impact wrenches, carpet strippers, chain saws or percussive tools (riveting or chipping hammer, jack hammer, or scaler) to do your job?		Do you use tools like these for more than 30 minutes per workday?			
 14. Do use moderate vibration tools like grinders, sanders, jig saws etc. to do your job?		Do you use tools like these for more than 2 hours per workday?			

For each risk factor that indicates a YES response in the 4th column, please review these questions to see if the activities meet these frequency criteria.

A. Does this happen more than once in a week? Indicate YES (**+**) OR NO (**-**)

B. Does this happen more than one week in a year? Indicate YES (**+**) OR NO (**-**)

"AB Positive Test"

After completing this form, if you answered
YES to Question A <u>and</u> YES to Question B
You have a CZJ

<u>After</u> you go thru the checklist considering a typical day scenario, <u>if you still have some concerns about not so "typical days", go thru the checklist again</u>, but think of what your worst days are like. Only consider what actually has happened within any single day worst scenario, NOT adding together a collection of worst things you ever do, if they wouldn't happen on the same workday.