JOB DEMANDS ANALYSIS

Company: City of Burnaby **Location:** Works Yard

Job Title: Recycling Driver/Swamper **Classification:** Regular Duty

Purpose of Activities

The purpose of the duties of the Driver/Swamper is to move residential recyclable refuse from the community to the disposal centres.

Tools and Equipment

The Driver/Swamper will use the following tools and equipment to perform their duties:

- Recycling Truck with side load bins.
- Gloves.
- Safety Boots.
- Safety Vest.

Usual Methods

The following will be carried out at up to 700 homes per day with total loads accumulating from 2,700 kg to 3,700 kg depending on the time of year. Loads range from 5 kg to highs of 25 kg. Participation rates in the recycling program are increasing. This job features significant climbing in and out of the truck, walking and lift/carry of awkward articles of moderate weight.

1. Check over truck at work's yard.
2. Drive truck out to route area.
3. Leave drivers side of truck and walk to the right side of the truck.
4. Flip up the right seat to stand. Stand with weight on left leg and operate pedals with the right.
5. Drive 10 to 20 metres (just past the pile of materials to be collected).**
6. Put hand brake on.**
7. Step out of the truck (0.5 metres).**
8. Walk a few metres (at most) to residential set out.**
9. Pick up blue box and blue sack and/or yellow sack at ground level.**
10. Carries refuse (one or two sacks and/or blue box) to the side of the truck.**
11. Lifts refuse into various compartments on the side of the truck according to the type of material (height varies from 1 metre to 1.6 metres).
12. Shake out contents of sacks into bins, remove bottles from blue box by hand sometimes, pull paper from sacks (especially when it is wet).**
13. Walk back to set out and place the blue box upside down with the sacks underneath.** Place extra or replacement sacks if necessary.

14. Walk back to truck.**
15. Climb into truck (0.5 metres) and release break.**
16. Repeat steps 5 to 15 for up to 700 stops (total time per cycle - average 30 seconds).
17. Frequently dump side bins into top of truck using lever located 1 metre from the ground.**
18. Drive truck to recycling depot and empty truck (run from inside the cab).
19. Drive back to Works Yard.

The presence of ** indicates non-value added tasks. These are tasks that do not contribute to the stated purpose of the work.

Administrative Issues

The Recycling driver starts work at 0700 and works on a "Task System." This means that the crews work until they complete their route and return to the yard. Once all the drivers have returned, everyone can leave for the day. Depending on volume, this can often be around 1230 or 1300. It is uncommon for the crews too take any official breaks or lunches. Every route has to be picked up on the appointed day, so irrespective of how heavy the work is it needs to be completed. The pace of work is very high with individuals moving at a near run.

The environmental conditions can change this job appreciably. It is possible to be exposed to extreme hot conditions that have implications for hydration, sunburn and heatstroke. Wet weather is common and can make footing less reliable, bags more slippery and grip forces much higher. Cold is also a possibility as is snow, although this is less likely than wet conditions.

Activity Demand Variables

These variables are tasks that must be carried out by the employee and are implicitly or explicitly required as objectives of the job.

- Drive a large vehicle.
- Walk over uneven ground.
- Stand for a large portion of the day on the left leg.
- Lift, carry, grip and handle unpredictable loads.
- Meet daily deadlines (task).
- Carry out tasks under unpredictable outdoor conditions that often include steady rainfall.

Worker Decision Variables

These variables are the sub-routines and cognitive/physical decisions made by the worker in carrying out the objectives of the job.

- Choose postures for carrying out duties (e.g. lifting using hips and maintaining neutral spine, creative energy saving techniques).
- Planning of lifts and routes for carrying.
- Placement of the truck with respect to the set out.

Accommodative Considerations

1. People with injuries to the spine in any region may have difficulty with constant movement of loads from near ground level to the back of the truck as well as the twisting and impact associated with climbing in and out of the truck several hundred times each day.
2. People with shoulder injuries such as rotator cuff tendinitis, bursitis and instability may have difficulty with the frequent and often challenging loads and the frequent elevated arm postures.
3. People with any upper extremity problems may have difficulty with this position because of constant gripping and carrying of loads.
4. Post-whiplash and other neck problems may have difficulty with this position because of constant upper extremity load and elevated arm postures
5. Individuals with knee, hip or ankle difficulties may find have difficulty with this job because of constant walking over unpredictable ground while carrying load and the regular climbing in and out of the vehicle.
6. Individuals with spine or pelvic misalignments may be negatively affected by the regular standing on one leg and climbing in an out of the truck.
7. A very high level of general fitness is preferred for this job and individuals who do not present with this feature are likely to be at higher risk for mechanical injury.
8. Individuals recovering from systemic illness should be carefully screened before entering this activity.
9. Individuals who do not cope under deadline pressure or in outdoor high-autonomy work environments would have difficulty with this position.
10. There is no significant learning curve associated with the tasks.

Prepared By: Greg Hart, Kinesiologist February 24, 1999

Summary of Stresses

Metabolic Stresses

The aerobic energy system supplies the vast majority of energy required to complete the tasks in this position since the work is ongoing in nature. It is a paradox that using good mechanical form in lifting and carrying actually increases energy consumption. Individuals with low aerobic power will take increasing mechanical risks with their bodies as a result of mounting fatigue. The "Task System" employed in Burnaby increases these demands further. The pace of the work on these routes is very high with only about 30 seconds required at maximum to complete each residence. It is higher than regular garbage collection due to the constant up and down from the cab and no other worker to spell off.

Structural Stresses

Spine – the twisting of the torso required to get in an out of the truck cab every 20 – 30 seconds places a load on the discs in the spine. If there is bending involved in the lifting, this exacerbates the loads on the discs. If there are asymmetrical lifts and twisting motions while carrying load, the risk of damage to the structures in the spine increases dramatically.

Shoulders and Neck – due to the regular load being carried by the upper extremities and the frequent positioning of the arms away from the body (especially at shoulder level), this activity places individuals at increased risk for rotator cuff tendinitis, sub-acromial bursitis and damage to the labral surfaces of the joint. The shoulder is mechanically ineffective when the arms are away from the body, especially under load. This also contributes to significant tension through the muscles of the neck and upper back. When the arm is held above the shoulder, it is in an impingement position which can lead to a number of the conditions stated above.

Arms and Hands – frequent heavy gripping increased the risk of injuries to the elbows and wrist tendinitis which can lead to nerve entrapment scenarios. The gripping is made worse by the wearing of gloves (obviously necessary) and wet materials. As muscles in the shoulder, trunk and legs fatigue, more work often comes from the arms which will also increase loads at the elbow and forearm and could lead to epicondylitis type conditions (i.e., tennis or golfer's elbow).

INTERVENTIONS

Recommendations that could be implemented to increase productivity and lessen the risk of injury are listed below:

1. Encourage the workers to maintain an increased level of fitness away from work that will focus on cardiovascular endurance, muscular strength, muscular endurance and flexibility. Especially cardiovascular endurance.

2. Provide regular education in effective use of the body and neutral joint positions for this type of work. This cannot be standard bend your knees and lift information, but creative work aimed at the precise issues of the job.

3. Avoid asymmetrical lifts wherever possible.
4. Avoid twisting with a load to avoid damage to discs in the spine.
5. Keep arms and loads close to the body at all times.
6. Test a load before it is lifted.
7. Plan the route from the set out to the truck, get the truck as close as possible.
8. Explore options for decreasing the height of the bins on the side of the truck and making them somewhat wider so that they are a bigger target.
9. Explore the possibility of creating a perching support for the driver so that his/her left leg is not supporting the full body weight.
10. Be careful to not increase grip forces unnecessarily.
11. Review foot wear for stability and lightweight construction.
12. Consider a program of pre-employment physical testing to ensure that candidates are able to safely carry out the essential job demands.
13. Begin a participative review of the “Task System” to explore alternatives that decrease pace of demand on workers.

Referral: Lana Ho		Organization: City of Burnaby							Title: Labourer
Dept.: Engineering		Division: Recycling							Contact: Bill Geiger
				FREQUENCY*					Date: February 24, 1999
	PHYSICAL DEMANDS	REQD	SIDE	Sel 1	Low 2	Mod 3	High 4	Max. Weight (kg)	Usual Weight (kg)	COMMENTS
STRENGTH	Lifting - Floor to Knuckle	■	B				X	25	5	Blue boxes, plastic sacks empty into bins
	Lifting - Knuckle to Waist	■	B				X	25	5	Blue boxes, plastic sacks empty into bins
	Lifting - Waist to Shoulder	■	B				X	25	5	Blue boxes, plastic sacks empty into bins
	Lifting - Over Head		D			X		15	5	Empty into high bin for paper
	Carrying - With Handles	■	B				X	25	5	Blue boxes from set-out to truck <3 m
	Carrying - Without Handles	■	B				X	25	5	Plastic recycling sacks
	Pushing - Upper Extremity									
	Pushing - Hip/Leg Assist									
	Pulling - Upper Extremity		B			X		10	5	Removing contents from sacks
	Pulling - Hip/Leg Assist		R				X	20	20	On handle to get into cab (>300 x/day)
	Reach - Shoulder or Above	■	B				X	12	5	One/both hands when emptying bags
	Reach - Sho. or Above extnd									
	Reach - Below Shoulder									
	Reach - Bel. Shoulder extnd									
	Handling	■	B				X	8	2	Boxes, bags, levers with gloves on
	Gripping	■	D				X	max.	mod.	Hold boxes(power), bags(pinch)gloves
	Fine Finger Movements	■	B				X	mod.	min.	Grab new bags, pick up paper
ENRG	Aerobic (percent)	■					85	Walking, lifting and climbing on truck, driving		
	Anaerobic (percent)	■			15			Very heavy lifts, high volume stops, walking up hill		
	High Energy Expenditure	■					X	Walking, lifting and climbing in/out of truck		
	Low Energy Expenditure				X			Longer periods of driving		
POSTURE+MOBILITY	Neck - Static Flexion									
	Neck - Static Neutral									
	Neck - Static Extension									
	Neck - Rotation	■	B		X			Shoulder check while driving		
	Throwing									
	Sitting	■			X			While driving vehicle (only a few times/day to 30 min.)		
	Standing	■	L				X	While driving the truck from one house to the next		
	Walking	■					X	All day at rapid pace in 5 metre increments		
	Running/Jumping		L				X	Jump/step down from cab (0.5 metres over 500X/day)		
	Climbing - Arms and Legs	■	R				X	One step into the cab (0.5 metres over 500X/day)		
	Climbing - Legs Only	■	B		X			Walking up hills, can be steep (<10 metres)		
	Bending/Stooping						X	Virtually all items they pick up are belowknee level		
	Crouching				X			To pick up small pieces of garbage		
	Kneeling									
	Crawling									
	Twisting					X		Not necessary, but common when throwing or turning		
	Balancing									
GEN	Traveling	■					X	Throughout Burnaby in a recycling truck		
	Work Alone						X	Drive and load vehicle		
	Interact with Public	■				X		In aleys or on street, as a driver		
	Operate Equip/Machinery	■	B				X	Recycle truck(drive and run dumping equipment)		
	Irregular/Extended Hours						X	Task system, employees leave after route completed		

* Frequency Legend 1 = Seldom; Not Daily 2 = Low Daily Activity; < 1hr
3 = Moderate Demand; Repetition 1 - 3 hrs daily 4 = High Frequency Demand; Repetition > 3 hrs daily

The following shading denotes a HIGH RISK TASK: Modifications should be considered

REQD is marked with an X if the particular demand or category is relevant to the purpose of the job.

SIDE refers to the side or limb required to execute a task. If it is marked **E**, it indicates either side, the most common choice is listed first. **D** refers to dominant and **B** to both sides.

Referral:	Organization:	Title: see 1st page header
Dept.:	Division:	Contact:
	FREQUENCY*	Date:

	PHYSICAL DEMANDS	REQD	SIDE	Sel. 1	Low 2	Mod. 3	High 4	COMMENTS
PERCEPTION	Hearing - Conversations	■	B			X		Colleagues, members of the public in person/radio
	Hearing - Other Sounds	■	B				X	Radio, traffic, machine sounds
	Vision - Far	■	B				X	Driving, locating boxes/bags and destination bins
	Vision - Near							
	Vision - Colour	■	D				X	Sacks are colour-coded
	Vision - Depth	■	B				X	Seeing and reaching into bins and around obstacles, driving
	Perception - Spatial	■	B				X	Backing truck up around obstacles, keeping hands clear
	Perception - Form							
	Feeling (Tactile)	■	B			X		Holding sacks boxes with gloves (may be wet also)
	Reading							
	Writing							
	Speech	■				X		Talking with colleagues and public in person/radio
WORK ENVIRONMENT	Inside Work							
	Outside Work	■					X	On the streets and in the alleys
	Hot Conditions >25 deg. C	■				X		In the summer months
	Cold Conditions <10 deg.C	■				X		In the fall, winter and early spring
	Humid	■					X	Often rains, can be humid in summer months
	Dust	■				X		Especially near construction sites and when windy
	Vapor Fumes	■				X		Vehicle exhaust
	Hazardous Machines	■	B				X	Large truck with dumping machinery
	Proximity to Moving Object	■					X	Garbage truck backing up on hills, in slippery conditions
	Noise					X		Noise of trcuk dumping system
	Electrical Hazard					X		Risk of truck contacting overhead wires
	Sharp Tools	■	B				X	Exposure to glass and metal
	Radiant/Thermal Energy					X		Through windshied, off of other cars and pavement
	Slippery Conditions	■			X			Heavy rain and mud, ice and snow (infrequent)
	Vibration and Related				X			heavy jarring when driving, whole body when riding step
	Chemical Irritants		B		X			Residue in recycling containers
	Organic Substances							
	Medical Waste							
	Blood Products							
	Congested Worksite							
	Lighting - Direct	■					X	Overhead natural light
	Lighting - Indirect	■					X	Reflections off of vehicles and buildings
	Lighting - Adjustable							
	Lighting - Fluorescent							
	Lighting - Incandescent							
	Lighting - Shadows etc.	■				X		Early and late in the day, around obstacles

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For detailed descriptions of each of the different categories, please refer to the reference guide or inquire with Human Effort at 1-888-4EFFORT