TASK ANALYSIS WORKSHEET

Company: The Corporation of Delta **Department:** Parks and Recreation
Job Title: Garbage Collection **Date:** May 18, 2004

Job Summary:

Garbage collection for Parks and Recreation has an established routine for the primary task of garbage collection and disposal from cans / bins with additional sub-tasks specific to seasonal activities e.g. grass clippings for disposal. There are over 100 parks plus beach access garbage and city garbage cans. In the winter additional garbage is handled on Annacis Island. Based on the number of bags used during a routine day an estimated 150 cans are emptied per day. This can increase during the summer. This job is performed by one employee.

Primary tasks include:
- Driving between sites
- Garbage collection
- Garbage disposal in truck
- Installation of clean bag

Secondary tasks include:
- Walking
- Disposal at landfill

Figure 1: Typical can

Figure 2: Height adjustable truck hoist

The employee observed has been performing this job for several years and has developed skills and abilities to off-set some of the material handling risk factors. He is familiar with the specific areas the garbage cans are located and knows how frequently they must be emptied. He also knows which garbage could be heavier than others based on use and experience. A newer truck with a height adjustable side hoist has been in use for one year. The employee noted this truck is a change for the better and that the height adjustable hoist is an improvement when placing the garbage bags in the truck.

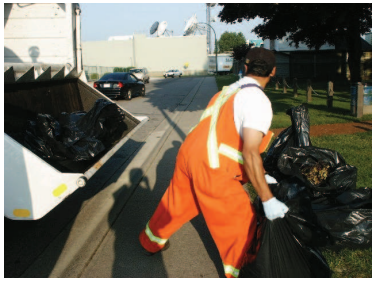
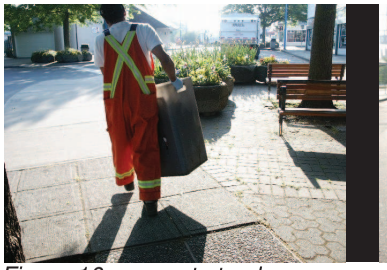
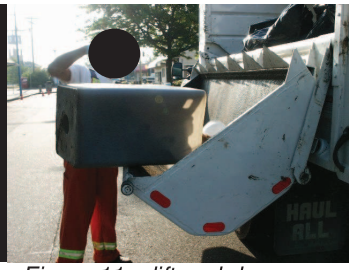
N.B: This assessment was based on a working population of males only.

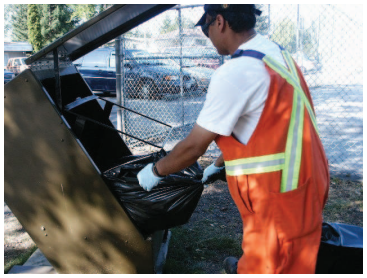
Frequency Rates:

- Seldom - not daily, 0-5%
- Occasional - <1 hour/day, 6-33% of the work shift or 1 repetition / 30 minutes
- Frequent - 1-3 hours/day, 34-66% of the work shift or 1 repetition / 2 minutes
- Constant - >3 hours/day, 67-100% of the work shift, 1 repetition / 30 seconds

Tasks & Description of Activities	Frequency	Duration
1. Driving between sites ▪ Drive small garbage truck to sites. ▪ Park as close a possible to garbage cans. ▪ Lower hoist (32" from ground) with hand controls (minimal effort and below shoulder height) *Figure 3 – hoist* 	**Driving** ▪ Estimated once every 2 – 5 minutes (may vary). *(frequent 34% - 66% of shift)*	**Driving** ▪ Duration and distances will vary based on community serving – North Delta, South Delta; or if driving between communities. ▪ Estimated minimum duration 2 minutes / Maximum duration 20 minutes.

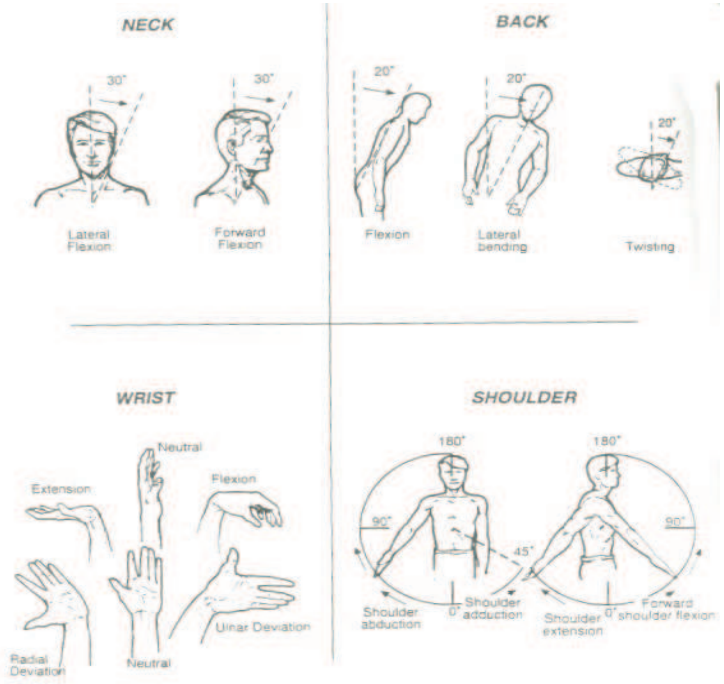
Tasks & Description of Activities	Frequency	Duration
2. Garbage Collection **Able to tip can:** ▪ Grasp edges of plastic bag and pull up to partially close ▪ Tip can over if not chained (or on a long chain) ▪ Pull bag from can ▪ Drag to truck ▪ Upright can  *Figure 4: Pulling from tipped can* **Unable to tip can:** ▪ Grasp edges of plastic bag ▪ Perform test lift (for weight estimation) ▪ Lift bag from can ▪ Drag to truck  *Figure 5: Grasp bag / test lift*  *Figure 6: Lift from can*	**Garbage Collection:** ▪ Estimated less than 1 minute per can for an average of 150 cans per day = 150 minutes or 2.5 hours. *(Frequent 34-66% of shift to Constant 67-100% of shift)*	**Garbage Collection:** ▪ Over an 8 hour period would result in 2.5 to > 3 hour duration spent collecting garbage. Work interrupted by walking and driving to sites.

Tasks & Description of Activities	Frequency	Duration
3. Garbage Disposal Into Truck ▪ Lift garbage bag from ground and toss into truck (height from ground 32")  *Figure 7 – lifting from ground*  *Figure 8 – toss into truck* **Unusual Disposal Tasks (examples):** ▪ Bag has fallen into can requiring entire liner to be lifted, carried and emptied. ▪ Unusual items left with garbage (e.g. batteries, tires) – observed bucket of cement *(figure 12)*  *Figure 9- lift liner from can*  *Figure 10 – carry to truck*  *Figure 11 – lift and dump*  *Figure 12 – bucket of cement*  *Figure 13 – lift and dump bucket into truck*	**Garbage Disposal:** ▪ Estimated less than 1 minute per can for an average of 150 cans per day = 150 minutes or 2.5 hours. ▪ Unusual items (see example in *figure 12 & 13*) or disposal of grass clippings will increase frequency of tasks. *(Frequent 34-66% of shift to Constant 67- 100% of shift)*	**Garbage Disposal:** ▪ Over an 8 hour period would result in 2.5 to > 3 hour duration spent disposing of garbage. Work interrupted by walking and driving to sites.

Tasks & Description of Activities	Frequency	Duration
4. Installation of clean bag ▪ Before leaving the truck grasp a bag from a box on the truck seat. ▪ Slash bottom with knife (to reduce fluid accumulation in bag) ▪ After removal of garbage, replace bag. *Note: Minimal force or exertion is required for this task for the majority of cans; however, the Haul-a-way (brown bins) with rear access for disposal, requires a significant pull force to install the standard bags (standard bags appear too small). As the frequency and duration is low this would not be a significant risk. However, if the bins increase in number a change in bags is recommended. Additionally, the sealed nature of the bins increases the odour of the garbage significantly.*   *Figure 14 – Haul-a-way bin* *Figure 15 – bin access* **<u>Secondary Tasks:</u>** ▪ Walking and Disposal at the landfill are not considered primary tasks. ▪ These secondary tasks provide a change in physical demands and provide a combination of dynamic and sedentary work and therefore minimize risks.	**Bag Installation** ▪ < 30 seconds *(occasional 6-33% of shift)*	**Trimming Sod:** ▪ < 30 seconds. duration ▪ Over an 8 hour period would result in < 1 hour duration.
TOTAL:	**100% of shift**	**Task durations: 1-5 minutes; interrupted by driving and walking**

Risk Factors considered:

- Joint posture: wrist, elbow, shoulder, neck, back, knees
- Awkward posture: reach, twist, bend, stoop, squat, climb, static, dynamic
- Force: lift, lower, carry, push/pull, pinch or power grip
- Repetition: frequency, duration
- Contact Stress
- Object weight, location, size, shape, handles, stability of load
- Work height, layout, seating, space
- Tool/equipment use
- Environment: layout, flooring, temperature, noise, light, glare, vibration
- Work Organization: recovery, schedule, workload, task variability, pace, PPE use, interruptions



Postures, WCB of BC

Department/Work Area: Parks and Recreation	**Occupation:** Garbage
Specific Location: Ladner (city and park), Beach Access, N. Delta (park)	**Contact Name:**
Assessed By: B. De Jong	**Assessment Date:** May 18, 2004

Description of work area: Outdoor city, park and rural locations.
Hours of Work/Shift Schedule: 7:00 a.m. to 3:30 p.m. (7.5 hours)
MSI signs / symptoms noted: back, neck, shoulders

Primary Tasks for Ergonomics Risk Assessment (Task Analysis worksheet):	**Frequency / Duration of Task:**	
1. Garbage Collection	varies from 1-3 to >3 hours/day	34-66% to >67% of shift
2. Garbage Disposal (into truck)	varies from 1-3 to >3 hours/day	34-66% to >67% of shift
3. Disposing of Grass Clippings	< 1 hour/day	6-33% of shift
	unknown - seasonal	unknown seasonal
Driving between sites will not be assessed as not considered high risk – the truck is new with adjustable seating and good lumbar support and the duration of the drive is less than 20 minutes. Installation of clean bag is also not considered high risk except for elements identified with the Haul-away bins (page 5). Secondary Tasks of Walking and Disposal at landfill will not be assessed as considered low risk activities.		

	Task	**Risk Factors**	**Freq/Dur**	**Mag/Range**		**Assessment/Observations/Comments**
Identification	**Garbage Collection**	Awkward Posture: ▪ Back flexion ▪ Shoulder flexion ▪ Shoulder abduction ▪ Shoulder extension ▪ Elbow flexion / extension ▪ Wrist extension	1 minute min. duration 34-66% to >67% of shift	Dynamic <30 sec.: ▪ Back flexion up to 45º ▪ Shoulder flexion 45 - 160º ▪ Wrist extension 20º (continued next page)	**Assessment**	Dynamic: ▪ Back flexion occurs when bending down to grasp the bag from the tipped can or picking up residual garbage falling outside the can. ▪ Shoulder flexion occurs when lifting the garbage up and out of the can. The can heights are 35” and must lift up to clear the can. ▪ Wrist extension occurs when handling the bag e.g. pulling edges, tying. Static: ▪ Shoulder extension (reach behind) occurs when dragging the bags to the truck. This posture may be held for 20-30 seconds duration. ▪ Shoulder abduction (reach sideways) occurs when dragging the bags to the truck. This posture may be held for 20-30 seconds. ▪ Elbow flexion (bending) occurs during the lift and carry (>10 seconds). ▪ Elbow extension (straightening) occurs during the lift and carry (>10 seconds).

	Task	Risk Factors	Freq/Dur	Mag/Range		Assessment/Observations/Comments
Identification	**Garbage Collection continued**	Awkward Postures continued		Static > 10 sec.: ▪ Shoulder extension up to 30º ▪ Shoulder abduction 10 - 120º ▪ Elbow flexion up to 120º ▪ Elbow extension up to 180º	Assessment	Shoulder extension is considered a high risk posture and must be avoided (Putz-Anderson). This posture exceeds all guidelines. Shoulder abduction > 10 sec duration with high effort (e.g. holding 4 kg) (Putz-Andersen) exceeds the guidelines and is a risk factor. Back and shoulder flexion - the dynamic nature and frequency and duration of the tasks do not exceed ergonomic guidelines for awkward postures (WCB Worksheet B). Able to pause and change position as required. The frequency / repetition of the elbow movements do not exceed ergonomic guidelines for awkward postures (WCB Worksheet B and Kilbom, 1994).
		Force: ▪ Grip	< 30 sec. duration	Power Grip – bag weighing > 5 kg.		The dynamic nature and frequency and duration of the tasks do not exceed ergonomic guidelines for grip force (WCB, Worksheet B). Power gripping weighing 5 kg. or more for > 4 hour per day – is not exceeded. (see lifting forces)
		Force: ▪ Lifting	< 5 sec. duration. 1 lift every 2-5 minutes for 1-2 hours of the shift	Weight of bags varied from 10 kg to 19 kg. Range: ▪ 10 kg. ▪ 10.9 kg. ▪ 11.4 kg. ▪ 13 kg. ▪ *15.5 kg.* ▪ *17.7 kg.* ▪ *18.6 kg.* ▪ *19 kg.*		Not all bags are lifted - if the garbage can is tipped results in pulling versus lifting. Approximately 50% of the cans resulted in a lift during the assessment time – this may vary based on the location. 8 bags were weighed during the assessment. The lifts for the bags weighed during the assessment exceed recommended weight limits for lifting tasks (WCB Worksheet B). The lift was calculated using an over shoulder lifting scenario (the highest risk) with the arms extended 7" for one lift every 2-5 minutes for >2 hours of the shift. The weight limit is 15.3 kg. (33.7 lb.). Of the 8 bags weighed during the assessment 50% exceeded the weight limit.

	Task	Risk Factors	Freq/Dur	Mag/Range		Assessment/Observations/Comments
Identification		Force ▪ Pulling	20-30 sec. 1 pull every 2-5 minutes for 1-2 hours of the shift	Pull Forces ranged from: 6.82 kg. (initial) to 11 kg. (initial)	Assessment	Using the WCB Pull Force Calculator (website) it was estimated that for the hands to be 25" from the ground, for 75% male population, pulling 150 feet every 5 min. the Initial pull force is acceptable at 25 kg. and Sustained at 14 kg. The frequency and duration of this task does not exceed the guidelines.
		Force ▪ Carrying	Varies	Varies		The majority of bags were not carried but pulled or dragged. Using the WCB Carrying Calculator (web site) it was estimated that for the hands to be 31" from the ground, for 75% male population, carrying 1 lift every 2 minutes the weight limit would be 24 kg. The frequency and duration and weights measured do not exceed the weight limit. This may vary based on "unusual" objects lifted like the pail with cement which clearly exceeded the guidelines.
		Repetition: ▪ Performs a variety of movements	varies	Recovery time between tasks.		Not considered repetitive work. The frequency and duration of the tasks does not exceed ergonomic guidelines for repetition (WCB Worksheet B). Able to pause and change position as required.
	Garbage Disposal (in truck)	Awkward Posture: ▪ Back flexion ▪ Shoulder flexion ▪ Shoulder abduction ▪ Shoulder adduction ▪ Shoulder extension ▪ Elbow flexion / extension ▪ Wrist extension	<1 minute minutes 2.5 hours per shift	Dynamic <30 sec.: ▪ Back flexion up to 20º ▪ Shoulder flexion 45 -60º ▪ Shoulder abduction 30º ▪ Shoulder adduction 30º ▪ Elbow flexion / extension up to 90º ▪ Wrist extension 20º		Dynamic: ▪ Back flexion occurs when bending down to grasp the bag from the ground. ▪ Shoulder flexion occurs when lifting the garbage up and into the truck. The truck height is 32" and must lift up to clear the edge. ▪ Shoulder abduction and adduction occurs when tossing the bag. ▪ Elbow flexion and extension occurs when tossing the bag. ▪ Wrist extension occurs when handling the bag. The frequency and duration of the tasks does not exceed ergonomic guidelines for posture (WCB Worksheet B). Able to pause and change position as required. However, the forces associated with tossing the bag into the truck versus lifting and placing may increase the risk of shoulder injury.

	Task	Risk Factors	Freq/Dur	Mag/Range		Assessment/Observations/Comments
Identification	Garbage Disposal continued…	Force: ▪ lifting	< 5 sec. duration. 1 lift every 2-5 minutes for 1-2 hours of the shift	Weight of bags varied from 10 kg to 19 kg. Range: ▪ 10 kg. ▪ 10.9 kg. ▪ 11.4 kg. ▪ 13 kg. ▪ 15.5 kg. ▪ *17.7 kg.* ▪ *18.6 kg.* ▪ *19 kg.*	**Assessment**	All garbage must be lifted into the truck. This adds to the possible lift occurring to remove the garbage from the can (previous section) and adds a second lift. The bag would be lifted and pull/dragged to the truck and then lifted again. The lifts for the bags weighed during the assessment exceed recommended weight limits for lifting tasks (WCB Worksheet B). The lift was calculated using waist to shoulder lifting scenario with the arms extended 7" for one lift every 2-5 minutes for >2 hours of the shift. A twisting factor was also used. The weight limit is 16.2 (36.6 lb.). If no twist occurs the weight limit is 19.6 kg. (43 lb.) Of the 8 bags weighed during the assessment 38% exceeded the weight limit *if a twist occurs and none were exceeded if no twist occurs.*
		Repetition: ▪ Performs a variety of movements	< 5 sec. duration.	N/A		▪ Not considered repetitive work. The frequency and duration of the tasks does not exceed ergonomic guidelines for repetition (WCB Worksheet B).
	Unusual Disposal Tasks	Force ▪ Lifting ▪ Carrying	Varies	Varies		Unusual items left in or near the garbage for disposal must be evaluated individually using the following questions e.g. is the lift from below knee height, are the hands close to the body, can twisting be avoided, is the lift occurring frequently? If the lift if below knee height and close to the body with no twisting required the weight limit is 32 kg. If the hands are extended to 12 inches or more from the body the weight limit is reduced to 16 kg. The bucket of cement (unable to accurately measure but exceeded the 23 kg. force gauge) exceeded the weight limits and carrying limits.

	Task	Risk Factors	Freq/Dur	Mag/Range		Assessment/Observations/Comments
Identification	Disposal of Grass Clippings	▪ Force ▪ Posture	Varies	Forces vary Dynamic Postures: ▪ Back flexion 30° ▪ Shoulder flexion 90° ▪ Shoulder abduction 30° ▪ Elbow pronation	Assessment	Grass clippings occur on a seasonal basis and requires the use of a pitch fork  (152 cm long) pitch fork – 1.4 kg,   **Force:** The dry grass seen above required minimal force to lift and pitch into the truck. Wet grass will weight more and may exceed weight limits, however smaller quantities of grass can be selected to pitch. **Posture:** The dynamic nature and frequency and duration of the tasks do not exceed ergonomic guidelines for awkward postures (WCB Worksheet B). Able to pause and change position as required.

SUMMARY

The risk identification and assessment for Parks and Recreation Garbage Collection job tasks have identified some risk factors that may exceed recommended guidelines. While these tasks have been assessed individually, cumulative effects of combined tasks may increase the level of risk.

With regards to garbage collection, in general, the risk factors are related to static postures and exerting forces (lifting and carrying using back and shoulder muscles). Additionally, while not exceeding guidelines for the individual tasks, cumulative effects of lifting and awkward postures of the back and shoulder may increase the risk of injury (> 66% of shift when all activities or tasks are combined).

New crew members who have not acclimatized to the physical demands of work may be at an increased risk of injury. All crew members are at a higher risk of injury in the morning hours when they may not be physically prepared or warmed up prior to performing physically demanding work. This was demonstrated in the Corporation of Delta's musculoskeletal injury (MSI) analyses (2001) report where 55% of MSI WCB claims occurred in the AM.

Note: The employee observed has acquired fairly expert knowledge in this job aside from exceeding some weight limits and some postural risk factors which can be minimized with training. It is recommended that if this job is rotated or a new employee is hired that the orientation is provided by the experienced employee.

CONTROLS

Recommendations for control of identified risk factors will focus on methods to minimize risk.

**Control Priority Note: 1 = recommended for implementation to reduce risk factors; 2 = optional, for consideration as a means of reducing risk factors; 3 = not for immediate action but for future consideration as appropriate.*

Risk Factor	Recommended Controls	Control Priority*	Responsible Person	Status
Endurance for physically demanding work	Maintain an increased level of fitness focusing on cardiovascular and muscular endurance and muscular flexibility. This is especially important for new workers who may not be acclimatized to the demands of work.	2	Employee	
Preparation for all physically demanding work	Develop a physical warm up program and train workers (through the use of certified fitness instructors) specific to the demands of the job. Workers should perform this warm up prior to the start of the day and before resuming work following >30 min. breaks. The duration of the warm up is less than 10 min. Micro stretches should also be performed following static, awkward postures e.g. neck and back bending.	2	Superintendent / Safety Dept.	
Force: ▪ Lifting ▪ Carrying ▪ Pulling	Shoulder extension (reaching behind the back) must be avoided. Never carry or drag the garbage bags with the arms behind the back. Tip the can whenever possible to pull and drag the garbage bags. Recommend extending the length of chains to allow tipping wherever possible. When lifting a bag above shoulder height (e.g. out of a can, no tipping possible) the weight limit of the garbage bag is 15 kg. if zero twisting occurs during the lift. Suggest demonstration training with a weight of 15 kg. so that he will be able to estimate if the weight is being exceeded during a lift and consider alternatives.	1 1 1	Superintendent Employee Superintendent Employee Superintendent Employee	

Risk Factor	Recommended Controls	Control Priority*	Responsible Person	*Status*
Force continued…	When lifting the bags from the ground to the truck, ensure zero twisting occurs. The weight limit is 19.6 kg. Avoid tossing as this places excessive force on the shoulders to lift and place the bags.	1	Superintendent Employee	
	When weight limits are exceeded, especially for unusual items, it is recommended the employee calls for assistance from co-workers. These lift should not be allowed.	1	Superintendent Employee	
	Following special events for long weekends consider adding an additional crew member to assist with anticipated heavy loads.	2	Superintendent	
	As this job is performed by one person, distribution of workload should be evaluated by rotating the job between 2 persons. The alternate work should not include the same risk factors related to force and posture to ensure recovery time.	2	Superintendent	
	Continue to park the truck as close to the garbage as possible to avoid distance to carry or pull the bags.	1	Employee	
Overall risk factors	Provide education related to identified risk factors and methods of working to reduce risk e.g. neutral joint positions, leg position, reduction of twisting etc.	1	Superintendent	

References:

- WCB of BC, Worksheet A, Risk Identification and Worksheet B, Risk Assessment.
- Eastman Kodak (1986), Ergonomic Design for People at Work, Volume 2
- Putz-Anderson (1994), Cumulative Trauma Disorders of the Upper Extremities.
- WCB of BC – Push/Pull/Carry Calculator (2003).

Prepared by: Brenda De Jong, June 24, 2004