



JOB DEMANDS ANALYSIS

Company: Corporation of Delta

Location: Ladner, Tawassen,
North Delta Recreation Centres

Job Title: Pool Maintenance Technician

Classification: Regular Duty

Purpose of Activities

The Pool Maintenance Technician is responsible for the repair and maintenance of the pool and building mechanical equipment and maintenance of the pool water quality.

Tools and Equipment

The Pool Maintenance Technician will use the following tools and equipment to perform his duties:

- Power tools – table grinder, compressor, router, skill saw, belt sander, mini grinder, drills, hammer drill, saber saw, pressure washer
- Hand tools – screw drivers, wrenches, sockets, hammers, files, rasps, pliers, level, pipe wrench, vise grips, square, hand saws, hack saw, tin snips, rivet gun, furniture dolly, hand carts, extension cords, caulking gun
- Locker lock repair kit, cylinder repair kit
- Paint brushes, rollers, extension handles, spray paint
- Step ladders, extension ladders
- Protective clothing to handle chemicals, - breathing apparatus, charcoal mask, goggles, rubber gloves, latex gloves

Usual Methods

The Pool Maintenance Technician is responsible for the repair and maintenance of the pool and building mechanical equipment and maintenance of the pool water quality. He follows a checklist that requires visual inspection, repair and maintenance work to be carried out daily, weekly, bi-weekly, monthly, quarterly, bi-annually and on an annual basis. In addition, the Pool Maintenance Technician stationed at Ladner Recreation Centre is responsible for the start up, regular maintenance/repair and shut down of the outdoor pool.

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

Administrative Issues

The Pool Maintenance Technician works an eight-hour day from 0700 to 1530, Monday to Friday. This position has an overtime and on-call requirement. The Pool Maintenance Technician typically works alone. He receives a ten-minute rest period in the morning, a 30-minute lunch break and a ten-minute rest period in the afternoon. The Pool Maintenance



Technician stationed at Ladner Recreation Centre is also responsible for the mechanical and building maintenance and repair of the outdoor pool.

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.

- Walking, standing on concrete, tile or wet floor
- Lifting carrying, pushing, pulling light to heavy objects (<1-22 kg) from below feet to above shoulder height
- Exposure to chlorine and ozone gas, sodium hypochlorite, natural gas
- Enter confined spaces to access pool and building mechanical equipment
- Bend, stoop, crouch, kneel and crawl to repair and maintain pool and building mechanical equipment
- Hand and power tool use to repair and maintain pool and building mechanical equipment
- Climb up and down stairs, step ladders, extension ladders and roof ladders to access all parts of the pool and building

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.

- Body posture and lifting technique
- Some task organization

Accommodative Considerations

1. People with injuries to the spine in any region may have difficulty with the dynamic and static movements required during pool and building maintenance and repair.
2. People with shoulder injuries such as rotator cuff tendonitis, bursitis and instability may have difficulty with static loading and dynamic reaching activities found in the building and pool repair and maintenance tasks
3. People with any upper extremity problems may have difficulty with this position.
4. Individuals who do not cope in open low-autonomy work environments would have difficulty with this position.
5. The Pool Maintenance Technician must have a working knowledge to trouble shoot heating, ventilation and air conditioning (HVAC) equipment, pumps, motors, pool chemical application, etc.

Prepared By: Jeffrey J. McGinn, Kinesiologist

May 20, 1999



Summary of Stresses

Metabolic Stresses

The aerobic energy system will supply the major source of energy while performing the duties and responsibilities of the Pool Maintenance Technician. This energy system will be required to maintain the low to moderate energy requirement necessary for this work. Short intense periods of activity will be supplied by the anaerobic energy systems. Performing tasks and duties using poor posture or technique will decrease the metabolic demand required throughout the shift but these postures and techniques will increase the structural stress to the spine and upper and lower extremities.

Structural Stresses

Spine – the static and dynamic nature of this position will require concentric, static and eccentric muscle contractions of the cervical, thoracic and lumbar spine in flexion, extension, lateral flexion and rotation. Typically, these movements will be performed during repair and maintenance tasks. Postural control (loaded or unloaded) is critical to maintaining a healthy spine. If spinal control is not maintained during task, a flexed spine posture is adopted. This posture requires no activity from the torso musculature, but increases asymmetrical disc compression, passive stretch on the posterior ligaments and disc fibres. This can contribute to disc integrity problems over time as well as decondition the torso support musculature. Shear forces to the discs, ligaments and fibres are also increased during the repeated manual handling (spinal flexion, extension, lateral flexion and rotation) of pool chemicals, pumps, motors, filters, tools and equipment and supplies.

Shoulders, Upper Extremities and Neck – due to the static upper extremity positions and the frequent reaching during repair and maintenance tasks, the muscles in the rotator cuff of the shoulder (especially dominant extremity) and the upper trapezius and scalene muscles of the neck, maintain significant and often constant static load. Lifting pool chemical bags/drums and other equipment above shoulders and overhead will also tax this area as described above. Static grip and compression forces through the upper extremity are high during tool and equipment use.

Hips and Lower Extremities – will be taxed in the many dynamic movements associated with walking, standing, climbing up and down stairs and ladders, bending, stooping, crouching or kneeling. Often these actions are performed on wet concrete or tile, which will decrease the Pool Maintenance Technician's stability in these movements. The concrete and tile floor and pool decks dramatically increase the forces transferred up through the ankles, knees and hips into the Pool Maintenance Technician's spine, which will increase the pressure on the intervertebral discs and associated structures of the spine.

Chemical Exposure – the Pool Maintenance Technician is at risk for chemical exposure at various stages throughout the day. These chemicals range from Muriatic acid, hydrogen chloride, sodium hypochlorite, liquid chlorine, ozone, etc. The Pool Maintenance Technician may be required to wear rubber, gloves, face shield, protective rubber clothing and/or a respirator when performing repair and maintenance activities where the above chemicals are involved. Exposure to these chemicals may cause skin, eye, nose and throat irritation to death.



INTERVENTIONS

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

1. Teach postural awareness or body care sessions that focus on the importance of proper body posture and how it relates to their ultimate physical comfort and fatigue level.
2. Encourage the Pool Maintenance Technician to maintain an increased level of fitness away from work that will focus on cardiovascular endurance, muscular strength, muscular endurance and flexibility.

PJDC-Pool Maint. Technician

Referral: Cathy Cook			Organization: Corporation of Delta						Title: Pool Maintenance Technician		
Dept.: Engineering			Division: Parks						Contact: Bill McCrumb		
PHYSICAL DEMANDS			R E Q D	S I D E	FREQUENCY*				Max. Weight (kg)	Usual Weight (kg)	COMMENTS
					Sel 1	Low 2	Mod 3	High 4			
S T R E N G T H	Lifting - Floor to Knuckle	X	E			X		22	<1-22	tools, equipment, pool chemicals	
	Lifting - Knuckle to Waist	X	E			X		22	<1-22	tools, equipment, pool chemicals	
	Lifting - Waist to Shoulder	X	E			X		22	<1-22	tools, equipment, pool chemicals	
	Lifting - Over Head	X	E		X			22	<1-22	tools, equipment, pool chemicals	
	Carrying - With Handles	X	D			X		22	<1-22	tools, equipment, pool chemicals	
	Carrying - Without Handles	X	D			X		22	<1-22	tools, equipment, pool chemicals	
	Pushing - Upper Extremity	X	E				X	22	<1-22	tools, equipment, pool chemicals	
	Pushing - Hip/Leg Assist	X	E			X		22	<1-22	tools, equipment, pool chemicals	
	Pulling - Upper Extremity	X	E				X	22	<1-22	tools, equipment, pool chemicals	
	Pulling - Hip/Leg Assist	X	E			X		22	<1-22	tools, equipment, pool chemicals	
	Reach - Shoulder or Above	X	E		X			22	<1-22	tools, equipment, pool chemicals	
	Reach - Sho. or Above extnd	X	E		X			22	<1-22	tools, equipment, pool chemicals	
	Reach - Below Shoulder	X	E				X	22	<1-22	tools, equipment, pool chemicals	
	Reach - Bel. Shoulder extnd	X	E		X			22	<1-22	tools, equipment, pool chemicals	
	Handling	X	E				X	22	<1-22	tools, equipment, pool chemicals	
Gripping	X	E				X	22	<1-22	tools, equipment, pool chemicals		
Fine Finger Movements	X	D			X		max.	low	nuts, bolts, fasteners, repair equip./components		
E	Aerobic (percent)	X					95	maintain and repair pool/building mechanical equipment			
N	Anaerobic (percent)			neg.				heavy lift, fatigue at end of day			
R	High Energy Expenditure										
G	Low Energy Expenditure	X					X	maintain and repair pool/building mechanical equipment			
P O S T	Neck - Static Flexion	X					X	work below shoulders to repair/maintain pool/building mechanical			
	Neck - Static Neutral	X				X		stand, walk, sit			
	Neck - Static Extension	X				X		work above shoulders to repair/maintain pool/building mechanical			
	Neck - Rotation	X	E			X		maintain/repair pool/building mechanical equipment			
U R E + M O B I L I T Y	Throwing										
	Sitting	X			X			paperwork, some bench repair			
	Standing	X					X	on concrete, pool deck, roof, asphalt			
	Walking	X					X	in building, outside building, outdoor pool, approx. 2 km/day			
	Running/Jumping										
	Climbing - Arms and Legs	X			X			step ladders, ladder to roof, ladders on roof, pool ladder			
	Climbing - Legs Only	X			X			stairs in building			
	Bending/Stooping	X					X	repair/maintain pool/building equipment and mechanical			
	Crouching	X				X		repair/maintain pool/building equipment and mechanical			
	Kneeling	X			X			repair/maintain pool/building equipment and mechanical			
I T Y	Crawling	X		X				repair/maintain pool/building equipment and mechanical			
	Twisting	X	E				X	repair/maintain pool/building equipment and mechanical			
	Balancing	X			X			on ladder, step ladder, pool deck			
	Traveling	X		X				possibly betw indoor/outdoor pools			
G E N	Work Alone	X					X	one Pool Maintenance Technician per pool			
	Interact with Public	X					X	constantly at pool			
	Operate Equip/Machinery	X					X	power tools, pool/building mechanical equipment			
N	Irregular/Extended Hours	X		X				0700 - 1530, Monday to Friday, OT and on-call requirement			
* 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: <div></div> 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:	
PHYSICAL DEMANDS		R E Q D	S I D E	FREQUENCY*				COMMENTS	
				Sel. 1	Low 2	Mod. 3	High 4		
P E R C E P T I O N	Hearing - Conversations	X				X		co-workers in building, contractors, delivery drivers, Supervisor	
	Hearing - Other Sounds	X					X	cell phone, pool/mechanical alarms	
	Vision - Far	X					X	repair/maintain pool/building mechanical	
	Vision - Near								
	Vision - Colour	X		X				water quality test for pool	
	Vision - Depth	X					X	walk, work in pool and building, mechanical rooms	
	Perception - Spatial	X					X	walk, work in pool and building, mechanical rooms	
	Perception - Form	X			X			tool selection, nuts, bolts, fasteners, filters, chemicals	
	Feeling (Tactile)	X			X			hand and power tool use	
	Reading	X			X			mechanical blue prints, instruction manuals, chemical labels	
W O R K E N V I R O N M E N T	Writing	X			X			daily water quality check reports, paperwork,	
	Speech	X				X		co-workers in building, contractors, delivery drivers, Supervisor	
	Inside Work	X					X	indoor pool building, mechanical rooms	
	Outside Work	X			X			around buildings, on roof	
	Hot Conditions >25 deg. C	X			X			on pool deck, in mechanical rooms	
	Cold Conditions <10 deg.C	X		X				outside around building	
	Humid	X				X		on pool deck, in shower/locker facilities 86% humidity	
	Dust								
	Vapor Fumes	X				X		natural gas, Chlorine/Ozone gas, Sodium Hypochlorite	
	Hazardous Machines	X				X		pumps, boilers, HVAC mechanical equipment, hand/power tools	
	Proximity to Moving Object	X				X		moving parts on pool/building mechanical equipment	
	Noise	X					X	mechanical rooms, pumps, boilers, power tools	
	Electrical Hazard	X			X			power tools, power tool use on pool deck near water	
	Sharp Tools	X			X			hand and power tools	
	Radiant/Thermal Energy	X			X			hot motors, chemicals	
	Slippery Conditions	X				X		on pool deck, in shower/locker facilities, water on floor	
	Vibration and Related	X		X				power tool use	
	Chemical Irritants	X				X		natural gas, Chlorine/Ozone gas, Sodium Hypochlorite	
	Organic Substances	X		X				human waste in shower/locker facilities, garbage	
	Medical Waste								
	Blood Products								
	Congested Worksite	X		X				in mechanical rooms, around pumps and filters	
	Lighting - Direct	X					X	overhead fluorescent lights, sun light, day light	
	Lighting - Indirect	X					X	day light, sun light, flash light	
	Lighting - Adjustable	X		X				flash light, trouble light	
	Lighting - Fluorescent	X					X	overhead fluorescent lights in building	
Lighting - Incandescent	X			X			possibly in some buildings, mechanical rooms		
Lighting - Shadows etc.	X			X			depends on location of work, time of day		

* Frequency Legend 1 = Seldom; Not Daily 2 = Low Daily Activity; < 1hr
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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