



## JOB DEMANDS ANALYSIS

**Company:** Greater Vancouver Regional District    **Location:** Iona

**Job Title:** Wastewater Treatment Plant Operator    **Classification:** Regular Duty

### Purpose of Activities

The purpose of the duties of the WWTP Operator is to make certain that the sewage treatment plant runs effectively and safely. They are responsible for its moment to moment total operation at any given time.

### Tools and Equipment

The operator will use the following tools and equipment to perform their duties:

- Gloves.
- Safety Hat
- Safety Boots.
- Coveralls.
- Computer keyboard and mouse.
- Valve keys.
- Submersible Pumps.
- Buckets
- Skimming pole.
- Hose (up to 2”).

### Usual Methods

Much of the operator's day (or night) is spent moving around the site and making adjustments to controls and valves. Other elements of the job include monitoring plant functions from the control room and assisting other people with maintenance projects. They also carry out some light labour duties like cleaning, handling sample rods, hoses, turning valves with a key or by hand.

They are responsible for lockout procedures in preparing equipment for maintenance. The position involves a lot of walking, sitting, standing and light stair-climbing.

### Administrative Issues

The operator works throughout the plant on an eight-hour day shift. There are four operators at Iona during the nights and up to six during the day and one foreman.

They work four shifts followed by four days off and alternate between days and nights on each cycle.

The work requires moving between outdoor and indoor environments. Some of the indoor work involves exposure to raw or slightly processed sewage. There are certain areas where spaces are very confined and noise levels are high enough that hearing protection is required.

### 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.

- Work in some confined spaces.
- Walk over concrete and stairs.
- Climb up and down ladders.
- Carry out some tasks under unpredictable outdoor conditions that often include steady rainfall.
- Exposure to sewage.

### 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 (limited).

### **Accommodative Considerations**

1. Individuals with knee, hip or ankle difficulties may find they have difficulty with this job because of constant walking.
2. Individuals recovering from systemic illness should be carefully screened before entering this activity.
3. Individuals who do not cope well in outdoor work environments would have difficulty with this position.
4. There is a significant learning curve associated with the tasks.

Prepared By: Greg Hart, Kinesiologist

June 6, 2001



## 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. There is also a high, but momentary anaerobic power requirement associated with occasional heavy lifts.

### **Structural Stresses**

There is regular walking associated with this position, but there is enough variation in the work that there is little in the way of accumulated structural stresses. There is occasional lifting, pushing and pulling that has implications for the spine and for the shoulders and upper extremities. This is especially true of lifting pumps from inside the tanks.

As long as significant sitting is avoided, there is minimal associated structural stress to the operator.

### **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, anaerobic power, 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.
3. Insure that sitting is never carried out for long durations (longer than 30 minutes at a time).
4. Avoid asymmetrical lifts wherever possible.
5. Avoid twisting with a load to avoid damage to discs in the spine.
6. Plan the route when manually handling materials.
7. Take a moment to extend the spine and warm up the body when switching from sitting to strenuous activities.



8. Review footwear to insure that safety wear also is as light as possible with excellent heel and forefoot support.

Referral: Mike Arcand		Organization: GVRD							Title: Plant Operator - Sewers/Iona	
Dept.: Engineering		Division: Sewers (WWTP)							Contact: Mike Arcand	
PHYSICAL DEMANDS		REQD	SIDE	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		B		X			40	10	Sump pumps, grates, sample rods, rag buckets
	Lifting - Knuckle to Waist		B		X			40	10	Sump pumps, grates, sample rods, rag buckets
	Lifting - Waist to Shoulder		B		X			40	10	Sump pumps, etc over railings
	Lifting - Over Head									
	Carrying - With Handles		B		X			20	10	Sample buckets for up to 100 metres
	Carrying - Without Handles		B		X			10	5	Pumps, grates, hoses and tools
	Pushing - Upper Extremity				X			8	3	Open/close valve levers, plunge digester
	Pushing - Hip/Leg Assist		B		X			30	5	Valve keys
	Pulling - Upper Extremity		B		X			40	10	Valves/pumps/buckets/hoses, plunge digester
	Pulling - Hip/Leg Assist		B		X			30	10	Opening valves with the key, hoses
	Reach - Shoulder or Above		B	X				10	3	Overhead wheel valves
	Reach - Sho. or Above extnd		B	X				10	3	Overhead wheel valves
	Reach - Below Shoulder		D			X		10	5	Scum sweeping with 4 metre aluminum pole
	Reach - Bel. Shoulder extnd				X			10	5	Awkward access around railings (scum sweep)
E N R G	Handling		B			X		40	10	A wide variety of tools, pumps, hoses, equip.
	Gripping		B			X		max	mod	Mouse, vacuum and water hoses, rods,etc.
	Fine Finger Movements		B				X	mod.	min.	Switches, computer keys, nuts and bolts
P O S T U R E +	Aerobic (percent)						90	Most activities are walking, sitting and short stair climbing		
	Anaerobic (percent)				10			For occasional exertion in lifting or climbing a long flight of stairs		
	High Energy Expenditure			X				Sustained stair climbing or lifting		
	Low Energy Expenditure						X	For almost all activities including sitting and light walking		
M O B I L I T Y	Neck - Static Flexion					X		Working on low level issues, checking samples/water		
	Neck - Static Neutral									
	Neck - Static Extension				X			Short duration to check overhead pipes, screens etc		
	Neck - Rotation		B			X		Looking around obstacles, work at main control with computers		
	Throwing									
	Sitting						X	Monitoring plant functions and doing computer work		
	Standing					X		To carry out many duties and as an alternative to sitting		
	Walking						X	Around the plant on concrete and metal, <200 metres/time		
	Running/Jumping			X				Possible in emergency situation		
	Climbing - Arms and Legs				X			Ladders in the plant (< 10 metres/time)		
	Climbing - Legs Only				X			Stairs in the plant, less than two flights/time usually		
	Bending/Stooping				X			Carry out low level equipment checks,		
	Crouching				X			Carry out low level equipment checks, make pump connections		
Kneeling			X				Carry out low level equipment checks			
G E N E R A L	Crawling									
	Twisting				X			Work around railings, accessing controls in congested spaces		
G E N E R A L	Balancing					X		On ladders, over railings, near access shafts		
	Traveling									
	Work Alone				X			Possible for some elements of the day, always radio contact		
	Interact with Public			X				Possible for tours		
G E N E R A L	Operate Equip/Machinery					X		Valves, pumps, computer, control panels		
	Irregular/Extended Hours			X				4 on/4 off shifts, 12 hour nights and days		

\* 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 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		REQD	SIDE	FREQUENCY*				COMMENTS	
				1	2	3	4		
P E R C E P T I O N	Hearing - Conversations		B			X		Colleagues in person, via phone, via radio	
	Hearing - Other Sounds		B				X	Alarms, machinery noises	
	Vision - Far						X	Most activity	
	Vision - Near				X			Examine parts or gauges closely	
	Vision - Colour				X			Determine the quality of the product, some computer info	
	Vision - Depth				X			Distances have to be judged when raising and lowering objects	
	Perception - Spatial					X		Many tasks involve working around obstacles	
	Perception - Form								
	Feeling (Tactile)				X			Impaired by gloves in most situations	
	Reading				X			Computer screens, gauges, instructions, correspondence	
	Writing		D		X			Short notes, lockout tags	
	Speech						X	Talking with colleagues	
	W O R K E N V I R O N M E N T	Inside Work						X	In buildings and galleries
Outside Work							X	On grounds, to include rain and wind (unlikely snow)	
Hot Conditions >25 deg. C				X				Occasionally, during summer months, near engines	
Cold Conditions <10 deg.C				X				Can be exposed (outside) briefly during the winter time	
Humid						X		In some enclosed spaces with water, outdoors on some days	
Dust					X			On windy days outside	
Vapor Fumes						X		Sewage fumes	
Hazardous Machines							X	A wide variety of equipment from screens to motors, fans etc.	
Proximity to Moving Object					X			Forklift, vehicle	
Noise			B			X		Some enclosed areas in the plant - very loud (>110 db) equipment	
Electrical Hazard				X				Should always be locked out but possible	
Sharp Tools				X				Possible with screwdrivers, etc.	
Radiant/Thermal Energy						X		From engines and pumps in the buildings	
Slippery Conditions					X		Around water constantly		
R O N M E N T	Vibration and Related								
	Chemical Irritants				X			Cleaning substances, testing substances	
	Organic Substances						X	Raw and partly processed sewage water and sludge	
	Medical Waste								
	Blood Products								
	Congested Worksite				X			Some areas that are highly populated with equipment	
	Lighting						X	Daylight, indoor fluorescent and incadescent	
	Lighting - Indirect								
	Consequences of Error						X	High, ranging from noxious odour release to explosion/others	
	Competence Challenge						X	Sometimes in terms of time, always with complexity and reaction	
	Autonomy						X	More pronounced at night, much decision making latitude in job	
	Relatedness				X			Limited team work required, have to get along with co-workers	

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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