



## Kelowna Wastewater Treatment Facility

The City of Kelowna is at the forefront of wastewater treatment with its advanced nutrient and carbonaceous removal system. The treatment Facility has evolved from its origins in 1913 to incorporate a biological treatment step based on the bardenpho system, as well as UV disinfection and other technological and environmental advancements.



Equalization Tanks

### The Plant

- Flow Capacity is 42 million L per day
- Average Flow for 2002 was 28 Million L per day
- Winter Flow Average is 27.5 Million L per day
- Summer Flow Average is 30 Million L per day
- Current population served - 60,000

	Influent	Effluent	Permit
<b>BOD mg/L</b>	186.0	5.0	10.0
<b>TSS mg/L</b>	350.0	2.0	10.0
<b>Total Phosphorus mg/L</b>	8.50	0.14	0.25
<b>Nitrogen mg/L</b>	36.39	4.03	6.00
<b>Fecal Coliform cfu/100 ml</b>	N/A	0.2	50.0

### THE TREATMENT PROCESS:

#### Preliminary Treatment:

Raw Sewage is pumped into the head works by 3 VFD pumps running at 75 hp with 500 l/s capacity. Influent then flows through a climbing bar screen and vortex grit removal system. The grit and debris collected is transported to the landfill for disposal.



Reactor

#### Primary Treatment:

There are 5 rectangular primary clarifiers designed to separate the larger organic solids from the waste stream by gravity sedimentation. Sludge is removed from the bottom of the tanks by scrapers and pumped to the Fermenter. During Peak flows, a steady flow is maintained by diverting excess flow into one of the 3 equalization basins, 2 of which can be retrofitted as future primary clarifiers.

### **Advanced Nutrient Removal:**

The BNR (Biological Nutrient Removal) system is a modified bardenpho design consisting of 2 large trains with 14 cells and 2 smaller trains with 7 cells. The wastewater flows through three zones: anoxic, anaerobic, and aerobic which reduce ammonia and nitrate to harmless N<sub>2</sub> gas.

Fermenter effluent, rich in VFAs (Volatile Fatty Acids) that aid in phosphorus removal, flows into the beginning of each train along with the internal recycle. Each litre that enters the reactor is recycled 4 to 6 times and eventually wasted at a rate of 2 ML/day to the DAF(Dissolved Air Flootation). The effluent from the bioreactor is then sent to the secondary clarifiers to settle the biological flocs for return to the reactor.



Blowers

### **Tertiary Treatment:**

The effluent from the secondary clarifiers is pumped to the Filters. There are five dual media gravity fed filters which backwash to the head works with a flow of 2.8 ML per day. The disinfection method used is a low pressure medium intensity UV radiation system.

### **Sludge Conditioning and Composting:**

Sludge from the primary clarifiers is thickened in one of the two circular fermenters. Waste Activated Sludge from the bioreactor is thickened in the three DAF units. The thickened sludges are then pumped separately to the dewatering building where they are blended with polymer and centrifuged into a 20 % solids cake. The cake is then trucked to the biosolids composting site where it is mixed with wood waste and composted to create Grade A soil conditioner called Ogogrow.



Fermenters

### **Odour Control Systems:**

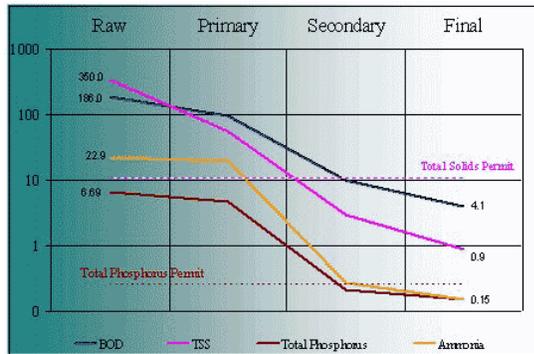
There are 2 mixed media Bio-filters in use to treat the majority of foul odour as well as a caustic addition column scrubber.

### **Outfall:**

Treated effluent is discharged 1 mile off-shore in Okanagan Lake through a diffuser system 65 meters deep.

### **Effluent Quality:**

The quality of effluent leaving the plant is consistently below permit levels. As well, because it has no chlorine added and is very low in phosphorus and nitrogen, it has no negative effects on the aquatic environment of Okanagan Lake.



**Plant Staffing:**

Consists of 10 wastewater treatment technicians, 2 lab technicians, 2 electrical and instrumentation technicians, 1 millwright, a foreman and a direct Supervisor.



Effluent Filter



Final Clarifier



UV System