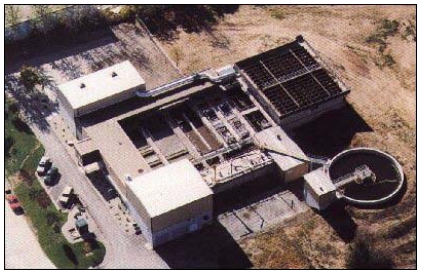
District of Salmon Arm Water Pollution Control Centre

The District of Salmon Arm operates one of the most advanced wastewater treatment facilities in British Columbia. The process includes primary, secondary, and tertiary treatment using a fixed growth reactor and suspended growth reactor combination (FGR-SGR) for ammonia and phosphorus removal. The Salmon Arm WPCC is classified by the EOCP as a Level IV plant.



Liquid Process

Wastewater from the District is pumped via the Wharf Street pump station to the plant. In the headworks, mechanical screens remove large debris and a cyclone grit separator removes the sand and grit from the raw influent wastewater. The headworks has capacity for 15,000 and eventually 30,000 people. Flow from the headworks enters two primary sedimentation tanks where settling out of the heavier solids occurs. In addition the primary solids are recirculated within the tanks to enhance production of soluble fermentation products utilized in the downstream biological nutrient removal (BNR) process. Primary sedimentation has capacity for 15,000 people.

Recycle flow from the anoxic tanks and the primary effluent enter the anaerobic tank. The zero dissolved oxygen reactor environment selects for the special microbial biomass needed for the BNR process. The wastewater from the anaerobic tank is combined with the recycle from the secondary clarifier under flow and moves through the anoxic tanks. In this reactor, the nitrates and nitrites are converted to nitrogen gas.

Suspended Growth Reactors (SGR)

Flow from the anoxic reactors is pumped over the two-stage trickling filter (FGR) system. In the first, carbonaceous stage FGR, the soluble food substrates are absorbed by the biomass (bacteria) that live on the surface of the media. In the second, nitrifying FGR, the ammonia is utilized by the biofilm and converted to nitrate and nitrite. The continuous growth process of the biomass results in it sloughing off the media and being carried over in suspension to the downstream solids contact tanks.

In the solids contact tanks the suspended excess biomass is flocculated and aerated by the Turborators. Additional soluble carbon food substrates are also utilized by the biomass.

In the secondary clarifier the suspended biomass is settled out of the liquid and the clean, clear effluent overflows to the disinfection tank. Return biological solids (RBS) from the settled inflow is pumped to the anoxic tanks, and some is wasted to the solids process train for further treatment. An additional clarifier is to be added in Stage IIIB, to provide capacity for 20,000 people.

Secondary Clarifier

The secondary clarifier effluent is then disinfected for a contact time of about an hour. After chlorination, any residual chlorine is chemically stabilized by the addition of sulphur dioxide. This protects the aquatic life in the lake, as chlorine compounds are harmful. The treated water then flows to Shuswap Lake via a long outfall pipe.

Solids Process

The Salmon Arm Water Pollution Control Centre uses the auto-thermal, thermophilic aerobic digestion process (ATAD) for solids stabilization. This process produces a high-grade retail use biosolids product which meets EPA 503 standards.

Primary solids are collected in the tank sludge hoppers and periodically pumped to the ATAD system. Waste biological solids (WBS) from the under flow from the secondary clarifier are pumped to the drum thickener. In the drum thickener, WBS are thickened from about 1% to about 5% solids and then fed to the ATAD system. The screen has a capacity for 30,000 people. In the four ATAD series reactors, the biosolids are heated and volatilized by over 50% at temperatures above 55o C, producing thin brown slurry high in nutrient value and minerals. The reactors have a capacity for 15,000 people.

The ATAD biosolids are pumped through a cooling coil and into the centrifuge. Polymer is added to the biosolids to aid in the dewatering of the biosolids by the centrifuge. The centrifuge dewaters the biosolids to about 35% dry solids. The centrate is treated to remove phosphate and then it is returned to the liquid process train.

Thanks to Mark Steffler, Municipal Engineer, District of Salmon Arm.