Okanagan

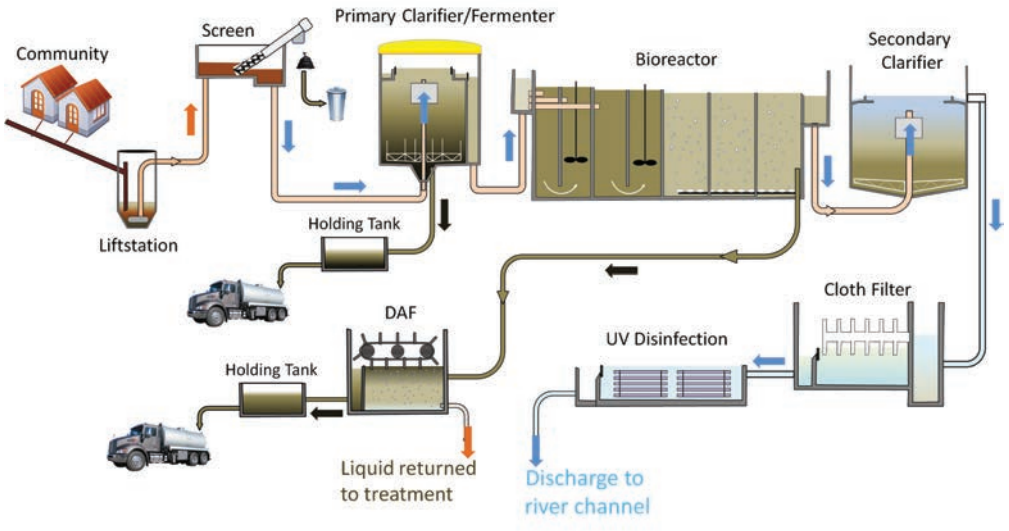
In March of 2013, the new Biological Nutrient Removal (BNR) wastewater treatment facility began operation at a location 2 km downstream of the old facility. It is located south of the community of Okanagan Falls, at 300 Rail Road, beside the Okanagan River Channel.

The Okanagan Falls sewer system and facility is owned and operated by the RDOS and serves approximately 750 properties, including single-family, multi-family, commercial, recreational, and institutional. There is 1 full time Operator, and 1 part time Operator at the plant, along with 1 part time lab technician.

All the sewage that arrives at the old facility now gets pumped into a force main by a new lift station that was installed at the old facility during the upgrades and travels to the new facility. The new facility consists of screening, primary clarifier/fermenter, bioreactors, secondary clarifiers, filtration units, ultraviolet disinfection, and discharge outlets to the river channel. The new facility produces highly treated effluent that is discharged directly into the Okanagan River adjacent to the treatment plant site.

The new treatment plant produces two types of thickened sludge, Thickened Waste Activated Sludge (TWAS) and Fermented Primary Sludge (FPS) from the process. Currently both types of sludge are not dewatered onsite but instead hauled to Penticton's Advanced Wastewater Treatment Plant for further processing.

Schematic of the Okanagan Falls Wastewater Treatment Plant



DAF and Effluent Filters as seen from the control room. Note how the DAF (on the right) is not only easily accessible but also safe and convenient to work on and monitor. The same applies to the Effluent Filters being inside and above ground making them also easy to work on and monitor with no concerns about engulfment or confined spaces. Also in this picture note one hose coming out of the top of each filter that siphon the filters' stagnant bypass pipes to keep them from contaminating the effluent. Also in this picture, leaning against the closer "SE" pipe is one of the filters' wedge shaped panels.

The following information provides a very brief overview of each main component of the wastewater treatment plant.

Lift Station: A new lift station at the old WWTP site will convey all the sewage by way of a force main to the new WWTP. The force main is approximately 2.2 km long and 250 mm in diameter.

Headworks: The headworks room is where the wastewater first enters the treatment plant. In the headworks room, a mechanical screen removes the solids and larger debris from the wastewater that are 6 mm or larger. The screening unit in the headworks has a washer and compactor to squeeze the wastewater out before being bagged for disposal in the garbage.

Primary Clarifier/ Fermenter: This circular tank acts as both a clarifier and a fermenter. Solids will settle out to the bottom of the tank by gravity. A scraper mechanism on the bottom moves the solids out very slowly. The solids remain in the tank for an extended period of time and thus undergo fermentation and produce short chain volatile fatty acids (VFAs) for the biological

Falls Wastewater Treatment Plant

phosphorus removal process in the bioreactor. It was designed for the primary clarifier/ fermenter mechanism to separate and thicken incoming screened raw sewage solids by gravity separation. Thickened fermented sludge is pumped to a holding tank for future disposal.

Bioreactor: Nutrient removal at the treatment plant occurs here in the pre-anoxic, anaerobic, anoxic and aerobic zones. Mixers in the unaerated zones and air diffusers in the aerobic zone keep the solids constantly moving and circulating and thereby ensuring that the bacteria and the organic materials come together. The bacteria use the organic material and remove the phosphorus and nitrogen nutrients.

Secondary Clarifier: The mixed liquor that leaves the bioreactor is made of the bacteria and the wastewater being treated. It flows into the center well of the secondary clarifier where gentle mixing promotes clumping of the solids. These solids then settle out onto the bottom of the clarifier. A rotating sludge scraper collects the settled solids (sludge) and directs it into the return activated sludge (RAS) pipe. Clarified effluent overflows the weir along the top edge of the clarifier. This effluent then travels to the disc filters for further treatment.

The Secondary Clarifiers within the circular Bioreactors not only saved concrete costs, but also help conserve heat, with the Combined Treatment Units having to be 70% above ground. In addition, it is much easier for the operators to compare foaming, supernatant and visual flows within the Clarifiers and Bioreactors with them in combined treatment units.

Filters: Effluent from the secondary clarifiers flows into the cloth filter panels. Solids catch on the inside of the filter panels, and as the solids build up on the inside of the filter it slows down the flow of water through the disc. This causes the water level inside the discs to rise, which triggers the disc to rotate and to begin a backwash cycle.

Ultraviolet Disinfection (UV): Coliforms serve as indicator organisms of contamination of water sources from feces from warm-blooded animals and humans. UV disinfects by altering the DNA of the bacterial cells exposed to it. It has been found that UV radiation with a wavelength of approximately 254 nm is most efficient for disinfection purposes.

Dissolved Air Flotation (DAF): The DAF thickening equipment takes the waste activated sludge (WAS) from the bioreactor. The DAF system has polymer added to make the solids clump together. Pressurized air is added into the bottom of the tank and small bubbles attach to the solid clumps making them float. The sludge can reach a concentration of about 10% solids which are then removed into a holding tank.

Biofilter: Fans draw odorous air from various points within the plant and then discharge it into a perforated pipe system beneath the biofilter media. The air is then filtered and treated as it moves upward through the biofilter and released into the atmosphere. The biofilter media is also irrigated to provide a moist environment for bacteria. Any water produced, irrigation water and rainwater, is collected in the biofilter drains and is piped back into the beginning of the treatment plant. The media is composed mainly of bark mulch, wood chips, and compost.

Effluent Reuse: Treated effluent is used for process, water maintenance functions and landscape irrigation. The heating and cooling system uses the treated effluent in various ways to provide up to 95% of the heating/ cooling requirements for the building. Treated effluent is also used in the toilets and many other places around the treatment plant.

Secondary Clarifier with walls of circular bioreactor.

Last Aerobic Zone with Alum Addition (Grey Drip Pipe) and Surface WAS (wasting) Box. Surface wasting has proven very helpful in resolving foaming and removing floating solids, leaves, etc. that find their way into the Bioreactor.

Thank you to Steve Anderson from the Regional District of Okanagan Similkameen for contributing the plant profile and photos.