

Handout 4: Okanagan Falls Wastewater Treatment Plant

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

Liftstation: A liftstation at the old WWTP site on Cedar Street conveys the wastewater to the new WWTP through a forcemain approximately 2.2km long and 250mm in diameter.

Headworks: The headworks room is the first step for the wastewater in the treatment plant. Here, a mechanical screen removes the solids and debris larger than 6mm from the wastewater. These solids are washed then compacted to squeeze out the water before being bagged for disposal in 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. As the clarifier is also a fermenter, the solids remain in the tank for an extended period of time where they undergo fermentation and produce short chain volatile fatty acids (VFAs) for the biological phosphorus removal process in the bioreactor. Thickened fermented sludge is slowly removed and pumped to a holding tank for future disposal.

Bioreactor: Nutrient removal at the treatment plant occurs in the pre-anoxic, anaerobic, anoxic and aerobic zones of the bioreactor. 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.

Filters: Effluent from the secondary clarifiers flows into the cloth filter panels to further reduce the solids in the final plant effluent. 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. The filtered effluent travels by the submerged UV bulbs, disinfecting it before discharge.

Dissolved Air Flotation (DAF): The DAF thickening equipment takes some of the mixed liquor from the bioreactor for wasting to keep the bacteria population fresh. Polymer is added to form clumps then pressurized air is added into the bottom of the tank. Small bubbles attach to the solid clumps making them float. The floating sludge can reach a concentration of about 10% solids which are then removed into a holding tank.

Biofilter: Fans draw odourous 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.

Schematic of the Okanagan Falls Wastewater Treatment

