City of Steamboat Springs Wastewater Treatment Plant

PLANT PROCESS

Collection System

The wastewater generated by residential, commercial, and industrial sources is collected by a system of sewers and transported to the Steamboat Springs Wastewater Treatment Facility. Each individual generates about 80-100 gallons of wastewater per day. Flow through the sewers occurs by gravity. Some subdivisions and other system users operate private lift stations. The wastewater is transported to the treatment facility through major trunk lines.

Preliminary Treatment

Preliminary treatment, the first treatment process, consists of the removal of substances that may interfere with the downstream processes or be detrimental to the plant equipment. Materials removed may include rags, plastic and grit. The Steamboat Springs Wastewater Treatment Facility has two mechanical bar screens to remove large objects, rags and plastic that would cause plugging problems in the downstream lines.

There are two aerated grit basins that remove the grit by sedimentation. Grit is abrasive material such as sand and gravel that must be removed to minimize wear on the downstream equipment.

Materials removed by the bar screens and grit removal system are de-watered, discharged to a dumpster and transported to the landfill for disposal.

Secondary Treatment

The next phase in the treatment process is secondary treatment, which consists of two steps that remove the dissolved and colloidal organic material. The Steamboat Springs Wastewater Treatment Facility uses an extended aeration activated sludge process. The activated sludge process is a biological process utilizing an active biomass (bacteria and other microorganisms) to oxidize the organic matter in the wastewater.

The Steamboat Springs Wastewater Treatment Facility has four aeration basins and four secondary clarifiers.

The active biomass (called return activated sludge) is mixed with the wastewater and air in the aeration basins. The microorganisms, in the presence of oxygen, use the organic matter and nutrients in the wastewater to sustain their life processes, including reproduction. Effluent from the aeration basins contains large quantities of suspended biological solids (called activated sludge) that must be removed prior to discharge. Therefore, the second step of the secondary treatment process is sedimentation in the secondary clarifiers. Most of the solids removed in the secondary clarifiers are returned to

the aeration basins as returned activated sludge to maintain the appropriate population of microorganisms needed to assimilate the organic matter entering the aeration basins.

The Steamboat Springs Wastewater Treatment Facility averages removal of about 94% biochemical oxygen demand and 97% total suspended solids. The secondary process is a biological process and can be adversely impacted by the discharge of incompatible or toxic wastes into the sewer system. Precise control of this process is necessary to effectively treat the wastewater.

Disinfection

The final treatment step for the wastewater is disinfection to destroy pathogenic (disease-producing) organisms. Disinfection at the Steamboat Springs Wastewater Treatment Facility is accomplished by ultraviolet light. The treated effluent is discharged to Yampa River after the disinfection process.

If all of the treatment units are in service, the process takes about 24 hours at the current average flow of 2.48 million gallons per day. The plant has a design flow capacity of 5 million gallons per day, which is sufficient to serve a population of about 50,000.

Sludge Treatment

The excess biological solids generated in the secondary process must be stabilized prior to disposal. Sludge at the Steamboat Springs Wastewater Treatment Facility is digested aerobically.

In aerobic digestion, excess biomass inventory is removed from the activated sludge process and placed in a large concrete tank and aerated. In essence, the biomass utilizes itself as a food source until a regulated stability is achieved. It requires approximately 20 days of digestion to reach this end point.

Biosolids Disposal/Reuse

The digested sludge from the aerobic process is known as biosolids. The biosolids produced by the Steamboat Springs Wastewater Treatment Facility are utilized as a soil conditioner. The biosolids are de-watered (dried) and then land applied. The stabilized biosolids contain nitrogen, phosphorus, potassium, and other elements beneficial to plant growth. Application of biosolids to the land has resulted in improved crop performance and increased yields. Biosolids are applied to grass hay and the application is strictly monitored. The plant produces about 0.8 dry tons of biosolids per day.