Technical specification

Advanced treatment plant is constructed for reusing of treated wastewater. There is a complete process arrangement for treating in order to meet requirement for reuse. Wastewater treatment plant effluent is stored in a storage tank. Disinfection is done by injection of calcium hypochlorite 10% to storage tank. Some part of wastewater is transferred to WWTP for tertiary treatment through submersible pumps. Others is used for irrigation purpose. Inlet wastewater to plant is entered to coagulation and flocculation units for suspended solid removal. Coagulation causing a reduction of forces tending to keep particles apart by injection of ferric chloride as coagulant. In flocculation unit by injection of polyelectrolyte as coagulant aid and also slow mixing, coagulated suspended particles are adhered to each other and flocks are produced. The flocculated wastewater is transferred to DAF system for removal of oil and sludge from wastewater. Contaminants are removed through the use of a dissolved air-in-water solution produced by injecting air under pressure into a recycle stream of clarified DAF effluent. This recycle stream is then combined and mixed with incoming wastewater in an internal contact chamber where the dissolved air comes out of solution in the form of micron-sized bubbles that attach to the contaminants. The bubbles and contaminants rise to the surface and form a floating bed of material that is removed by a surface skimmer. There are five dual media pressure filters which working in parallel after DAF system. When one filter is in backwash mode, the inlet wastewater is entered to 4 dual media filters. At the bottom part of filters, a plate is considered to keep the filter media inside of the vessel. Wastewater enters the vessel from the top of filters via distributor system and passes through the filter bed. The filtering media are anthracite; sand and gravel (as support layer) respectively. The suspended solids will be removed through filtering media (for reducing turbidity to less than 1 NTU) which consists of anthracite at top and sand in bottom of these pressure vessels. Filters should be backwashed when the following conditions have been: The head loss is so high that the filter no longer produces water at the desired rate; and/or Flock starts to break through the filter and turbidity in the filter effluent increases and If a filter is taken out of service for some reason, it must always be backwashed prior to being put back on-line. After filtration unit, UV system is considered for disinfection and protection of ultrafiltration unit and RO membranes from growth of microorganisms on membrane. UV system effluent is entered to self-cleaning prefilters with mesh of 100 micron for ultrafiltration system protection. The liquid enters the body and flows through the element from outside to inside. Debris is collected on the outside of perforated element, which is cleaned without flow interruption by the rotation of the element against the blades. The debris accumulated during rotation is deposited into the bottom of the filter body from where it is periodically discharged automatically. After that there are UF systems for removal of suspended solid less than 100 micron size. The technology is used to remove suspended solids and microbial contaminants, but it does not remove total dissolved solids and small

molecules. UF plants are automated and have low operational labor requirements. These systems require frequent cleaning. UF membranes have a service life of three to five years or longer. The backwash mode occurs automatically and may include an air scour, but always includes draining, backwash through the top drain, and backwash through the bottom drain, and a forward flush. The air scour step, is used to loosen particulates deposited on the membrane surface. Air is introduced on the fibers and displaced feed flow/concentrate is allowed to discharge through the top of the module for disposal. After 20 to 30 seconds of air scour the module is drained by gravity to remove dislodged particles. After draining the first backwash step is performed. Filtrate flow is reversed from the inside of the fiber to the outside and backwash flow is removed from the module housing through the top drain on the module. The second backwash step is performed to remove contaminants through the bottom of the module housing. Filtrate flow is reversed from the inside of the fiber to the outside and backwash flow is removed from the module housing through the bottom drain on the module for efficient removal of heavier materials. The two steps of backwash can be repeated numerous times depending on the degree of fouling. After backwash, a forward flush is performed to remove any remaining contaminants and remove any air trapped on the outside of the fibers. After that, the modules are returned to the operating mode. The next unit considered for this plant is reverse osmosis unit. The first step in this unit is chemical injection including acid for pH adjustment, Antisclanat in order to prevent from precipitation in reverse osmosis membrane, SMBS as a dechlorination chemical, and biocide for controlling bio-growth on reverse osmosis membrane. There are 2 RO systems with recovery 80% in this plant. The permeate is collected in permeate tank and will be sent to consumer by pump. In order to force the water through the membrane, a certain pressure is required, which results from the osmotic pressure of the water and the required net driving pressure (NDP) of the membrane. The water temperature has a big effect on the operating pressure, between 10ºC and 25ºC therefore each high pressure pump will be equipped with a VFD to deliver a constant feed flow at variable feed pressures.

The produced sludge in DAF unit is entered to dewatering unit. Dewatering is a physical unit used to separate the solid matter and water resulting in high solid content stream called cake and a liquid stream. The dewatering technology for this wastewater treatment plant is decanter. The feed enters the decanter through the feed pipe and is gradually accelerated within the rotating feed chamber. It is lead to the rotating bowl, where the actual separation process takes place. Due to their difference in density, solids and liquids are separated by the centrifugal force.