

## **Surface Water Treatment Plant Waste Management Plan Redwood Glen Camp & Conference Center**

Redwood Glen's treatment units both generate waste streams during their respective backwash and cleaning cycles, as follows:

- Waste stream from the continuous membrane filtration (CMF) unit:
  - Regular backwash, once per hour of operation (frequency will depend on water quality and usage),
  - Maintenance & conditioning wash, once per 1-2 weeks (frequency will depend on water quality), and
  - Cleaning-in-Place chemical wash, once per quarter.
  
- Waste stream from the iron and manganese (Fe/Mn) Pelican Water unit:
  - Regular backwash, once per day maximum (frequency will depend on water quality and usage).

### **CMF Waste Streams**

#### *1. Regular backwash*

The regular backwash cycle is meant to prevent the fouling of the membranes. It does so by injecting compressed air through the membranes in the opposite water flow direction to dislodge the particles that were filtered out by the membranes. Raw water then washes away the loose particles out of the unit. The cycle is set to occur every 60 minutes, lasts approximately 90 seconds and uses approximately 40 gallons of water. The plant operator may also adjust the frequency of backwash from the CMF unit's control panel. Additionally, the CMF unit will automatically trigger a backwash cycle if the trans-membrane pressure rises above 1 psi.

During ADD conditions, the daily backwash volume produced is estimated to be approximately 230 gallons, and during MDD conditions, it is estimated to be approximately 530 gallons.

The recycling of the regular cycle backwash water will ensure that Redwood Glen will be able to reuse as much water as possible of its available supply. Through settling and dilution, Redwood Glen plans to recycle the CMF's regular backwash cycle water stream.

Based on the estimates presented above, Redwood Glen proposes the installation of a 2,500-gallon conical tank, which would allow the settling of the particles and the easy disposal of the solids accumulated at the bottom of the tank. A 2,500-gallon tank will have the capacity to store the equivalent of:

- Backwash water for up to 11 days of ADD; and
- Backwash water for up to 4.5 days of MDD.

The suspended solids in the backwash water will settle on a daily basis when the plant is not operating and the clear supernatant will be returned to the two (2) 5,000-gallon raw

water tanks once a day. The amount of accumulated solids varies based on the concentration of total suspended solids in the raw water and the number of hours the CMF unit is operating (i.e the water demand).

Based on the calculated volume of solids that will settle during ADD and MDD conditions, it is estimated that the conical section of the tank will be 75% full after approximately 20 years of operation. The solids accumulate at the bottom of the tank, within the conical section of the tank and can be removed through the outlet located at the center of the conical bottom of the tank.

### Disposal of Solids

The backwash water in the conical tank does not contain any added chemical from the treatment process and the settled solids only include the surface water source's suspended solids. The settled solids can be removed at a frequency established by operations and maintenance (O&M) staff and land-applied on Redwood Glen's property.

### *2. Maintenance & Conditioning Wash – “Short” CIP*

The maintenance wash consists of a sodium hypochlorite wash to condition the membranes and ensure their long-term performance. The sodium hypochlorite concentration is between 400 to 500 ppm. The frequency of the maintenance wash will be based on the water quality and will be set automatically according to the vendor's recommendation. Following the vendor's recommendation, the total volume of the maintenance wash should be approximately 350 gallons and the cycle should run every 1 to 2 weeks, depending on the seasonal water demand and the exact raw water composition. The monthly maintenance wash volume would be vary between 700 and 1,400 gallons. The waste stream from the maintenance wash will be directed to the 2,500-gallon CIP water holding tank and be hauled off-site periodically, as described below.

### *3. CIP Chemical Wash – “Regular” CIP*

The Cleaning-in-Place (CIP) cycle occurs once per quarter and includes a citric acid/sodium hypochlorite chemical cleaning and a series of backwash cycles. The complete process uses approximately 350 gallons of water. Similar to the maintenance wash water, the chemical cleaning waste will be directed to the 2,500-gallon CIP water holding tank and be hauled off-site periodically, as described below.

### Disposal of CIP Waste Stream

A 2,500-gallon CIP holding tank will ensure a practical frequency of the off-site hauling trips (once a month or less). The maintenance wash will use up to 1,400 gallons of the tank's capacity, which will leave sufficient available space if a CIP cycle needs to be performed. A qualified vendor will haul the CIP water off-site. Trinity Liquid Waste Services (<https://www.trinityliquidwaste.com/>) has confirmed that they can provide transport and disposal services for this waste stream on a monthly basis.

## **Waste stream from the Fe/Mn Treatment Unit**

The Fe/Mn treatment unit has one (1) backwash cycle, and the vendor estimates a backwash volume of 75 gallons per cycle. The frequency of the backwash cycle can be adjusted by the operator depending on the usage and the raw water Fe/Mn concentrations. Based on Redwood Glen's demand and concentrations of Fe/Mn, the vendor predicts the following backwash cycle frequency:

- During low water consumption periods, the backwash can be set to run every 4 to 5 days; and
- During high water consumption periods, the backwash can be set to run daily.

The vendor of the iron and manganese unit has confirmed that the backwash water of the unit can be used for irrigation or sent to a septic system, floor drain or drain field. A backwash drain line is supplied with the unit.

The backwash water from the Fe/Mn unit will be directed to an existing onsite 2,500-gallon tank, currently located near the SWTP. During the high season, the 2,500-gallon tank will hold approximately 30 days of the waste stream. During the low season, the 2,500-gallon tank will hold up to 5 to 6 months of the Mn/Fe unit backwash water. The stored Fe/Mn backwash water will then be used as on site as irrigation water and represent useful water savings for the system.