

A Mammoth of a Groundwater Chemical Treatment Application

ProSeries-M® M-3 assists in Arsenic removal in Groundwater Wells

Mammoth Lakes is a resort town nestled in the Sierra Mountain Range in North Eastern California. Known for winter and summer tourist activities, the town experiences a high seasonal demand on its water resources during tourist influxes.

The towns' drinking water resources consist of 9 ground water wells, and surface water from Lake Mary, which is situated above the town. Mammoth Community Water District operates two Ground Water and one Surface Water treatment facilities to treat the drinking water.

Arsenic is present in the well water, and the Water District installed ProSeries-M® M-3 Peristaltic metering pumps to assist in the treatment of the water, and removal of the Arsenic.

Mammoth Water District utilizes Sodium Hypochlorite (NaClO) and Ferric Chloride (FeCl₃) in a multi-step arsenic removal process. The injection of NaClO oxidizes the arsenic to a non-soluble state allowing for co-precipitation with the FeCl₃ and then filtered through manganese dioxide media.

Water in one of the wells contains higher levels of silica and phosphorus which makes the co-precipitation more difficult. Operators discovered segregating this well during treatment lead to an overall reduction in chemical consumption and related cost. The treated water could then be re-integrated with that of the other wells.

Originally, the ground water treatment plants utilized Solenoid Style pumps however; it was found the off-gassing nature of liquid NaClO created vapor lock in the pumps. The peristaltic design of the ProSeries-M® allows the excess gas accumulation to be pumped through the tubing, while also maintaining smooth, accurate and constant flow rate, with no potential for vapor lock.

Additionally, when solenoid diaphragm pumps were used, the chemical tank required regular vigilance. If fluid volume levels fell below the level of the pump head, the pump became susceptible to suction lift errors, including loss of prime. In the case of the ProSeries-M, the pump head serves as a check valve: no matter the level in the chemical tank, the peristaltic pump has reliable suction lift, and will not lose prime.

Utilizing the pumps 4-20mA input, the Water District was able to set desired dosages in the SCADA system and pace the output of the chemical pumps proportionally with the incoming raw water. The ProSeries-M is able to handle fluctuations in feed demand, keeping chemical injection at a consistent ratio.

ProSeries-M[®] design includes the built-in, patented Tube Failure Detection system (U.S. Patents 7,001,153 and 7,284,964). The TFD System is able to detect a wide range of chemicals, and is designed to disregard pump compatible fluids; such as water and lubricants. If there's a rupture in the pump tube, and a chemical is detected in the pump head, the pump will automatically shut off and energize a relay, permitting communications with external equipment, such as an alarm or a SCADA system. The chemical must be cleaned from the pump head before the pump will restart.

ProSeries-M[®] M-3 is capable of feed rates to 33.3 GPH/126 LPH, with a 10,000:1 turndown ratio. Maximum pressure rating is 125 PSI / 8.6 Bar.

ProSeries-M[®] M-3 assisted in the resolution of water treatment challenges at Mammoth Community Water District.