REVIEW OF THE
CLEAN FILTRATION TECHNOLOGIES PROPOSAL
FOR THE
BEAR VALLEY WATER DISTRICT
TERTIARY WASTEWATER TREATMENT PLANT IMPROVEMENTS
BY
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A review was conducted of Clean Filtration Technologies (CFT) proposal to Bear Valley Water District (BVWD), dated 19 May 2008, related to the water recycling facility upgrade and improvement project. The work consisted of review of the backup material (e.g. permits, facilities reports, water quality analyses, equipment pilot testing data, correspondence from regulatory agencies, etc.) as well as a review of the final proposal submitted by CFT to BVWD. CFT has developed a creative scheme to incorporate the existing treatment assets and infrastructure with proven state-of-art technology and new processes to cost-effectively resolve the BVWD regulatory-driven wastewater treatment, beneficial reuse and failsafe disposal issues. The core technologies being employed are low pressure membrane systems (microfiltration or ultrafiltration) with Ultraviolet Radiation (UV) as the secondary pathogen inactivation unit process. These unit processes have a long track record of use in the wastewater treatment arena.

In 2005, AwwaRF published document No. 91059, *Development of a Microfiltration and Ultrafiltration Knowledge Base* whose research objective was to "…consolidate the dispersed knowledge on the use of MF/UF membranes…" This report analyzed data obtained from surveying published literature, vendors and owner/operators for the time period 1995 through 2003. Information on almost 500 membrane plants worldwide was collected. Of these, approximately 47% (213) are located in North America. These 213 plants represent over a 5000% increase from the 4 plants in the North America in 1995 to the 213 plants in operation in 2003. Of these 213 plants, 178 are located in the United States, and of those 32 are located in California. The growth of the utilization of membrane plants in wastewater treatment systems has increased exponentially during this nine year period. The owner/operators reported that 76% used pilot testing to confirm and optimize system design parameters, and that of those, 87% reported that pilot testing accurately predicted full-scale performance. Membrane systems using wastewater as the source water are now commonplace and are the "gold standard" of treatment efficacy.

The use of UV for secondary pathogen inactivation is on the same trajectory as membrane systems were in the 1990's. Pilot testing and acceptance by the California Department of Health Services for use in water recycling applications has been obtained by multiple system vendors.

According to a report published by the State of California, Department of Health Services, Division of Drinking Water and Environmental Management in January 2007; *Treatment Technology Report for Recycled Water*, approximately one dozen membrane manufacturers and seven UV manufacturers have "…documented ability to meet the performance objectives of Title 22…" and thus have earned formal department recognition and status as "Accepted" for use in water recycling applications.

The system proposed by CFT incorporates membranes and UV disinfection in conjunction with the existing secondary treatment aerated ponds and utilizing their 10 micron Turboclone filtration system as pretreatment. It has been clearly demonstrated that membrane systems can be successfully operated with secondary effluent as the feed water source. In some instances the membranes are immersed in the secondary effluent tank and in other applications the membranes are situated outside the secondary effluent tank and utilize pre-filtration or enhanced coagulation prior to the membrane step. Pilot testing with the proposed Hydranautics membrane system showed that it could successfully operate on secondary effluent with the addition of a coagulant (ferric chloride) and a disinfectant (chlorine). The coagulant is used to create pin floc that allows the membranes to operate more efficiently and reduce fouling, and the chlorine is used to prevent regrowth of bacteria, pathogens and algae which also increases membrane efficiency and promotes reduced fouling. The CFT proposal utilizes both pre-filtration and enhanced coagulation. The efficacy of UV disinfection on microfiltered or ultrafiltered water is well documented.

The pilot testing step during both the cold months when the BOD is the highest and the hot months when the algae growth is highest is definitely recommended to ensure proper design and operating parameters are identified and incorporated into the full-scale system configuration. For example, ferric chloride dosing must be optimized so that it will serve its purpose but not impact discharge water quality compliance.

The design team must actively direct the pilot testing to ensure that all pertinent data is collected and adjustments to the experimental plan are implemented so as to have adequate information with which to prepare a final full-scale design. This information is also necessary to prepare the permit applications to the appropriate regulatory agencies to ensure system acceptance. As part of the design team I will be involved in all steps of the pilot testing, permit application preparation, full-scale system design, construction and start-up.