

WaterWorld

Serving the Municipal Water/Wastewater Industry

Editorial *focus* **ODOR CONTROL**

Overview of Odor Control Techniques/Technology *By Tim Malki*

Controlling odors typically emitted from the various stages of the water reclamation process is a critical part of operating a municipal wastewater treatment facility. Odorous air has been dealt with by capturing fugitive emissions from targeted structures in a plant where high levels of hydrogen sulfides and VOCs are present: i.e. headworks, truck loading bays, primary and secondary basins, digesters, wet wells, solids handling buildings, etc. Traditionally the approaches to mitigating the exhaust of odorous air have been limited to one (or a combination) of the following three methods:

a.) Wet packed chemical scrubber towers: Influent air stream containing contaminants is introduced counter-currently to a recirculation reagent that is continuously saturating a vertical column of packing media. The packing bed is made up of numerous independent and porous polypropylene structures that are geometrically designed to have the

largest possible contact surface area while allowing the maximum volume of air to break through. The reagent is repeatedly spiked with NaOH and NaOCl via a chemical metering system to maintain optimum pH and ORP reaction levels. The clean air that is eventually discharged from the two stages of wet packed scrubbers is chemically stripped of 99.5% of H₂S contaminants and over 80% of volatile organic compounds.

b.) Dry carbon adsorber scrubber units: Influent air stream containing pollutants is introduced to adsorber scrubber vessels containing dry carbon media. Typically, the pelletized carbon media is made of bituminous coal-based activated carbon. The carbon may be virgin or impregnated with neutralizing compounds such as caustic. The air is forced through the carbon media and stripped of its pollutants. This

process is particularly effective in capturing 99% VOCs and mercaptans. At times, carbon vessels are used as second stage polishers to wet chemical scrubbers.

c.) Biofilter Beds: A shallow below grade concrete-lined bed containing media such as wood chips, bark, mulch and/or pea gravel is continuously moistened using a drip irrigation system. The media covers parallel rows of perforated FRP or CPVC pipe branches laid out equidistantly across the bed.

The branches are fed by one common header, which, in turn, is supplied by foul air exhaust lines. As a result, the H₂S-laden air is evenly distributed across the biofiltering bed area and stripped of pollutants as it rises through the approximately three-foot depth of media. This method requires no chemicals or carbon change out. It does, however, require large areas of unused land. Recently, new methods that remain in

the experimental stages have been introduced to the industry; the most prominent of which is the "Biotrickling" method. This entails the use of a culture made up of bioorganisms, which "feed" on or consume the pollutants found in the odor control system's influent.

Of the above-mentioned methods of controlling exhaust odors, the most prevalent and widely accepted method is the wet packed towers. Two systems supplied by Daniel Mechanical illustrate what needs to be considered and analyzed in taking this approach:

Benicia Wastewater Treatment Plant, Benicia, CA - Daniel Mechanical supplied an odor control exhaust and scrubbing system having a removal efficiency of 99.5% of H₂S from various plant process areas such as truck loading facility and sedimentation tanks.

Bullhead City Wastewater Treatment Plant, Bullhead, AZ - The firm supplied two separate multistage systems with H₂S removal efficiencies of 99.5%. Odors have been dramatically reduced,

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as have complaints by plant neighbors. Crucial to any wet packed tower installation is the performance of the chemical metering pump used. Both of these installations require that chemicals such as NaOCl and NaOH be metered into each scrubber vessel's sump to maintain the recycling reagent ORP levels, at anywhere between 600 to 700 millivolts and pH levels from 9-10.

Concentrations of 50% NaOH and 25% NaOCl are typically stored in fiberglass holding tanks. To achieve the necessary performance results, Daniel specified Series 500 pumps from Neptune

Chemical Pump Co., which consistently and efficiently meter the required doses of these chemicals to the reaction chamber.

Daniel has found that while the Neptune pump can deliver accurately measured doses at low power costs, it is also designed to operate continuously with minimal clogging despite the presence of debris in the chemical solutions. The pumps are electrically wired to be energized upon detection of low levels of chemical concentration and deenergized as soon as the required levels are reached.

Ideally, the specified chemical metering pump should be an indestructible

"workhorse" with the capability to respond accurately to intermittent and sudden demands.

Chemical metering systems for odor control units are often subjected to harsh climatic conditions, extreme temperatures and poor maintenance practices. Both locations represent exposure to extreme climatic elements where the Neptune Series 500 pumps have stood up to their respective environmental rigors.

Benicia is located North of the San Francisco Bay area with temperatures ranging from 90°F to as low as 30°F. The environment is dank and the ocean

air presents corrosion problems. On the other hand, Bullhead City's weather ranges from 30°F to 140°F. The piping system is subjected to direct sunlight and frequently experiences interruptions in the flow due to vapor lock.

It's important to specify pumps that will operate effectively in a wide range of environmental conditions to meet performance requirements and to consistently maintain necessary flow without the need for repeated priming.

About the Author: Tim Malki is the Vice President and Senior Project Manager for Daniel Mechanical with more than 14 years of experience in designing, manufacturing, and installing odor control systems nationwide.