PRODUCTS IN ACTION

By Mike Hoover

Scrubbing Out Odor

Packaged scrubber system fills odor control needs in a Michigan town

Many suburbs across the U.S. are experiencing population growth. That growth creates infrastructure demands, with none more demanding than those at the Wyoming, Mich., Clean Water Plant. This facility is surrounded by new home developments, causing odor control to be a primary concern for local residents.

Enlisting the aid of a large international engineering firm, the city of Wyoming set out to determine the most efficient and effective means of odor control. After a thorough review of the wastewater treatment process and a detailed characterization of the various odor sources and constituents, it was determined that multistage chemical scrubbing technology would be the most practical and cost-effective means of eliminating the offensive odor.

With more than 40 years of design and manufacturing experience specializing in the municipal odor control industry, Duall Division, Met-Pro Corp., Owosso, Mich., was selected as the equipment manufacturer for this project.

Odor Source

The odor combinations emitted from sludge holding tanks at a wastewater treatment plant can be numerous and difficult to control. The primary odor constituents at this facility were high concentrations of ammonia with some hydrogen sulfide. Duall accepted the challenge and worked with the city's consultant, construction contractor and plant operations personnel in designing a solution.

System Design

A total of three Duall PTMD (14,000 cu ft per minute [cfm] each) odor control systems were installed. Each scrubber system consists of two stages and utilizes three chemistries.

Stage one consists of a scrubbing stage that utilizes dilute sulfuric acid (H_2SO_4) to treat more than 100 ppm by volume (ppmv) of ammonia loadings. The low-pH acidic scrubbing solution is recycled through the stage one scrubber, where the sulfuric acid reacts with ammonia to form ammonium sulfate. This nonvolatile, soluble salt is then discharged with the scrubber liquid effluent.

Stage two consists of a scrubbing stage that utilizes a combination of sodium hydroxide (NaOH) and sodium hypochlorite (NaOCl) to treat hydrogen sulfide and other sulfur-based odor. The sulfur-bearing compounds are simultaneously neutralized by the NaOH and oxidized by the NaOCl to a soluble, nonvolatile sulfate.

The reaction between the absorbed odor vapors and chemicals in the scrubbing solution transforms the odorous vapors into a species that does not inhibit further adsorption of that vapor. This action increases the capacity of the scrubbing solution to absorb the vapor and allows for cost-effective recirculation of the scrubbing solution. The proper type and amount of chemicals added to the scrubbing solution are automatically and precisely controlled.

The PTMD chemical scrubbers worked well for this application because the multistage, skid-mounted design minimizes the overall height for indoor installations with restricted height requirements.

Each factory-packaged, preassembled system also includes Duall Model NH PVC exhaust fans, Fybroc recirculation pumps, instrumentation, chemical metering pumps, PVC duct, exhaust stacks, chemical storage tanks and NEMA 4X control panels.

The Scoop on Scrubbers

Standard features of the PTMD scrubbers include: pre-engineered systems up to 25,000 cfm; single and multistage factory-packaged design; a proportional chemical feed system; corrosion- and UV-resistant thermoplastic construction; and low-profile, easy access for operators and maintenance personnel.

Advantages of the units are as follows:

- Easy, low-cost, factory prepiped and wired, skid-mounted installation minimizes contractor onsite rigging and installation costs.
- Minimal footprint and headroom requirement saves valuable facility space and allows it to be utilized for other facility needs.
- Easy access, maintenance and operation allow for "safety-first" operator access.
- Cost-effective multistage chemistry in one preassembled equipment package to deliver maximum odor removal, system operating flexibility and reliable, low-cost operation.
- Odor removal efficiencies are consistently in excess of 99%.

Typical applications of these scrubbers are municipal odor control for lift stations, headworks, grit chambers, clarifiers, sludge holding and processing operations; high-efficiency NOx removal and acid gas scrubbing; and industrial odor control for a variety of complex chemical processing applications.

FIGURE 1: System Efficiency

Results: Efficiency	Inlet	Outlet	Removal
Air Flow Rate: 14,000 cfm			
Ammonia	100 ppmv	< 1.0 ppmv	> 99%
Hydrogen Sulfide	3 ppmv	< 0.03 ppmv	> 99%

Present Status

The Duall PTMD scrubbers systems were put into service and performance-tested in September 2005. Since then, odor removal has exceeded the design performance requirements. As this community continues its development, Duall PTMD scrubbers will be on the job, accepting the challenge of that growth.

Duall's unique PVC construction provides a wide range of corrosion resistance to acids, alkalis and oxidants often utilized with complex wet scrubber chemistries. The citizens of Wyoming received the value-added assurance of a cost-effective investment with an odor-free wastewater treatment facility. WWD

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ARTICLE SUMMARY

Challenge: A water plant was emitting odor with high concentrations of ammonia and hydrogen sulfide, causing nearby residents to complain.

Solution: A multistage chemical scrubbing technology proved to be the most practical and cost-effective solution to the odor problem.

Conclusion: Since the scrubbers went online in September 2005, odor removal has exceeded the design performance requirements for the system.

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