

Honorable Mention

Practical Applications, Inc.'s (PAI) design of the biological wastewater steam kill system for the University of Pittsburgh BSL-3 Laboratory receives an honorable mention in this year's Design in Excellence Award. The design of the treatment system addresses the on-site concerns for pretreatment of bio-hazard waste. The design uses a common means of killing the biological waste, steam. The plumbing

codes limit the discharge temperature of all waste. The system design addresses this concern with a heat exchanger.

This design by PAI is being used in the design of other BSL-3 laboratories across the country. *PM Engineer* applauds Practical Applications, Inc. for the dedication to environmentally sound pretreatment of biological wastewater.

Practical Applications, Inc., BSL-3 Steam Kill System for the Regional Biocontainment Laboratory at the University of Pittsburgh (Boston, MA)

Boston-based Practical Applications specializes in the design, installation, and maintenance of industrial process water and wastewater systems. The company has won the bid to design and construct the BSL-3 Steam Kill System for the Regional Biocontainment Laboratory at the University of Pittsburgh. The Pittsburgh facility is one of nine biocontainment laboratories under construction across the country to study diseases and viruses that theoretically could be used as weapons by terrorists. The system will be used to kill biological pathogens found in laboratory wastewater generated by the university as it studies emerging infectious diseases.

The project is led by Joshua Jondro, Project Engineer/Chemical Engineer. PAI will complete the system's design and electrical equipment fabrication at its new facility located in the EDIC Marine Industrial Park, Boston. All tank fabrication and testing will be completed at PAI's South Boston Fabrication Facility. It will then be taken apart and shipped to Pittsburgh, where it will be re-assembled and fit within the dimensions of a room still being constructed.

The system collects all wastewater generated by the BSL-3 laboratories in a special sealed 6,500-gallon tank. As demand requires, the wastewater is transferred to one of three 1,500-gallon "Steam Kill" tanks. In the Steam Kill tank, live steam is injected and mixed with the wastewater at temperatures above 250°F and at a maximum pressure of 30psi. Once the biological material has been destroyed, the wastewater is cooled via a plate and frame heat exchanger, and discharged. All critical systems are automated and monitored via a state of the art SCADA system.



PAI applied a unique mixing design to the treatment process to improve heat transfer, which drastically decreased cycle times and vessel volume. It allows the system to homogeneously heat the entire contents of the tank without any solids settling. This eliminates tank stratification and guarantees that the effluent is 100% treated. This proprietary mixing design decreased equipment costs, mainly by improving through-put and increasing performance. The increased through-put allowed for a significant decrease in equipment sizes, while the proprietary mixing design improved heat transfer rates on solids suspended in the wastewater.

Piping Systems

This project has unique plumbing and piping systems, including medium pressure steam, welded stainless steel piping, welded polypropylene piping, special coatings, pressure vessels, and automatic valves. The way the pipes are connected is a very important part of such a system. If there are threaded pipe sections, there would be a risk of contaminated water leaking out. This design consists of schedule 10 welded stainless steel pipe, with pipe connections either welded or flanged, eliminating the need for any threaded sections.

In addition, there are only a handful of similar treatment systems existing in the United States. The ultimate challenge was to design a system that is reliable, safe, and easy to operate while maintaining a finite barrier to the bio-hazard.

Meeting Schedules and Reducing Cost

PAI minimized schedule delays by ordering in advance major control components (i.e., control valves, control panel equipment) and pre-testing the equipment prior to installation on the system skid.

Costs were minimized by selecting vendors whose core business was in-line with the required item.

How Does the Project Improve the Community?

The treatment system allows scientists to safely research hazardous biological agents without impacting the community. The research laboratory also provides a local facility for the community to promptly mitigate public health episodes.

Overall, PAI's improved research will allow the United States to prevent disease, guard against bio-terrorist attacks, and maintain the worldwide lead in biological research.

For more information on Practical Applications, visit www.pai-online.com.