Odor Control Solution for Influenza Vaccine Egg Waste Vapor

Bionomic Industries' air pollution control systems have recently been installed to remove ammonia and hydrogen sulfide vapors emitted by egg waste generated during the production of influenza vaccines.

Vaccines are produced by infecting fertilized eggs with a virus. After incubation, the antigen containing fluid is harvested and the egg waste is blended, dried, and sent for disposal. Egg waste has a pungent odor containing ammonia (NH3) and hydrogen sulfide (H2S).

Low level exposure can cause irritation to the eyes, nose, and throat, while hydrogen sulfide can additionally cause fatigue, headache, nausea, shortness of breath and potentially death depending on the concentration and duration of exposure. Bionomic Industries' air pollution control system is designed to reduce the concentration of these odors to below the human detection limit for the well-being of both employees and the surrounding residential communities.

Bionomic Industries supplied a fiberglass Series 5000 Model 60 Packed Tower to remove ammonia with sulfuric acid (H2SO4). In response to decreasing pH, sulfuric acid is added proportionally by the acid metering pump system, which reacts to form sodium sulfate (Na2SO4). A conductivity sensor modulates a blowdown valve to maintain a constant concentration of sodium sulfate while level controls maintain the liquid level in the packed tower's integral sump.

A second Series 5000 Model 60 Packed Tower was installed in series to remove hydrogen sulfide with a combination of sodium hydroxide (NaOH) and sodium hypochlorite (NaOCI) to form sodium chlorite (NaCI) and sodium sulfate (Na2SO4). In response to decreasing pH, sodium hydroxide is added proportionally by the caustic metering pump system. Simultaneously, decreasing ORP causes the bleach metering pump system to continuously add sodium hypochlorite. Identical conductivity and level controls were installed to maintain the blowdown and make-up rates.

The packed tower scrubbers are fed by PTFE-lined magnetically-driven pumps which recycle fluid from the integral sump to the spray headers. The recycle pumps and chemical metering pumps are skid mounted and piped using code registered polypropylene fittings. The bleach metering pump skid uses perfluoroalkoxy (PFA) tubing for additional chemical resistance and durability.

Gas is drawn through the system by two stainless steel in-line fans, which are controlled by variable speed drives and designed to maintain a constant system inlet pressure.

Due to extreme space limitations, all equipment skids feature pumps and fans which are stacked on top of one another to conserve space and fit within the available footprint.

Controls monitor and maintain equipment setpoints by modulating automatic valves, regulating the addition of process water, sulfuric acid, sodium hydroxide and sodium hypochlorite solutions. Under low pressure, flow, pH or ORP alarm conditions, the operating pump or fan may be stopped, and the offline spare may be brought online to ensure continuous operation and prevent a release of odors which might elicit complaints from the city.

Bionomic Industries coordinated the integration of the client's chemical supply with the scrubber system's chemical metering pumps. The chemical storage tanks are located far from the scrubber system and require a local pump at the storage tank to directly feed the scrubber's metering pumps. Control of

the local storage tank pumps, valves and instruments were completed by Bionomic Industries and incorporated into the main control system.

Bionomic Industries provided an electrochemical ammonia and hydrogen sulfide sensor to monitor the stack outlet emissions and issue an alarm should the system be out of compliance. The two Series 5000 Model 60 Packed Towers were found to reduce ammonia and hydrogen sulfide emissions down to 3 ppm and 1 ppm, respectively.

Design Conditions:

Flow Rate (ACFM):	5,300
Temperature (°F):	85
Inlet Pressure (in.WC):	-2.5
NH3 Loading (lb/hr):	5.5
H2S Loading (lb/hr):	2.2

Process Flow Diagram:

