



Bell & Gossett...Keeping Bacteria Warm

Alabama's largest municipal wastewater treatment plant is using anaerobic bacteria as part of its wastewater treatment scheme. Keeping these living creatures happy at just the right temperature are pumps, heat exchangers and controls from ITT Industries' Bell & Gossett unit.

Jefferson County, Alabama is situated in the foothills of the Appalachian Mountain Range, less than 15 miles from downtown Birmingham which is the county seat. It lies in the Jones Valley, a gently sloping dale 578 feet above sea level.

Keeping the Bacteria Happy

Jefferson County, like most places in the southern United States, likes to pride itself on making visitors feel welcome with its hospitality. In the case of a new expansion of its wastewater treatment facility, this welcome certainly extends to keeping the mesophilic bacteria in the new anaerobic digesters feel right at home.

Recently, the Valley Creek Waste Water Treatment Plant in Bessemer, Alabama has gone through a major upgrade of its facilities. The project included the renovation of old digestors and building a new digester for a total of seven digestors for the anaerobic bacteria. Anaerobic digestion is a bacterial process that breaks down organic materials with in waste in the absence of oxygen. It is generally run in closed tanks. Biomass consisting of sewage or processing wastes is mixed with water and fed into the digester without air. The waste stream generally contains fats, oils, and grease.

Already the largest wastewater treatment facility in the state of Alabama, the expansion will increase the plant's water treatment capacity from 65 million gallons per day to 85 million gallons per day. With the expansion, the plant will also be able to more easily handle peak flows. Jefferson County is adding new head works, eight new primary clarifiers, 16 new intermediate clarifiers, a new effluent pump station, new submersible pumps from ITT's Flygt unit (more about those pumps later), a blower building, and a generator building to the plant.

Not Too Hot, Not Too Cold

Although it has major benefits, one of the problems with anaerobic digestion has been its unreliability. Because of the complex association of different types of bacteria, anaerobic digestors are difficult to control and are have a higher risk of



Seen here is an aerial view of the huge Valley Creek Waste Water Treatment Plant in Bessemer, Alabama.

breakdown than other systems. This is where Bell & Gossett H.V.A.C. pumps and systems are proving helpful.

In a "not too hot but not too cold" scenario, the anaerobic digester operates optimally at a distinctly tropical 95 to 98.6 degrees. At this temperature range, the mesophilic bacteria breaks down dissolved organic material releasing methane, carbon dioxide and water, with the remaining organic and inorganic material residue stabilized into biosolids.

The water to heat the sludge where the bacteria live is heated in a primary hot water loop. This primary hot water loop is separated from the secondary water loop by Bell & Gossett plate heat exchangers. The temperature of the secondary water loop is carefully controlled with Bell & Gossett type HSC pumps and variable speed drives. Mangham & Associates, Inc. worked closely with the consulting engineer on the system design and equipment selection.

Stan Mangham, Sr., C.E.O. of the firm notes that there are a total of seven Bell & Gossett pumps and five variable speed drives with expansion tanks, air separators and miscellaneous equipment. Unique to this installation was that all motors had to have variable speed drives that were enclosed in stainless steel cabinets with an air conditioning unit on each.

Because the Valley Creek wastewater treatment plant operates around the clock and can not be shut down for repairs, the reliability of this equipment is of crucial importance. The entire system is duplex with stand-by pumps and controls.

Advantages of Anaerobic Digestion

Anaerobic digestion has some major advantages over alternative methods of waste treatment. Like its fellow "aerobic" biological treatment - the activated sludge system, anaerobic digestion is a more efficient and economical process than chemical or physical methods of waste treatment. And, unlike the activated sludge system, anaerobic digestion doesn't require oxygen and is therefore cheaper to run. On top of that, a by-product of the anaerobic process is bio-gas, a mixture of methane and carbon dioxide, which can be used in a way similar to natural gas as a fuel for heating or electricity generation at the plant or in the surrounding community. Apart from bio-gas, anaerobic digestion also creates solid and liquid by-products, which can have value as a fertilizer or soil amendment.

Using this process, the Valley Creek treatment facility is on the cutting edge of wastewater treatment science. The anaerobic digestion process for wastewater treatment has grown tremendously during the past decade. European plants account for about 44 percent of the installation base with only 14 percent of the systems located in North America. A considerable number also are in India and South America.

According to the International Energy Agency's (IEA) Bioenergy Anaerobic Digestion Activity, over 35 industries that use digesters for industrial wastewater have been identified, including processors of chemicals, fiber, food, meat, milk, and pharmaceuticals, among others. Frequently, anaerobic digestion is used as a pretreatment step to control odors, and reduces the costs of final treatment at a municipal wastewater treatment facility. Likewise, sewage treat-

ment facilities themselves have been paying increasing attention to anaerobic digestion due to the 50 to 80 percent reduction in biosolids volume, the production of bio-gas, and a rich, biologically stable residual material.

Submersible pumps manufactured by ITT's Flygt unit also have a large presence at the wastewater plant. There are a total of 21 Flygt pumps operating at this treatment plant. Flygt CP model pumps are used to pump raw sewage, storm water and water with a large amount of abrasive grit. The CP model pumps are also used to pump effluent in the first stage primary clarifier. The treatment plant is also using Flygt model CS pumps to handle sump pump applications.

From moving the wastewater through the plant to keeping the anaerobic waste digestion process running smoothly, pumps, heat exchangers and control equipment have found a happy home along with the mesophilic bacteria in Jefferson County.



Inside the plant, pumps and control systems from Bell & Gossett work to keep anaerobic bacteria at just the optimum temperature.