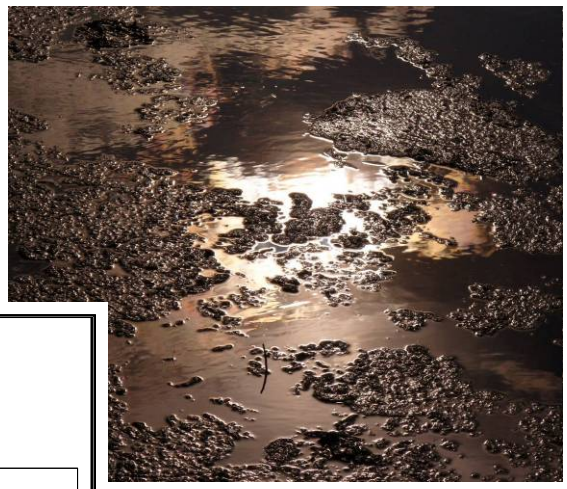
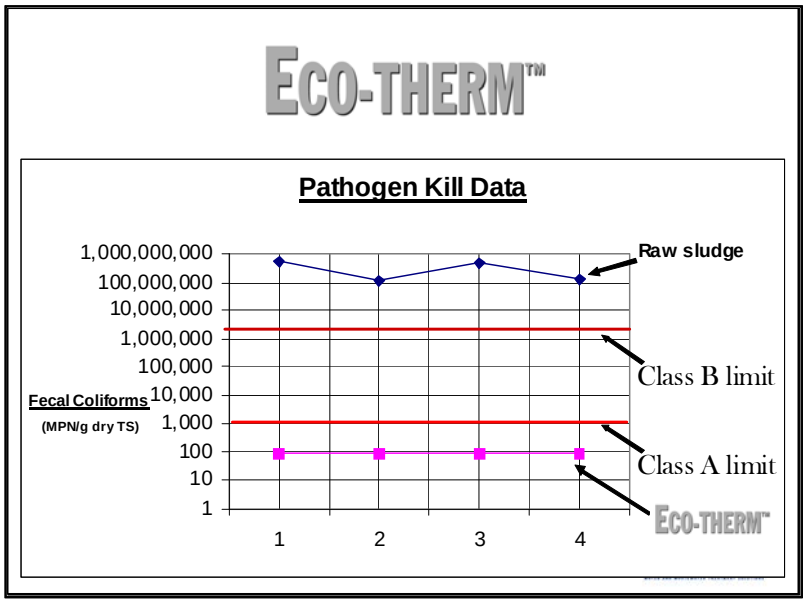
ECO-THERM™

CLASS A BIOSOLIDS CONTINUOUS PASTEURIZATION PROCESS

OVERVIEW

Ashbrook® ECO-THERM™ technology is a continuous pasteurization process for the on-site production of high-quality, neutral pH, Class A biosolids. When comparing the options available for sludge disposal, the beneficial use associated with land application is much preferred over other options such as land filling or incineration. With the higher level of pathogens (< 2,000,000 MPN/g TS) present in Class B biosolids, land application is highly restricted and not attractive to the public in general. Conversely, Class A biosolids substantially lower pathogen levels (< 1,000 MPN/g TS), enabling it to be used with few restrictions and enjoy much better acceptance by the general public. The current trend is toward both land application and the use of Class A biosolids, as Class A biosolids are ideal for usage as a soil amendment.





ECONOMICS

Class A biosolids can be produced by processes classified as pre-anaerobic digestion, modified thermophilic anaerobic digestion or post-digestion. Neither post-digestion nor thermophilic digestion processes allow for maximum use of existing WWTP facilities and minimum additional construction, as ECO-THERM™ does, which supports ECO-THERM™ as the most economical way to achieve Class A.

The ECO-THERM™ process substantially reduces biosolids disposal costs and generates a Class A biosolids product which can potentially produce a revenue stream for the treatment facilities. The pasteurized product's relatively high nutrient content (i.e., total nitrogen and phosphorus concentrations) makes the product a very valuable soil conditioner.

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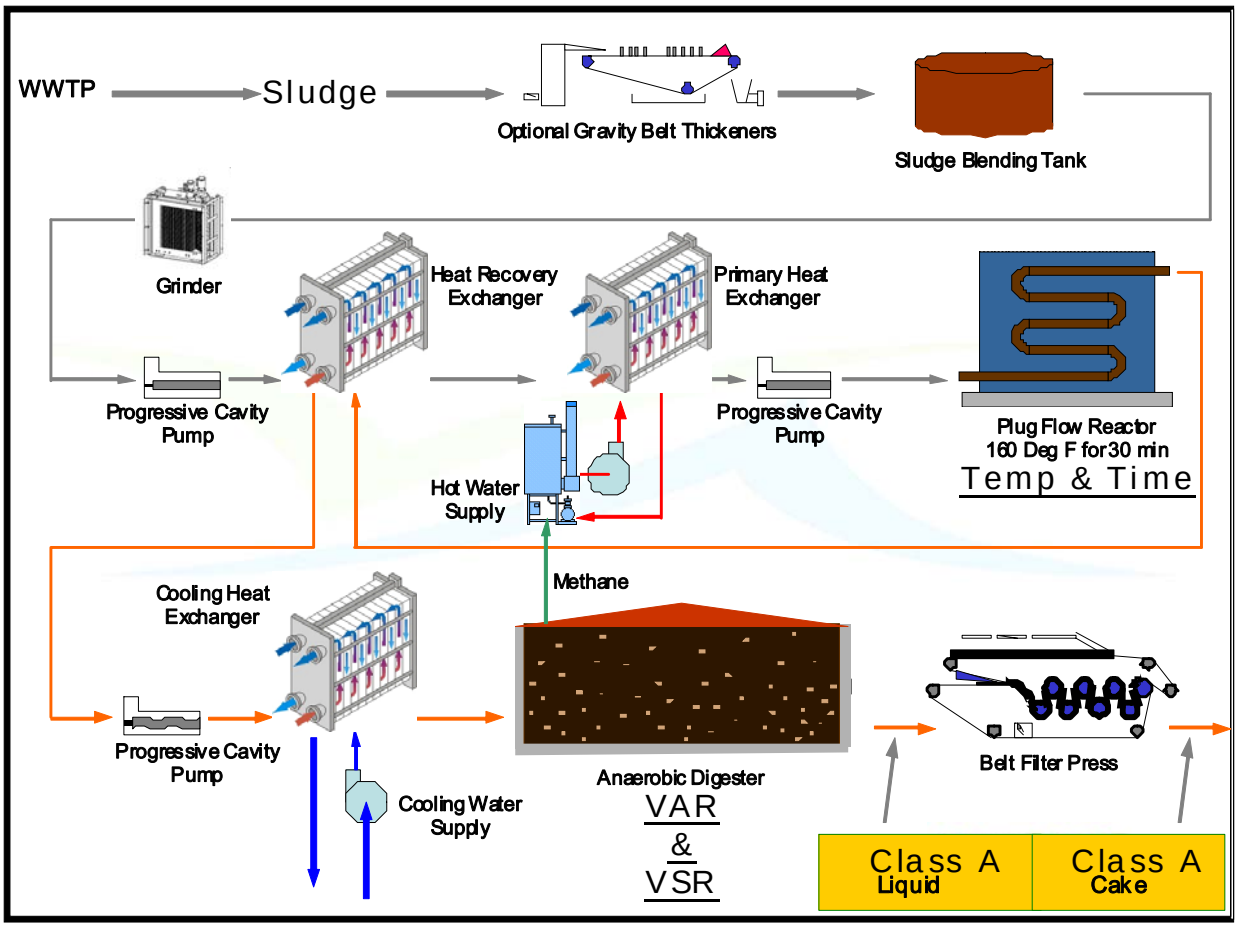
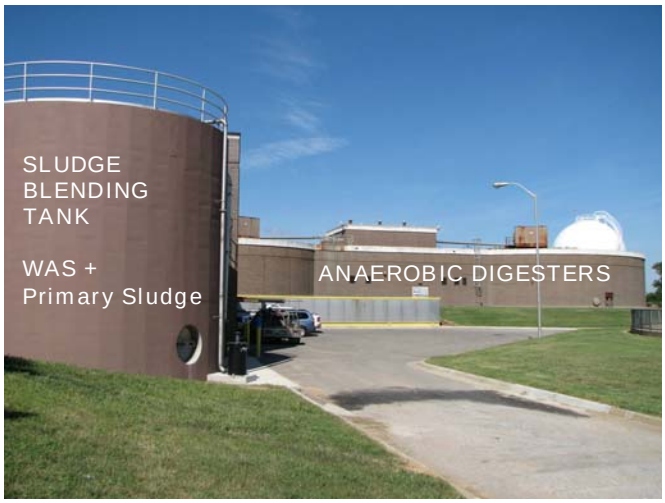
The process is simple to operate and requires minimal operator attention. The system can run on a continuous basis without operator attention or in low flow scenarios, the system may run on shifts. By using methane from anaerobic digestion as the energy source for heating the sludge, energy consumption is very low. In many cases the heated pasteurized sludge will provide the digester heating requirements.

There are no chemicals required with the ECO-THERM™ process, which constitutes a safer environment for both operators and local citizens and eliminates the cost of purchasing, storing and handling chemicals. The system is completely enclosed, producing no off gas, and therefore no odor, eliminating the need for scrubbers. In addition, the heated biosolids do not generate offensive odors during dewatering, hauling or air drying.

PROCESS

As displayed in the schematic below, the process begins with an optional dewatering step to reduce sludge volume using a gravity belt thickener.





The sludge from the WWTP initially goes to a blending tank which feeds a uniform concentration and flow rate into the pasteurization system. From here, the sludge passes through a sludge grinder to ensure that all solids are of an appropriate size to pass through the heat exchangers and into the anaerobic digester. A progressive cavity (PC) pump then moves the sludge through the Heat Recovery Exchanger where it is heated to approximately 90 deg. F. The Heat Recovery Exchanger runs counter current to the final product, allowing both heat recovery from the final stream and the reduction of heat of the final product which enters the mesophilic anaerobic digester.

The Primary Heat Exchanger then heats the flow to just above the mandatory temperature of 158 deg. F. The sludge runs countercurrent to hot water from low pressure hot water boilers. The low pressure boilers do not require any additional certifications for the operators. The boilers typically are fueled by biogas from the anaerobic digesters to minimize energy costs.

A second PC pump moves the sludge through the Plug Flow Reactor to provide the required 30-minute detention time at temperature. The ECO-THERM™ produces Class “A” sludge that is completely in accordance with U.S. EPA 503 regulations. The patented continuous process plug flow reactor positively ensures the sludge is exposed to the critical time and temperature conditions. A third PC pump moves the sludge through a Cooling Heat Exchanger, which maintains the proper temperature of the anaerobic digester. The anaerobic digester reduces volatile solids and provides for vector attraction reduction, resulting in Class A biosolids.

Additional dewatering and volume reduction can be done using a belt filter press or a centrifuge. The cake can then be used for agricultural soil amendment. It may be air dried prior to shipping, with an anticipated further volume reduction of 25%.

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Both the flow rate through the reactor, which ensures the correct processing time (time = Volume of Reactor / Flow rate), and the reactor effluent sludge temperature are continuously monitored by the programmable logic controller (PLC).
The PLC also continuously monitors the temperature and the time of pasteurization at multiple points within the reactor. If either parameter falls below a setpoint, the system automatically goes into a recirculation loop and alarms the operator. The process will not begin to discharge effluent sludge until the time and temperature requirement is met. An automatic cleaning cycle is also programmed into the control system.