TPS THERMAER™ PROCESS

ThermAer™ Applications Report

Marshall, Minnesota

Minnesota's First 2nd Generation ATAD Offers Marshall Process Flexibility

Marshall, Minnesota – ThermAer™ treats solids generated by a wide variety of plant influent, while consistently producing Class 'A' Biosolids.

Marshall, Minnesota, named one of the "Best Small Towns in America" for the third time, has recently installed the state's first 2nd generation Autothermal Thermophilic Aerobic Digester (ATAD). The Marshall facility has a unique set of challenges. The community is home to an ice cream manufacturer, a turkey processor and one of the state's largest corn milling facilities. In addition, it is the home of the Southwest Minnesota State University Mustangs resulting in a 20% increase in population during the school year.

ThermAer™ retrofit of existing anaerobic digester

Working closely with the Minnesota Pollution Control Agency and the city's engineering firm, Bolten & Menk, the city selected Thermal Process Systems' ThermAer™ process. Given the unique and often dynamic chemistry coming into the plant from its industrial customers, it was imperative the city have a system capable of handling varying conditions.

The ThermAer, quite simply, stabilizes and pasteurizes raw biosolids through the use of aerobic thermophilic temperature conditions without supplemental heating (autothermal). Heat is produced by the microbial degradation of the volatile fraction of the biosolids – similar to composting.

ThermAer™ Offers:

Aerobic Process, 60% TS Reduction, ORP Process Control, Quality Class 'A' Biosolid, Odorless Solution, Ability to Retrofit Existing Tanks*

** Based on Marshall's operational data*

Marshall uses a rectangular, open top BiofiltAer.™ PLC controls adjust the fan speed to keep the BiofiltAer at an optimum temperature and humidity for biological activity.

Marshall utilizes two ThermAer ATAD reactors, each fed on alternating days, 7 days a week. Primary and secondary sludge is fed to the reactors at a solids concentration of approximately 3.5%.

ThermAer™ Applications Report

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In the heart of Minnesota's corn belt, the Marshall facility must be capable of processing a variety of waste water chemistries.

Jet aeration provides mixing and independent control of the oxygen fed to the reactor. Control by Oxidation Reduction Potential (ORP) allows the control panel to modulate the amount of the oxygen fed to the reactor. Higher oxygen levels are required after feeding to produce superior mass reduction and minimize the formation of mercaptans and other sulfur compounds. As the ORP climbs, the blower speed and pumping rate are reduced thereby saving on horsepower and reducing the overall power consumption of the process.

Foam control pumps serve double duty and are used to control foam and transfer the biosolids from the ThermAer reactors to the Storage Nitrification/Denitrification Reactor (SNDR™). Because nitrification is inhibited at higher temperatures, the solids are air cooled to 95-100°F, a temperature more conducive for nitrification/denitrification. A jet header, similar to the ones in the ATAD reactors, was installed in the SNDR. ORP and pH control the blower for cycling the air to the SNDR for nitrification and denitrification.

In addition to the PLC control panel, Marshall utilizes E-WON software, allowing the operators to track trends and make process control decisions.

Two large storage tanks are on site for treated biosolids storage. The plant decants from these tanks providing higher solids concentration to the farm fields. The tanks allow for storage during the cold months and when land application is not feasible. Demand by the farmers for this nutrient rich, Class "A" material is so great the facility is able to charge $75/acre to off-set application costs.

"We are very happy with the ThermAer™ system."

Scott Truedson,
Assistant Superintendant, Marshall WWTP

The ThermAer system installed at Marshall offers the following:

- *Class A Biosolids*
- *Total Solids Reduction = 60%*
- *Odor-free operation*
- *Revenue of $75/acre - liquid land application*
- *Complete PLC automated control*
- *Decant of the long term storage volume*

Class A biosolids consist of:*

- *5.58 % nitrogen*
- *3.37 % phosphorous*
- *7.0 pH*
- *5.2 % solids after decanting*

** Data provided by Minnesota Valley Testing Laboratories.*

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