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Frackville Area Municipal Authority WWTF Aerobic Digestion System Case Study

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History and Objectives

Frackville Area Municipal Authority (FAMA) Wastewater Treatment Facility (WWTF) in Frackville, Pennsylvania currently operates an Ovivo AirBeam™ cover aerobic digestion system and was commissioned on October 2010.

FAMA was seeking to upgrade and improve their aerobic digestion system. Entech Engineering was contracted by FAMA to design an improved aerobic digestion system that would reduce the amount of solids to be disposed for land application.

FAMA WWTF Aerobic Digestion System Design

Previously aerobic digestion at the FAMA WWTF was done through a floor mounted coarse bubble diffuser system in uncovered aerobic digester tanks. Entech Engineering proposed to retrofit the two existing aerobic digestion tanks with an Ovivo AirBeam cover aerobic digestion system to minimize operating and capital costs, provide maximum mixing and aeration efficiency of waste activated sludge (WAS) while using minimum energy requirements, minimize odors, and provide optimum temperature control to improve digestion of the WAS. By covering the aerobic digester tanks provided faster kinetic reactions in the system resulting in shorter solids retention time in the existing tanks to obtain Class B stabilized sludge which prevented the construction of new tanks.

Each aerobic digester tank was designed with an AirBeam cover integrating Ovivo's MS diffusers and shear tubes. The shear tubes allow the diffusers to be submerged several feet above the bottom of the tank floor reducing the blower discharge pressure resulting in lowering energy requirements of the aerobic digestion operations.

Figure 1: FAMA WWTP AirBeam™ Cover Aerobic Digestion System



AirBeam™ Cover Aerobic Digestion System



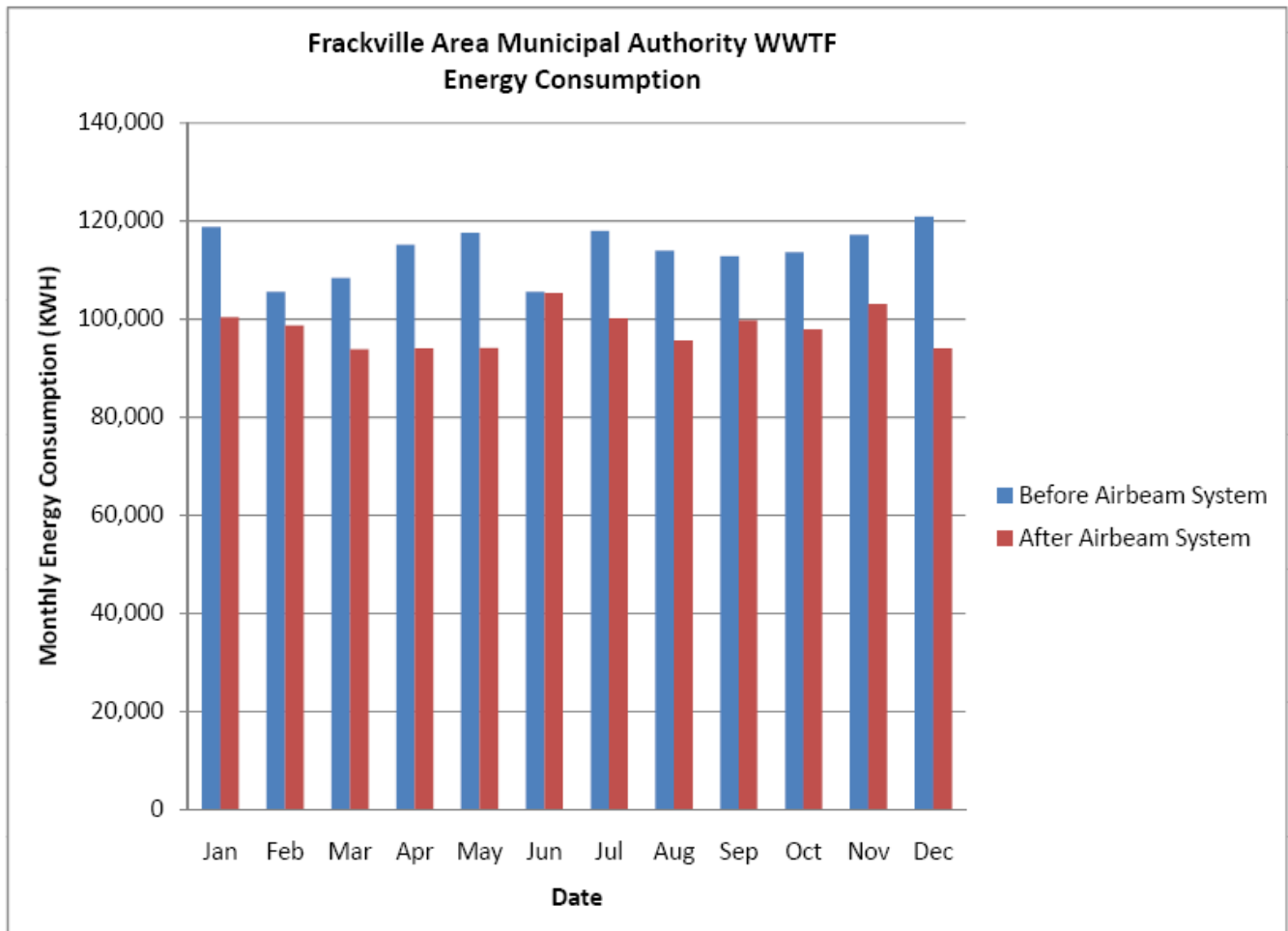
Shear Tube Aeration Equipment Under the AirBeam™ Cover

Results of the FAMA WWTF AirBeam™ cover Aerobic Digestion System

Reduced Energy of at the FAMA WWTF

In comparison to the prior floor mounted diffuser system the shear tube design at the FAMA WWTF is capable of lowering the discharge pressure of the blower system by nearly 1.5 psig resulting in more than a 15% reduction of annual energy usage at the FAMA WWTF since incorporation of the AirBeam cover aerobic digestion system. Figure 2 below shows the reduction in energy as a result of the AirBeam cover aerobic digestion system. The reduced energy usage from this system saves FAMA \$18,000 annually in energy costs.

Figure 2: FAMA WWTF Energy Consumption Data



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FAMA Awarded Rebate as a Result of Energy Savings

Pennsylvania Power & Light (PPL) Electric Utilities currently offers financial incentives under the PPL E-power Program to facilitate the implementation of cost effective energy-efficient for commercial, industrial, governmental, institutional, and non-profit customers. The E-Power incentive program pays on per unit of energy (kilowatt hour (KWH)) saved basis. Due to the reduction of energy usage provided by the AirBeam cover aerobic digestion system highlighted above, FAMA applied for this incentive under the PPL E-Power Program. The FAMA was granted a \$27,503 Energy Efficiency Rebate from the PPL in February 2012.

Figure 3: FAMA Energy Rebate Agreement

PPL Electric Utilities E-power Incentives FINAL APPLICATION AGREEMENT

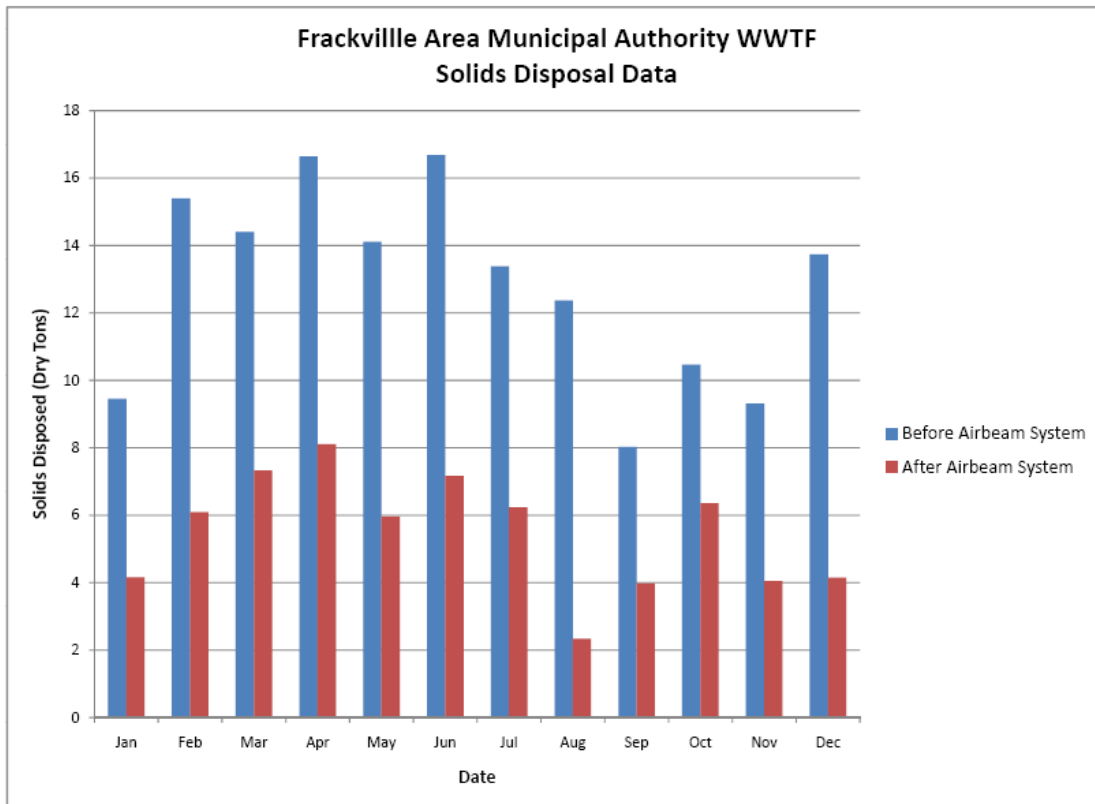
INCENTIVES REQUESTED AGREEMENT		
<p>I have read and understand the program requirements, measure specifications, and E-power Incentives Terms and Conditions set forth in this application and agree to abide by those requirements. Furthermore, I concur that I must meet all eligibility criteria in order to be paid under this program.</p>		
<p>FOR FINAL APPLICATIONS, SIGN AND SUBMIT ONLY AFTER ALL EQUIPMENT HAS BEEN INSTALLED AND OPERATIONAL. A CUSTOMER SIGNATURE IS REQUIRED FOR PAYMENT. SIGNED APPLICATIONS RECEIVED BY FAX OR EMAIL WILL BE TREATED THE SAME AS ORIGINAL APPLICATIONS RECEIVED BY MAIL.</p>		
TOTAL PROJECT COST	**TOTAL INCENTIVES REQUESTED	
\$344,262 of a total project cost of \$939,062.27	\$27,503.37	
CUSTOMER SIGNATURE (PPL Electric Utilities CUSTOMER)	YOUR PPL ELECTRIC UTILITIES 10-Digit Account #:	
PRINT NAME	DATE	ACTUAL COMPLETION DATE
Doug Cleary	2/22/2012	May, 2011

Reduced Sludge Disposal

Enhanced temperature control provided by the AirBeam cover aerobic digestion system greatly improves digestion performance as shown by the reduction in the quantity of sludge to be dewatered and disposed described in Figure 4 below. After the solids are digested by the AirBeam cover aerobic digestion system they are dewatered with a belt press and the Class B solids are land applied. Prior to incorporation of the AirBeam cover aerobic digestion system 250 acres were used to land apply the solids and after incorporation of the AirBeam cover aerobic digestion system 172 acres were used, resulting in a over 30% reduction. Prior to incorporation of the AirBeam cover aerobic digestion system FAMA disposed 1,036 wet tons of solids in 2009 costing \$26,000. After incorporation of the AirBeam cover aerobic digestion system FAMA disposed of 444 wet tons of solids in 2011 costing \$11,000. By substantially improving digestion of sludge, the AirBeam cover aerobic digestion system

provided a nearly two and a half times reduction in sludge disposal generating savings of \$15,000 annually in disposal costs.

Figure 4: FAMA WWTF Solids Disposal Data



Conclusions

The AirBeam cover aerobic digestion system at the FAMA WWTF has improved digestion performance and substantially reduced energy usage without having to build additional tank volume. The improvements have resulted in a more than 57% reduction of solids disposed and 15% reduction in annual energy costs. FAMA is able to save a total of \$33,000 annually through reduced energy and disposal costs alone from the AirBeam cover aerobic digestion system. The AirBeam cover aerobic digestion system proved to the PPL that it was a cost effective energy efficient measure FAMA was awarded a \$27,503 rebate.