Case Study

Client/ Location:
Shelley's Septic Tanks, Zellwood, Orlando, Florida, USA 31/08/2011- 12/11/2011

Type of waste:
Sewage sludge and fats

The project:
Shelley's Septic Tanks are a family owned and operated business in Florida which specialise in the removal and processing of septic tank waste. They provide biosolid management for commercial and residential customers, and receive large volumes of sewage on a daily basis. Fats, oils and greases (FOGs) from pump and lift stations also require special treatment and can cause problems with their sewerage system, encouraging the client to search for alternative options. Shelleys emphasise their environmentally conscious practices and undertook an Advetec XO demonstration to see if their waste was compatible and could be efficiently reduced to further enhance their green and sustainable image.

Objectives:
The clients main focus was to find a waste management system that is able to efficiently process large volumes of waste both quickly and efficiently. The XO reactor was therefore chosen to be trialled based on the high volume reductions it can achieve on organic waste in such a short time frame. The client wanted to see volume reductions of over 80% on the sewage which would significantly reduce their processing costs. The main aim of the initial trial was to assess how efficient the XO digester would be on the sewage sludge waste; a trial extension was then undertaken to examine what reduction of the FOGs the XO digester could achieve.

Implementation:
A XO with a capacity of 1.2 tonnes a day was installed under the canopy area of the work yard. An air extraction system with Ozone and Carbon filters was also implemented to ensure that noxious odours were not discharged into the atmosphere. Additionally a UV sterilisation unit was retrofitted to the chamber to ensure pathogens were not discharged. To avoid anaerobic respiration from occurring, the XO was only filled to the level where the surface of the sludge was still mixed by the machine paddles; this reduced the operating capacity of the machine by 45%. The unit was loaded twice daily for 6 weeks. During this time extra stirrers and a screening edge were added to the end paddles to maximise the break up of the fine discharge material. These modifications allowed 85% liquid and 15% solid material to pass through the XO in a state of digestion. The second part of the trial included gradually adding FOG material to the residual sewage sludge until 100% of FOG laden material was being added.

Table 1: Sludge reduction

Date	Input of sludge/ grease (kg)	Discharge (kg)
31/08/11-07/09/11	840.5	–
08/09/11-15/09/11	281	–
16/09/11-23/09/11	327.21	26.3
24/09/11-1/10/11	468.7	–
2/10/11-9/10/11	494.8	59.1
10/10/11-17/10/17	111.7	31.9
18/10/11-25/10/11	48.7	60.9
26/10/11-02/12/11	208.5	–
Total	2781.11	178.2

Results:
The data collected from both stages of the trial (shown in table 1 and 2) revealed the XO digester could reduce the organic sludge by 93% from the original mass input, and when combined with greases could still achieve a 89.1% reduction. Nutrient testing by NRM Laboratories also determined the discharge material was 89% dry matter. Stage two of the trial included testing on FOG material which yielded a slightly lower reduction of 89.1%. During the trial several modifications were made to the unit to maximise the capability of the XO; these adjustments reflect the complexity of managing this waste type. As the machine could only be filled to 55% of its normal capacity in this trial, an XO machine built for this client would have the central auger raised so the paddles reach the top and bottom of the chambers and create agitation through the whole mass.

Summary:
The Advetec XO digester has proven to reduce the mass of the organic sludge by over 90% in 72 hours; a significant reduction which met the aims of the client. The features added to this system were specifically designed to process this waste type; the high performance of the Advetec XO digester supports the conclusion that Shelleys would benefit considerably investing in this tailored waste solution.

Table 2: Sludge and grease reduction

Date	Sludge input (kg)	Grease input (kg)	Discharge (kg)
03/11/11	62.1	18.2	–
04/11/11	17.8	31.9	40.1
08/11/11	88.5	16.3	–
09/11/11	57.8	12.7	–
12/11/11	48.6	14.2	–
Total	274.8	93.3	40.1

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D ZELWOOD

MANURE

MANURE ANALYSIS RESULTS (Metric Units)

Sample Reference : ZELWOOD

Sample Matrix : MANURE

The sample submitted was of adequate size to complete all analysis requested.

The sample will be kept as the dry ground sample for at least 1 month.

Laboratory References	
Report Number	44888
Sample Number	36652

Date Received	19-SEP-2011
Date Reported	28-SEP-2011

ANALYTICAL RESULTS

Determinand on a DM basis unless otherwise indicated	Units	Result	Amount per fresh tonne	Amount applied at an equivalent total Nitrogen application of... 170 kg N/ha	250 kg N/ha	Units
Dry Matter	%	89.1	891.00	2584	3799	kg DM
Total Nitrogen	% w/w	6.58	58.63	170	250	kg N
Total Phosphorus (P)	% w/w	2.83	57.74	167.43	246.23	kg P2O5
Total Potassium (K)	% w/w	0.796	8.51	24.68	36.29	kg K2O
Equivalent field application rate		—	1.00	2.90	4.26	tonnes/ha

The above equivalent field application rates for total nitrogen of 170 kg/ha and 250 kg/ha have been provided purely for guidance purposes only. Organic manures should be used in accordance with the Defra Code of Good Agricultural Practice and where required within the specific regulatory guidance for the spreading of that material to land. To get the most benefit from your organic manures it is recommended that you follow the principles as set out in Defra's Fertiliser Manual (RB209) or as directed by a FACTS qualified adviser.

Released by *Andrew Chase* Date *28/09/11*

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