Case Study

Client/ Location:

North America, Auburndale, Florida facility (2016)

Type of waste:

Waste water sludge

The project:

one of the most popular soft drinks in history, and a well known global brand. The facility pictured on the right manufactures products, and had a demonstrator version of the XO unit on site to see what reduction could be achieved with their non-carbonated products. An evaluation of the machine's performance was completed over the course of 26 days (from 28/11/2016 - 23/12/2016) this trial aimed to demonstrate the rapid and effective waste reduction that can be achieved with the Advetec XO reactor.

Objectives:

The focus of the trial was to demonstrate that a 70% reduction of waste could be achieved using the XO organic reduction system. The trial period also included measurements of the emissions from the XO to determine the environmental impact of the machine. This allowed the client to assess whether using a machine would improve their compliance to the environmental pillars implemented by the company. Additionally, digestate from the machine was sent for analysis to determine the nutrient content, and assess what potential uses the digestate is suitable for. Effective use of the digestate can further reduce the volume of waste going to landfill, enhancing the environmental benefit.

Implementation:

The demonstrator XO unit, shown on the left, was used for the trial at this facility. It has a capacity of of 0.1m3/day and a power usage of 2.6kwh. Organic waste solutions, LLC conducted the trial on the XO unit and all input and output values were verified by the staff of the facility. The machine was loaded every 6 hours, equalling approximately 100 pounds each day. The Advetec biobugs starter pack was used to initiate the process; this includes a bespoke blend of micro organisms that colonise and digest the waste through exothermic reactions. The waste entered and digestate output were recorded, logged and verified to give the reduction percentage.

Results:

During the trial period, a total of 2307.49lbs was entered which gave an output of 375.74lbs (this includes the waste remaining in the XO at the end of the trial). These figures reflect a total reduction of 83.27%, showing the machine is exceeding the expected reduction target and giving significant reductions in waste volume and mass.

The quality of the digestate was throughly analysed by TestAmerica to shows the quantities of macro and micro nutrients, while the emissions from the machine were monitored and evaluated by Grove Scientific and engineering which deemed the machine to be a very minor source of CO2 emissions.

Summary:

The trial test on the waste from this client revealed reduction rates that exceeded expectation; showing the trial of the XO to be a huge success. The sludge waste produced digestate with high nutrient and calorific content, and could therefore be used for fuel in biomass boilers or as a soil conditioner. The emissions results also revealed a very low production of CO_2, and when compared to landfill, reveal savings of over 80% on landfill CO_2 levels. This XO unit therefore represents significant benefits for both economical and environmental objectives.

TestAmerica

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ANALYTICAL REPORT

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TestAmerica Job ID: 660-78052-1
Client Project/Site: Annual Sludge Centrifuge Sludge

For:

Authorized for release by:
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Matt Jones, Project Manager I
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December 23, 2016

RE: Advetec Pilot Project Air Test Results
America - Auburndale, Florida

Dear

We have completed the initial air sample analysis of the Advetec Bio-Thermic Reactor located at the above referenced facility. The Advetec is a biological reactor that accelerates the digestion of organic waste to a dry stabilized product. Grove Scientific & Engineering Company as contracted to do the following;

1. Review the process technology as it applies to air pollution regulations.
2. Collect and analyze gas samples for CO2, O2 and VOC. Make on-site observations for odor.
3. Do a rule applicability analysis on the process.
4. Prepare a letter style report of findings with a general opinion of of the full scale unit as it applies to air pollution regulations.

Sample Collection and Analysis

Tedlar® Bag sample were collected using a vacuum chamber for transport

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to our air testing laboratory. Samples were analyzed for O_2 and CO_2 by instrumentation using US EPA Method 3A. Volatile organic compounds (VOC) were analyzed by flame ionization using US EPA Method 25A. Airflow and temperature were measured using a digital micromanometer. All instruments were calibrated using EPA protocol gases. The results are presented below;

Parameter	Results
Airflow (ACFM)	90
Temperature (° F)	101
Oxygen (%)	20.8
Carbon Dioxide (%)	0.1
Volatile Organic Compounds (ppm as propane)	10.8
Volatile Organic Compounds (lb/hr)	0.007

Discussion

The Advetec is an aerobic biological digestion process so the air pollution parameters were selected to address those gases that could be expected to be emitted. The respiration gases include carbon dioxide and VOC as verified by the analytical results. The data indicates that oxygen is emitted at ambient concentrations. Carbon dioxide is emitted at 0.1% or 1000 ppm and is consider a low source of CO_2.

The primary gas emitted from this biological process is VOC and odor. The VOC are products of bacterial respiration and are likely to be made up of ethanol from the breakdown of sugar.

Air Pollution Rule Applicability

In our opinion as air pollution experts who have worked in 49 states in the USA, the Advetec is a minor source of air pollution.

- There are no federal air regulations that apply to this process in either 40 CFR Part 60 or 40 CFR Part 63.
- The full scale model would likely be exempt from air permitting requirements in many states, including Florida.
- The full scale model comes equipped with an optional activated carbon odor control system which would be necessary in most urban installations such as Auburndale. Activated carbon will also absorb VOC and will act as a pollution abatement device.

Please call or email bruno@grovescientific.com should you have any questions regarding this report.

Sincerely,
Grove Scientific & Engineering Company