

CASE STUDY

BioReactor Composting System Food Waste



"Our composting system runs on Cruise Control now!"

Jeff Jessen

Renewable Resources Program Administrator,
Alaska Green Waste Solutions



Alaska Green Waste Solutions was created as an offshoot from Alaska Waste—a local refuse hauling company in Anchorage. Alaska Waste’s customers included many grocery stores, which utilized AW dumpsters. There were challenges with the typical waste collection process due to the high volume of produce waste being disposed of compounded by the cold climate.

The problems occurred when pre-consumer vegetable and fruit waste (thousands of pounds per day) were placed in the dumpster, and the juices from the produce would run out of the dumpster and the collection trucks. (When you consider that the moisture content of fruit and vegetables is 75% to 95%, there was a tremendous amount of liquid running out). Because of the cold temperatures in the winter months in Anchorage, the liquids would ice up causing hazardous conditions for the people who had to access the dumpsters. Plus, the liquids running out of the collection trucks as they made their way through the streets of Anchorage were causing icy slicks on the streets, which did not please the regulatory agencies. So, something needed to be done to ensure the safety of employees, customers and citizens.

Alaska Waste owners had wanted to divert these 450 to 500 tons of organic materials from the landfill and looked at the possibility of windrow and static pile composting. However, the company did not have the space for these methods and the throughput would be too slow anyway. Then Alaska Waste investigated in-vessel composting methods and came upon the rotating drum BioReactor technology by XACT Systems. The BioReactor has a tiny footprint and tremendous throughput capacity. It was a good fit for Alaska Waste’s needs, so they purchased a 10’ diameter by 30’ long vessel and installed in 2009.

At the same time, Alaska Waste provided (at a small rental rate) all of its grocery store customers 64-gallon tipper carts to dump their vegetable and fruit waste in. The grocery stores accepted the new program readily as it made for a safer and cleaner situation for their staff as well as reducing their waste haulage fees to landfill. In addition, they were able to raise their “Green” status in the community.

Meanwhile, Jeff Jessen, the Renewable Resources Program Administrator, had to learn to make compost with the available feedstocks. He says, “there is a little bit of an art to it, but once you get it dialed in, it runs on Cruise Control!”

In order to get the correct C/N ratio for successful composting, more carbon was needed to blend with the food waste. Wood chips were readily available and proved to be an ideal carbon source. When blended with the food waste, the chips provided better porosity for the mixture, which allowed for better aeration.

At the same time, there were many horse farms in the Anchorage area experiencing the burdensome and expensive problem of disposing of the horse manure. Alaska Waste realized that horse manure would be a good addition to the compost recipe, so they put roll off containers at the horse stables and arranged for weekly pick ups.

Through some trial and error, the ideal blend of organic materials proved to be 2 parts food waste, 2 parts wood chips and 1 part horse manure. Plus, a microorganism accelerant is added. Loading each day, the mix is tested for ph, moisture and temperature. All the data is recorded in a daily log book. The data is also collected and recorded at the time of output.

The composting system is housed in a building, which already existed on site and is comprised of the BioReactor, 4 conveyors, and a mixer. Processing begins with the waste produce being loaded into a 4-auger mixer truck and allowed to sit overnight allowing the excess liquid to drain off. In the morning, the mixer is started and the manure and wood chips are added. The mixer runs for about 20 minutes, and the contents are discharged onto a conveyor that takes the material to the in-feed of the BioReactor.

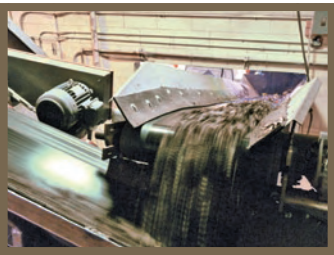
The waste material is retained in the drum for 7 days and it rotates only a couple hours per day. The operating temps vary between 115°F and 145°F. They shoot for 130°F and the micro-organism additive boosts the processing temperature to help reach this target. Plus, the variable speed exhaust fan draws moisture off the unit and is vented with duct work outside. Upon discharge there are no identifiable particles, and the compost is light and fluffy organic matter with consistent high quality. The total volume of the material as it passes through vessel is reduced by about 20%.

Alaska Waste sells the compost to a local nursery for \$50.00 a cubic yard. The nursery cures it for a couple of weeks, blends it and uses it for landscaping at housing projects, erosion control for large projects, and as a medium for compost socks. “They cannot get enough of our compost” Jeff reports.

There is only one operator who works a total of 3 to 4 hours a day with the entire composting system. There is minimal maintenance and the energy requirements are so low because the 10’ x 30’ drum is being driven by only a 5 hp motor. As an added bonus, the heat off the BioReactor helps heat the building.

Jeff says, “the composting system runs on Cruise Control now...it runs so well and it couldn’t be easier to operate.”

Christina & Jeremiah Eneix of Green Earth Landworks in Anchorage Alaska purchases the compost produced by Alaska Green Waste Solutions. The compost is cured in static piles, and, due to the severity of the weather conditions, the piles are inoculated with a microbial package to enhance the final maturation of the compost. The mature compost is blended with top soil for bulk sales at the nursery. It is also used for top dressing, erosion control socks filler. These socks are used by the DOT which requires the compost be certified. The lab report shown here shows that the compost passes the tests with flying colors!





**US COMPOSTING
COUNCIL**

*Seal of Testing
Assurance*

Green Earth Landworks

Christina Eneix

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Anchorage, AK 99518


Product Name: Man/Wood/Food

Sample Date: 4/22/11 1020

COMPOST TECHNICAL DATA SHEET

LABORATORY: A & L Western Agri. Labs 1311 Woodland Ave. #1, Modesto, CA. 95351 Ph. 209-529-4080 Fax 209-529-4736

Compost Parameters	Reported as (units of measure)	Test Results	Test Results
Plant Nutrients:	%, weight basis	%, wet weight basis	%, dry weight basis
Nitrogen	Total N	0.41	0.57
Phosphorus	P ₂ O ₅	0.20	0.28
Potassium	K ₂ O	0.17	0.24
Calcium	Ca	1.19	1.66
Magnesium	Mg	0.57	0.79
Moisture Content	%, wet weight basis	28.44	
Organic Matter Content	%, dry weight basis	20.31	
pH	pH units	7.2	
Soluble Salts (electrical conductivity EC ₅)	dS/m (mmhos/cm)	0.6	
Particle Size	% < 9.5 mm (% in.), dw basis	100	
Stability Indicator (respirometry)		Stability Rating:	
CO ₂ Evolution	mg CO ₂ -C/g OM/day	0.79	Very Stable
	mg CO ₂ -C/g TS/day	0.16	
Maturity Indicator (bioassay)			
Percent Emergence	average % of control	100	
Relative Seedling Vigor	average % of control	100	
Select Pathogens	PASS/FAIL: per US EPA Class A standard, 40 CFR § 503.32(a)	Pass	Fecal Coliform
			Salmonella
Trace Metals	PASS/FAIL: per US EPA Class A standard, 40 CFR § 503.13, Tables 1 and 3.	Pass	As,Cd,Cr,Cu,Pb,Hg
			Mo,Ni,Se,Zn

Report No. 11-115-022 Lab No. 27154 Date: 5/20/11 Signature 

This compost product has been sampled and tested as required by the Seal of Testing Assurance Program of the United States Composting Council (USCC), using certain methods from the "Test Methods for the Examination of Compost and Composting" manual. Test results are available upon request by contacting the compost producer at the phone number listed above. The USCC makes no warranties regarding this product or its contents, quality, or suitability for any particular use.

For additional information pertaining to compost use, the specific compost parameters tested for within the Seal of Testing Assurance Program, or the program in general, log on to the US Composting Council's TMECC web-site at <http://www.tmecc.org/sta/>.