Biosolids Management

BACK OF A NAPKIN DESIGN

LOW-COST ROUTE TO BIOSOLIDS COMPOSTING

IN a small town, one of the problems that any municipal operation faces is a limited budget. So when we needed to select a new biosolids management option, there were some definite constraints. In Wilton, Maine, located in the western mountains of the state, we wanted a solution that could benefit everybody and that wouldn't involve sending biosolids to landfills for $60 to $65/cubic yard (cy) plus the associated costs.

The town was not interested in liquid spreading. And we had been land applying dewatered biosolids, but were running into problems with abutting land owners when the material was spread on farms. That public acceptance situation wasn't getting any better. In addition, new regulations were becoming more restrictive and costly. We sat down with a local engineering firm that came up with a fantastic idea: composting. Its proposal was to set up a system and build a two-story building at an estimated cost of $678,000.

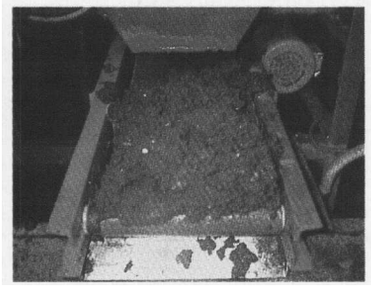
Because our total budget only runs around $400,000/year, that was quickly rejected. Clayton Putnam, chief operator of the plant, and I drew up our own plan for a composting facility on the back of a napkin during lunch one day. The entire operation, including a mixer that was purchased, cost $47,000.

FACILITY BASICS

Wilton's composting facility has been operating for seven years. Biosolids from the wastewater treatment plant are dewatered to approximately 17 percent solids. Between 330 to 375 cy/year of biosolids are generated; 100 percent are composted. Hardwood shavings (at seven percent moisture), marketed primarily for cattle bedding, are used for amendment. Even though the shavings cost about $6.50/cy, in the long run they are the more cost-effective choice. They are mixed in with equal amount of biosolids (along with a half yard of finished compost). By comparison, we would need to use three cy of a softwood (at 20 percent moisture) to every cy of biosolids, so we end up having to handle less material overall. Of course, the exact mix varies, based on the percent moisture of the dewatered solids. With experience, you can visually tell how a mix will respond.

Initially, biosolids and amendment were mixed using a back hoe with a front bucket. It resulted in a fairly decent compost, but mixing was inadequate. We purchased a Knight mixer with a gasoline motor to avoid high electrical costs. The mixer holds five cy. Once the mixer was in use, it didn't take long to learn that it is absolutely essential to have a paved area. We tried it with just an earthen surface, but that wasn't beneficial because the chain in the mixer kept popping every time a rock entered.

After mixing, materials are put into piles under a pole barn. Precast cement walls — an off-the shelf item utilized by farmers for various purposes — were used to construct "bins" (interior push walls and side walls) for the piles. There are three bins, each with the capacity to hold about a 40-cy pile. The roof of the barn is made of metal, and we have not seen any corrosion. Due to the slope of the roof, it never stays moist because any condensation slides off.



Mixed biosolids and wood shavings are ready for composting in bins.

Operators of a small Maine wastewater treatment plant design an efficient system to manage 330 to 375 cubic yards of biosolids annually.

Russ Mathers

A cement pad with floor drains was installed in the barn. A 12-inch PVC pipe was laid down first (holes are put in with a hand drill). The larger diameter opening provides natural convection to the pile, which is so effective that forced aeration is minimal when the pile has been properly constructed.

Instead of an electric blower system, the facility has a manhole ventilator that puts out 1,100 cfm of air and runs on gasoline. In our case, the forced aeration is used to cool the piles. By monitoring the pile temperatures and visually inspecting the mix, it is simple to determine when air is needed.

The composting material stays on the pad for 21 days, although sometimes it's slightly longer, depending on how temperatures rise. The piles run between 120°F and 125°F for about 18 days; the last several days, temperatures reach in excess of 130°F. A probe is used to monitor temperatures in three spots in the pile several times a day.

All of the piles are covered with hardwood shavings to cut down on odor and to maximize aesthetics. The facility is open to the public all the time. The impression people get when they come to the composting site is crucial to whether they will want the material.

One lesson we learned the hard way the first winter was to cover storage piles if they aren't in a building. That first year, the piles froze harder than granite. We solved the challenge by buying tarps for about $15 each. Another beneficial step is to turn the finished piles every day and then cover them back up. That results in a homogenous mix. Overall, the minimum curing time is 21 days, although more time may be required if the pile temperatures do not approach ambient air temperatures.Turning the piles at least three times per week will assure proper results. Our facility is based on a small output without having to worry about time constraints to a degree. If it takes 30 days

until we are satisfied with the pile, so be it. A large facility would not have this option.

The product is tested for metals, nitrogen content and nutritional value. We use salmonella as an indicator of pathogenic organisms. Regulations require testing once a year but we do it twice a year — two biosolids tests and two finished compost tests. We have a very clean domestic sewage flow. No industrial waste is allowed in the system.

PROOF'S IN THE PLANTER BOXES

Word of mouth has been a large part of our success in distributing compost in a wide area. Another aspect of this is setting a model for others. The compost operation has allowed us to reach the public on many aspects of being environmentally aware. The ability to explain issues face to face with the public that not only deal with composting, but with other areas that they can impact, has been a bonus.

Throughout the seven years of operation, we have had absolutely no complaints. The finished compost is used everywhere in town, including people's window boxes. One marketing method to get people interested in the compost was to plant a flower garden in a very public spot. The post office in the center of town was selected. Along a 50-by-10-foot stretch of the wall, we put our compost in with a tremendous flower bed. The interest generated was phenomenal. Now there are flower beds all over town that have Wilton compost in them.

About 500 to 600 cy/year of compost are produced. It is distributed at no charge, because it is much cheaper to produce finished compost hauled off site by the user than it is to truck sludge to a landfill. The public relations benefit that comes with giving people something that works so well has no price. People come from 40 to 50 miles away with their trucks to pick up our compost. In fact, we have had to put up signs so that people only take the finished compost, as some would come in on weekends and start tearing apart the piles cooking in the bins!

Everybody who takes compost gets a three-color brochure that explains how it is made and what is in it. The lab reports are available as well. Public education has been critical to our success.

I exclusively use our compost at my own home. If you are not confident of what you are producing, don't expect anyone else to be. There is a lot of nutritional value in this compost for plants and it is a shame to not use it just because we can't get past our own inhibitions about the origin of the source material. At times, it is frustrating to deal with the public's aversion, but if you invest the time to show them the process and explain that it is their responsibility to deal with the waste they themselves have produced, most will understand.

Biosolids composting costs the town of Wilton about $25/cy, close to a $40 savings over landfill disposal. Our facility is proof that composting can be done cheaply — you don't have to deal with a phenomenal cost. The approach is very inexpensive, very low-tech and can be used by smaller communities where money is limited. The additional benefit of public education in the area of clean water and soil usage has been a wonderful side of the process we had not thought of originally. Any small town with the resources needed to build a plant can have the results we have enjoyed for almost eight years. ■

Russ Mathers is Superintendent of the Wilton, Maine Water and Sewer Department. This article is based on his presentation at the BioCycle Northeast Conference '99 in Portland, Maine.

Instead of an electric blower system, the facility has a manhole ventilator that puts out 1,100 cfm of air and runs on gasoline.