On The Road To Biosolids Composting In Knoxville, Tennessee

Cooperative demonstration project brings many players and feedstocks to nine piles. What more can you ask from a regional forum searching for the best composting recipe.

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WHAT happens when you mix two wastewater utilities, one county solid waste division, one consultant, two contractors, two state regulatory agencies, two disparate biosolids, kitchen grease trap waste, and three types of processed wood products? In many parts of the country, this would be a recipe for disaster, but in the case of Knox County, Tennessee, it was the recipe for a successful biosolids composting demonstration project.

Knox County Solid Waste Division (SWD) currently uses a contractor to grind yard trimmings and pallets to form mulch products that are sold throughout the area. The SWD has taken upon itself the objective of removing as much organic material as possible from area landfills while producing marketable products. To further this goal, it has plans to modify the current mulch program into a composting operation. Since Tennessee has no recycling mandates and relatively low landfill tip fees, the availability of organic materials for the compost operation is relatively limited.

The Knoxville Utilities Board (KUB) is responsible for, among other things, disposal/utilization of biosolids. Historically, the biosolids are anaerobically digested and then dewatered on a plate and frame press using significant amounts of lime and ferric. The biosolids meet Class B criteria for pathogen kill. Dewatered biosolids are land applied by a private contractor, but availability of nearby farmland has diminished due to high pH and land sales, so land application costs are escalating at an unacceptable rate. The KUB wastewater treatment plant (WWTP) also accepts approximately 12,500 gallons/day of grease trap pumpings. These pumpings are placed in a tank and pumped to the headworks and then through the wastewater treatment process. The grease trap wastes...
cause problems and high costs to the KUB.

Recently, the KUB and SWD discussed their mutual concerns and decided that a cooperative study would suit the needs of both. The SWD agreed to fund the study, hire a consultant who was an expert in composting, provide various ground wood residuals products, and provide contractor services to operate the demonstration study. The KUB had a decommissioned WWTP, which was permitted to treat biosolids, that could be used as the site of the demonstration study. The KUB also would provide the biosolids, have its contractor provide a mix box, and do all required laboratory analysis.

Site Visit And Project Objectives

The first task of the demonstration study involved a site visit by Compost and Technology Solutions, Inc. (CATS) to meet with the project participants, determine project objectives, identify potential impediments, and gather preliminary data on the various materials to be composted. During this site visit, the following determinations were made:

- High pH and low volatile solids in the KUB biosolids could impede the biological process;
- The plate and frame biosolids batches would determine the demonstration pile size since they dropped from the press directly into a truck and were then taken to the use site;
- There was lack of knowledge about biosolids composting by the regulatory agency and confusion over which division would regulate the facility; and
- There were other biosolids management agencies in the area that could provide biosolids that had properties more amenable to composting.

During this initial trip, a visit was made to the First Utility District to determine its potential interest in cooperating in the demonstration study. The District utilizes an oxidation ditch for wastewater treatment and produces an 18 percent solids cake off of a belt press. The biosolids are then treated by the N-Viro process and land applied. The District was interested in composting as an alternative to N-Viro for cost and marketing purposes.

After completion of the initial site visit, a detailed protocol was developed. This protocol provided a comprehensive plan for the remainder of the demonstration program, including roles of the participants, materials balances, sampling and analysis details, and reporting requirements.

Training The Operators

The third phase of the demonstration project called for a training session. The original intent was to train the operators on correct procedures to build and monitor compost piles. However, because of the high level of interest in the demonstration project, the scope of the training session was expanded to provide a more comprehensive overview of composting. The training session was held on August 28, 2001 in the Knox County complex. The 30 persons who attended represented all of the local utility districts, regulators from both the solid waste and water divisions of the state regulatory authority, solid waste board, facility operators, and a representative from the United States Marines.

The following day, many of these same people came to the demonstration site to view the piles being constructed. Nine piles were built: Pile 1 – Comprised of KUB plate and frame dewatered biosolids (LSB) and fresh ground yard trimmings (GWG) and winrow composted; Pile 2 – Comprised of LSB, GWG, and KUB-collected grease trap wastes (KUBG), and windrow composted; Pile 3 – Identical to Pile 2, except that it was composted by the aerated static pile method; Pile 4 – Only KUBG and GWG and was windrow composted; Pile 5 – First Utility District biosolids (FUDB) and ground pallets (PWG), and winrow composted; Pile 6 – Same as Pile 5, except material was aerated static pile composted; Piles 7 through 9 – Combinations of biosolids, grease trap wastes, and wood wastes to use up all materials delivered to the site.

Mixing Feedstocks And Getting Results

The material mixing was done in a mix box provided by Synagro, KUB’s biosolids contractor. All pile building was done by the Southeastern Mulch Company, Knox County’s mulch contractor. Site supervision was provided by CATS. The aerated static piles were covered with aged ground yard trimmings and utilized ground yard trimmings as a biofilter.

Pile 1 was designed to simulate composting of the existing KUB-generated biosolids with initial energy provided by the fresh ground yard trimmings. Piles 2 and 3 were to determine if the grease trap wastes could be incorporated into the piles to provide energy and moisture. Pile 4 was designed to explore the possibility of composting pumped grease trap wastes alone since these represent a considerable cost and create handling problems since the KUB WWTP. Piles 5 and 6 were to see if the ground pallets, which have limited market use, could be a suitable bulking agent for non-limed biosolids. It also demonstrated to the KUB what the impact of shifting from plate and frame to other types of composting might be on the compostability of their biosolids.

The most significant odors that occurred at the pile building were from the grease trap wastes. These wastes were stored at the compost site in 250-gallon plastic carboys and were odorless until mixed with the biosolids and bulking agent.

This project exemplifies the advantages of inter-utility cooperation in promotion of beneficial use projects. All piles were composting well at the time of writing this article, and no off-site odors have been generated. The results of the various piles will be reported in a future Operators Forum.