# Composting Garbage and Sludge—An Alaskan Solution

Climate, geography, and geology often combine to create seemingly insurmountable challenges for waste management in Alaska. The village of Haines, located in southeast Alaska, like many communities, faced a limited number of waste management options—all prohibitively expensive. Fortunately, Haines Sanitation, Inc. (HSI) devised a creative and innovative approach to solve the village's solid waste management problems: in-vessel municipal waste composting.

HSI, under the leadership of company president, Lynda Walker, and vice president, Tom Hall, is composting the village of Haines' municipal solid waste and sewage sludge through a large-scale, aerated in-vessel operation. This municipal waste composting treats unseparated garbage and sewage sludge from the village's wastewater treatment plant to create an inert material suitable for use as landfill cover.

Ms. Walker and Mr. Hall strongly believe in this process and hope to work with other villages in the near future to develop a customized system to meet their needs. "Spreading mixed compost or using it as a cover material for an existing open dump is a much better option than throwing untreated garbage and honey bucket waste on the tundra or into surface water. The health and environmental benefits will justify the costs to the villages." Ed Emswiler from Alaska Department of Environmental Conservation (ADEC) agrees, "It is a much better option than open dumping and much of the burning currently taking place in Alaska. HSI has demonstrated the technology works—now we just need to get out there and test it."

HSI turned to municipal waste composting as an affordable method for managing the village's waste after exploring several other options. HSI's first option was to bring its landfill into full compliance with the Subtitle D landfill requirements. This approach was immediately rejected as being too expensive. HSI then tried shipping waste to Seattle for disposal. After paying more than $200,000 in one year and charging community members more than $40 per month for a one can per week garbage pickup, this was also abandoned as too costly.

> "Municipal solid waste composting is an option that needs to get on the table in Alaska. Its major advantages are its ability to stabilize garbage, control disease and vectors, and manage and decontaminate sewage sludge."
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> —Ed Emswiler, Alaska Department of Environmental Conservation

It was at this point that HSI decided to pursue composting. Over the next two years, HSI spent approximately $500,000 designing, purchasing components, building, and perfecting its municipal waste composting system. The entire system, with the exception of the computer monitoring and control system, was built using off-the-shelf components and electronics. A significant portion of this sum was spent perfecting designs and addressing engineering and operational problems as the system was built. With this experience, Mr. Hall believes he could now

HSI's final compost product curing in windrows. Not even mid-winter freezing temperatures slow the process down.

reduce the cost of developing a new system for a village to between $300,000 and $350,000, including all freight costs.

While this price is still high, HSI believes the potential improvements to village health and the environment justify the expense. Mr. Hall also points out that the process could potentially use fish waste or honey bucket waste (i.e., raw sewage) in addition to, or in place of, biosolids. "We just need to try it and work out the engineering," explains Mr. Hall.

## Advantages of Composting

While cost savings is the major motivator in HSI's composting, volume reduction, waste stabilization, and the generation of a usable product are other major benefits of municipal solid waste and sewage sludge composting. By reducing the volume of the 1,100 tons of waste it treats each year by about one-third, HSI's process will nearly double the life of the current Class III landfill (permitted for inert wastes only), according to Mr. Hall.

The composting process also effectively neutralizes organic materials in waste and sludge that attract birds, rats, foxes, dogs, bears, insects, and other disease vectors. The process destroys organic compounds that can leach from untreated waste and contaminate drinking water supplies or valuable fishing waters. "Our compost will not leach or attract animals. We have not had any problems with bears, and the ravens are really not happy with us," reports Mr. Hall. The decomposition process also decontaminates sewage sludge, making it safe for disposal—an important health consideration for many Alaskan villages.

HSI's finished compost also can be used as landfill cover material. Adequate volumes of suitable cover material are extremely hard to find and expensive to procure in many parts of Alaska, particularly in remote tundra settings. HSI believes that the large amounts of decontaminated, inert compost that its process generates presents a low-risk alternative to expensive imported cover materials. At this time, HSI is awaiting ADEC approval to use the final compost as cover material at its Class III landfill. Mr. Hall is confident they will receive approval. "It makes an excellent cover material as it compacts well and can support plant growth," he explains.

## The Process

HSI's mixed waste composting combines most of the municipal solid waste generated by the Haines community and sewage sludge from the community's wastewater treatment plant. Some materials such as construction and demolition (C&D) debris and other large items are separated and taken directly to the landfill. The materials collected through the community voluntary recycling program are, likewise, managed separately and not composted.

The first step in the process is shredding the garbage and mixing it with the biosolids from the wastewater treatment plant. The shredding and mixing takes place in a mixing trommel, a 12-foot diameter by 30-foot long, knife-lined rotating drum. After spending two hours in the mixing trommel, the waste/sludge mixture is ready to be placed in the digester.

Using the proper carbon-to-nitrogen ratio (i.e., waste to biosolids) is

### EPA 503 REQUIREMENTS

The Subpart D (pathogen and vector attraction reduction) requirements of 40 CFR Part 503 regulations were developed for the land application or disposal of biosolids (sewage sludge). For biosolids to be applied to lawns and gardens as a soil amendment, they must meet the Class A Pathogen and Vector Attraction Reduction Guidelines. These guidelines require that temperatures be sustained during the biosolid composting process at 55° Celsius (131° Fahrenheit) or greater for at least three days if in-vessel or static aerated piles are used, or 55° Celsius or greater for at least 14 days if aerated windrows are used. There are no federal *composting* requirements, but many composters use the 503 regulations as guidelines for their composting operations.

## A MILLION DOLLAR ALASKAN OPPORTUNITY—DENALI COMMISSION SOLID WASTE PROGRAMS

In 2004, the Denali Commission received a $1 million appropriation from the U.S. Department of Agriculture's Rural Development office (USDA RD) to address deficiencies in solid waste disposal sites which threaten to contaminate rural drinking water supplies (under the FY 2004 Omnibus Appropriation Bill (H.R. 2673 Sec. 764)). This funding provides the Denali Commission and its partner organizations an opportunity to identify innovative solutions to technical and logistical challenges of traditional handling of municipal solid waste (MSW). The appropriation authorizes the Denali Commission to fund pilot projects incorporating emerging technologies to improve local management options. To date, Denali Commission has allocated $842,870 of the $1 million FY04 funds to 13 separate projects, including several composting projects.

For FY05, USDA RD appropriated another $1.5 million for the Denali Commission Solid Waste Program to distribute. While the initial FY04 was considered a single-year funding opportunity, the 2005 funding signals the possibility of continuing investment by USDA RD.

To learn more about the Denali Commission's Solid Waste Program and funding opportunities please contact: Cindy Roberts at 907 271-3018 or email to croberts@denali.gov. A list of the current award recipients and application information is available on the Web at <www.denali.gov/Program_Documents.cfm?Section=Solid%20Waste>

crucial to achieving maximum compost efficiency and ensuring the process is self-sustaining within the digester. HSI uses an aerobic composting process, so proper water and air concentrations also are critical. When all of these ingredients are in the proper proportions, the composting/digestion process generates temperatures sufficient to sustain decomposition and meet EPA 503 Pathogen Reduction and Vector Attraction Requirements. During the first two years, HSI experimented with different waste, sludge, air, and water ratios. Mr. Hall believes they have finally found the proper proportions and can consistently produce compost of the desired quality.

HSI staff monitor and control air and moisture levels within the digester with a computer control system. To maintain desired moisture levels, water is periodically added, mostly derived from previous batches of compost. Because it is a closed-loop system, no water is discharged from the system to pollute the environment.

To keep temperatures within the digester from getting too high (i.e., high enough to kill the beneficial microorganisms responsible for the decomposition process), the computer regulates the flow of air into and out of the vessel. If temperatures become too high, more air is pushed through the vessel in order to cool the compost. Conversely, air supply is reduced when temperatures are too low. The computer system also records in-vessel temperatures over time to demonstrate that each batch meets the EPA 503 temperature requirements. Odors from the decomposition of the waste are controlled by passing air exhaust through a wood chip and sawdust biofilter.

After the 14-day digestion period, the compost is removed from the vessel and passed through a rotating two-inch screen. This screening separates the larger particles (mostly glass, plastic, and cans) from the compost. The large-sized waste is taken to the landfill and buried as inert municipal waste. The screened compost is then placed in curing bins for 14 days. After curing, the final product is ready for use. In 2003, HSI produced approximately 400 tons of usable compost and landfilled 300 to 400 tons of screened, inert material.

Due to its unsegregated nature, the compost contains small shards of glass, plastic, metal, and other items that can pose a safety hazard. Occasionally, needles end up in the compost when community members throw them in the trash instead of taking them to the community health facility for proper disposal. Because the compost frequently contains these dangerous items, HSI workers wear protective safety gear (e.g., gloves, boots, and aprons) when handling it.