City of St. Peters
Organic Resource Recycling Program

Executive Summary

For over 25 years, the City of St. Peters has been active in organic resource recycling. The program has evolved and been refined from liquid biosolids land application to an innovative biosolids/yardwaste composting operation recycling valuable organic materials to produce marketable products.

The main goals of the program are as follows:

➢ Integrate the City’s Solid Waste and Wastewater Plant organic waste operations to achieve efficiency and savings
➢ Manage the organic waste streams in an environmentally responsible way to provide 100% beneficial reuse of the materials
➢ Accomplish organic material recycling at less cost than other more wasteful methods
➢ Engage and involve the residents of St. Peters in organic recycling and encourage their understanding of the benefits of beneficial reuse and their patronage of recycled products

By viewing organic waste streams as valuable resources, it is possible through professional management to achieve beneficial reuse by producing marketable products. The organic material recycling program has provided important environmental and economic benefits to the City and region and will continue to do so in the future.
1. Design of Composting System

Description of Operations: Managed by the Public Works Utility Department, the St. Peters Earth Centre Organic Resources Recycling Facility is located on a 12-acre site on the north side of the City, water and wastewater plant property. At this facility wastewater treatment plant biosolids are composted with yard waste from the community to produce high quality marketable products. The site includes a yard waste material drop-off area, a processing area for grinding materials to make feedstock, a biosolids dewatering building with a feedstock mixer, a windrow composting area, a curing and screened material storage area, and a customer service product pickup area. The entire facility is operated on a paved asphalt surface which allows for year-round operations and effective and environmentally safe site management.

For public convenience, St. Peters designed a yard waste drop-off area and a separate finished product pick-up area managed through a scale house attendant who collects fees by cash or credit. The City also offers a loading service to fill pick-up trucks and trailers. One advantage of the layout of the drop-off and product pick-up areas is that residents can easily see that the material they drop off is recycled to a product that they can use. Through public
education efforts, signage and placement of convenient waste receptacles; the yard waste is generally clean and free of plastics and other debris and contaminants. The on-site attendant, frequently services the drop off pile by pushing the pile up with the loader providing a safe and clear area for residents to maneuver trucks and trailers. The frequent visits also provide an opportunity to educate patrons that may not be aware of the rules and to remind them to separate trash from the organic material. Customers are directed to place limbs & brush, grass & leaves, and logs into three separate piles. This pre-sorting system allows the City to better manage how these materials are processed and blended into the products produced. For instance, the logs and limbs may be ground and used as feedstock in the windrow compost process, or they may be ground and placed in a static pile to compost for six months before being ground again for use as mulch. Grass and leaves may be ground and blended in the compost mix or they may be diverted to direct land application and incorporated into farm ground to add nutrients and improve soil tilth.

Currently under construction near the biosolids dewatering building is an aerated static pile compost facility that will consist of eight (8) 30-ft by 70-ft concrete bunkers with aeration troughs cast in the floor. The new composting system will be monitored and controlled by an Engineered Compost Systems designed PC based control system that will keep the piles aerobic throughout the composting process providing positive or negative air flow though the piles based on pile temperature. The new computer controlled aerated static pile processing system will provide greater operating efficiencies and labor savings through less material handling and automatic process temperature monitoring and compliance report generation. The new facility will also greatly reduce fugitive odors from the operations by keeping the compost aerobic at all times and filtering process air discharges through biofilters. This $2 million facility is scheduled for startup in May 2010.

History of Compost Operations and Evolving Design of Facility: The compost program has operated successfully since 2001 starting with a start-up pilot project in 1998 under an agreement with the Missouri Department of Natural Resources (MDNR) to compost biosolids and yard waste. The composting operation went to a full-scale operation in
2001 after MDNR approved the management plan for composting biosolids and yard waste after the successful pilot project. A key element to this program was the negotiation of an intergovernmental agreement with the St. Louis Metropolitan Sewer District to receive cake biosolids from their Missouri River Plant. In the agreement, MSD agreed to pay a per-ton tipping fee which is considerably less than they were paying to a landfill. The biosolids provide a good nitrogen source for composting while the tipping fee provides revenue for St. Peters to successfully manage the program. The City’s long-term vision was that someday it would be necessary to convert its own wastewater plant liquid biosolids management program to a cake biosolids composting program because of concerns with lagoon odors from encroaching development and the progressive loss of nearby farmland.

By actively managing the composting process and combining MSD cake biosolids with the yard waste to maintain a consistent carbon-to-nitrogen ratio, the City is able to produce “Class-A” compost meeting the federal requirements of 40CFR Part 503. The City initially invested over $1,000,000 in site improvements and equipment to operate an actively turned windrow process compost facility. This EPA approved process to further reduce pathogens (PFRP) requires the pile temperatures to be maintained above 131°F for over 15-21 days while turning the piles at least five times to ensure all material in the pile is exposed to the pathogen and weed seed killing temperatures.

After active processing, the compost is allowed to cure on site for another 60 to 90 days before it is tested and screened for sale. Quality control is essential for safety, public acceptance and to produce marketable products.

That is why the City also became a member of the U.S. Composting Council and subjects the finished compost to the additional testing requirements of the Seal of Testing Assurance Program through independent labs approved by the U.S. Composting Council. The high-quality compost product has greater public acceptance that generates
product sales revenues to offset most of the cost of running the program.

The City later invested $4,000,000 in a biosolids processing and dewatering facility to dewater its own wastewater plant biosolids with that facility coming on line in March of 2009. The dewatering facility is designed to deposit the cake biosolids outside the press building into a concrete bunker. There it is convenient to a mixer where a loader operator can proportion the recipe of biosolids and yardwaste feedstock material by weight to achieve the proper carbon to nitrogen ratio (C/N) for optimum composting. A bunker was also constructed to receive biosolids from outside sources or food wastes should that diversion market develop in the future.

Overall, the Earth Centre Composting Facility site is designed to maximize convenience and safety for the customer, while providing flexibility for the operation and management of the processing operations.

2. **Regulatory Compliance**

The Spencer Creek Wastewater Plant and the Earth Centre Organic Resources Recycling Program are operated under Missouri NPDES Permit No. MO-0030970. The permit allows for the composting of biosolids and yard waste as a beneficial reuse option. One of the benefits of locating the facility near the wastewater treatment plant and working on a paved surface is that all storm water runoff can be collected in an on-site storage lagoon where solids are settled out and the water can be returned to the treatment plant for processing making the facility a zero discharge site. The composting facility has always met every regulatory requirement. The City’s wastewater lab and independent labs are used to test biosolids and compost to ensure safety, quality, and compliance. City staff monitors the compost operation daily to manage pile temperatures and turning.

By achieving regulatory compliance an in recognition of the quality of the City’s compost program, in 2008, the City was selected by the US EPA for a national Exemplary Biosolids Management award.
3. **Planning**

When planning the design of the City’s compost facility, many factors were considered. Site location was initially determined based on available city-owned property with close proximity to the wastewater treatment plant. Being near the Solid Waste Department’s recycling facility and transfer station also allowed for the shared use of a check-in station at the scale house which was planned to allow solid waste customers to drive on one side of the building across the scale and the yard waste drop off and compost customers to pass on the other side of the building avoiding delays for both. Also because of proximity to the wastewater treatment plant it was possible to collect and treat all storm water runoff from the site.

Customer service, convenience, and safety were considered during all phases of the planning process. Having an orderly and quick way for the customer to transact their business was the first item of consideration. At the scale house residents can present their resident privilege card and be allowed to drop off yard waste materials at no charge. Non-residents and commercial accounts pay a fee using cash or a credit card. Customers can also purchase compost products at the scale house and are given a receipt that they present at the product pickup area.

Having a large, well organized drop-off area was an important design consideration. By locating the drop off piles for limbs, grass and leaves, and logs in separate areas allows the customers to disperse and more efficiently drop of the materials and leave the site. Putting the product pickup area in a separate location, avoids conflict with customers that just want to drop off materials. The product pickup area was planned to separate the available products by a sufficient distance so customers can access them without conflict. By offering a loading service, the skid steer operator can load a pickup or trailer in a few minutes and have the customer on their way.
4. **Performance, Economics & Cost Effectiveness**

The City measures success of the operation in several ways including cost effectiveness, public service and convenience, and the promotion of environmentally sound and sustainable practices. From the beginning, it has been a program goal to operate the facility so that revenues and avoided costs are at least equal to the cost of running the operation. Planning and constructing a facility that allows convenient and safe public access while producing high quality products that are in demand was the goal for public service. Finally, developing markets for recycled organic products to achieve 100% beneficial reuse has been the environmental sustainability goal. After 10 years of continuous improvement, the City has achieved all of these goals.

The City currently processes annually nearly 30,000 cubic yards of yard waste, and 10,000 wet tons of biosolids at the compost facility to produce approximately 20,000 cubic yards of Class-A Compost. Besides compost, the Earth Centre Facility also process and sells double ground aged mulch, wood chips, topsoil, erosion control mix, filter sock media, and rain garden mix. The City provides a limited amount of material to St. Peters residents for free (2 cubic yards annually per household), but charges for quantities above that amount and charges all non-resident and commercial customers. One successful aspect of this program is high public acceptance because of the quality and usefulness of the product. Each year there has been a growing demand and last year the City sold approximately 25% of all compost produced. Nearly 3,800 cubic yards of compost was sold to commercial customers and 1,200 cubic yards was sold to individuals. The balance of the compost produced was either placed in inventory or land applied as a soil amendment and for plant nutrients on agricultural farmland.

Over the past several years, the City has also incorporated compost products in the following types of Public Works projects:

- Constructed Wetlands
- Construction Site Erosion & Sediment Control
- Rain Gardens
- Levee Construction Slope Vegetation
- Road Construction Re-vegetation
A key element to this program was the negotiation of an intergovernmental agreement with the St. Louis Metropolitan Sewer District to receive cake biosolids from their Missouri River Plant. In the agreement, MSD agreed to pay a per-ton tipping fee which is considerably less than they were paying to a landfill. The additional revenue helps St. Peters to offset the costs of operations to successfully manage the biosolids/yard waste program. After the City started dewatering their own biosolids to use in the composting operation, the cost of the liquid land application program was eliminated saving approximately $200,000 per year in avoided costs.

By processing a variety of organic waste streams, the St. Peters Organic Resource Recycling Program is able to optimize how the end products can be cost effectively recycled. At the present time with tipping fees from the cooperative agreement with the Metropolitan St. Louis Sewer District and growing finished product sales, the Earth Centre Composting Facility is able to operate near the break-even point. The composting program costs the City $222,500 annually to operate with another $130,000 of annual capital replacement costs. Approximately $165,000 of revenues are generated from the MSD tipping fee and product sales. When the nearly $200,000 in annual savings from avoided costs for composting the City’s biosolids instead of land applying them is factored in, the net result has a positive impact to the City of approximately $12,000 annually. Therefore, the program has met its goal of being self-supporting.

5. **Utilization of Equipment/Systems and Technologies**

Compost operations are equipment intensive. The City has invested in the following equipment to effectively manage the current windrow compost operations:

- John Deere & Cat Rubber, Tire Loaders
- Bobcat Skid Steer Loader
- Vermeer Tub Grinder
- Ashbrook Belt Filter Press
- Roto-Mix Feedstock Mixer
- Scarab Windrow Turner
- Vermeer Wildcat Trammel Screen
- Kuhn-Knight Compost Spreader

St. Peters is currently moving to a new higher technology Aerated Static Pile (ASP) Composting System in 2010 that will require less material handling and use computer monitored temperature controls to modulate aeration blowers. Based on pile temperatures, the control system will be able to either positively or negatively aerate piles and cause all
discharged air to be processed through biofilters. This innovative technology will be the first ASP compost facility in Missouri.
6. **Worker Health & Safety**

The City of St. Peters has invested a lot of time researching, planning, designing and upgrading the facilities and processes to provide for public and employee safety. By keeping the site neat and orderly and providing clearly designated areas for material drop off, compost processing, and product pickup, the City has maintained an excellent safety record. In addition, the comprehensive material testing and quality assurance program ensures that the compost products are safe for public use. The facility workers are engaged in safety training weekly and daily participate in a morning stretching program developed by the City to avoid muscle pulls and strains. The Utility Department has won several safety awards from the Missouri Water Environment Association in the past several years.

7. **Public Acceptance, Appearance and Aesthetics**

An important project management activity is working to improve public acceptance through education and a commitment to produce high quality compost products. Quality control is essential for safety, public acceptance and to produce marketable products. Through product brochures, City newsletter articles, and Earth Day event activities residents are informed about organic resource recycling and the beneficial compost products that are available and how to properly use them. The City has even developed an educational video to inform the public of our Organic Resources Recycling Program. This video can be viewed on the City’s web site at [www.stpetersmo.net](http://www.stpetersmo.net) by selecting “Watch SPTV” and choosing St. Peters TeleVision Online then selecting “SPTV Specials.” The video is titled “Going Green: St. Peters Organic Resource Recycling Program.”

Area residents use compost for lawns and gardens.
As a measure of public acceptance, one subdivision of mostly senior citizens sponsors an annual “Compost Day” to beautify the landscape in their neighborhood.

8. Innovative Practices

St. Peters works to be innovative in the approach to organic resource recycling by continually looking for ways to improve processes in a cost effective way while trying new ventures to develop markets for the products produced. As a result of this vision and commitment, the following simple innovations have helped make our program successful:

- Negotiated an intergovernmental agreement that started in 2000 for St. Peters to receive biosolids from a St. Louis Metropolitan Sewer District (MSD) facility that previously went to a landfill. This material is now beneficially reused to produce compost. The agreement financially supports St. Peters operation while saving the MSD a significant amount in disposal costs.

- One innovation was the decision to locate the biosolids composting facility at the Wastewater Treatment Plant. This simplifies the regulatory permitting of the facility and allows for all of the excess collected storm water run-off on the site to be treated at the wastewater plant. By locating our new solids dewatering facility near the composting operation, we minimize the material handling distance and related hauling and spillage problems.

- To ensure the highest quality of finished compost products and to gain additional public acceptance, St. Peters joined the US Compost Council and tests our finished products to the standards of their Seal of Testing Assurance Program. Also membership in the US Composting Council has exposed our staff to information available from other industries that has help improve our processes and markets.
St. Peters became a certified “Filtrexx” erosion control product supplier. By working with Filtrexx to understand their product needs for the erosion and sediment control industry, the City developed products that meet their standards and they have become one of the biggest commercial customers.

One of the process innovations that is used to meet the product supply needs of Filtrexx is to double screen the oversize material from the finished compost process to create a blend of material ideal for filling erosion control socks.

St. Peters has incorporated the use of compost and compost erosion control Best Management Practices in the City’s construction project specifications to encourage the use of recycled organic products.

St. Peters has recently created a public service announcement video that explains our organic resource recycling program. This video airs on the public service cable access channel and can be viewed on the City’s website. (www.stpetersmo.net SPTV Online)

St. Peters has initiated several full-scale projects or has been a supporting supplier of compost to several pilot projects including levee construction, constructed wetlands, lead contaminated soil remediation, and land reclamation projects. These projects showed that the use of compost amended soils improves performance of re-vegetation in a cost effective way.

The City has also constructed its first rain garden using a compost and sand media to promote plant growth while encouraging infiltration of stormwater. The rain garden demonstration project has been featured in City sponsored storm water management workshops on low impact development. The City now sells an erosion control mix for commercial contractors.

9. Attachments
   ➢ BioCycle Article
   ➢ DVD of (Going Green: St. Peters Organic Resource Recycling Program (www.stpetersmo.net SPTV Online, Special Features)
OPTIMIZING FEEDSTOCK MIX

COCOMPOSTING: A WIN FOR MUNICIPALITIES

Biosolids/yard trimmings cocomposting facilities expand due to cost-effectiveness of program and demand for finished product.

Nora Goldstein

THE CITY OF ST. PETERS, Missouri has relied on composting to manage its yard trimmings since 1990. In 1999, it began cocomposting biosolids cake from the Metropolitan St. Louis Sewer District with yard yard trimmings, and more recently, has been processing all of St. Peters' biosolids as well. Now, 20 years later, St. Peters is completing construction of its most recent facility upgrade to an open bin aerated static pile (ASP) system.

"We compost about 6,000 wet tons of biosolids and 30,000 cubic yards of yard trimmings annually," says Russ Batzel, Manager of Public Works Services. "We converted from static piles to an actively turned windrow process a number of years ago. Recently, the city decided to move to the aerated static pile system to more efficiently produce compost and manage odors generated during the active composting phases by cycling all the process air through biofilters. We are using a system supplied by Engineered Compost Systems where material is composted in aerated bunkers."

When switching from turned windrows to an aerated static pile process, optimizing the initial feedstock mix becomes more critical, especially in terms of pile porosity and more uniform aeration. In 2008, the city received a $40,000 grant from the St. Louis-Jefferson County Solid Waste District that was used toward the purchase of a Roto-Mix 3410 (34 cubic yard) stationary electric mixer. Total capital cost of the mixer and electrical supply was about $150,000. The new aerated static pile system upgrade is about $2 million.

"The solid waste district uses fees they collect from landfills for grants to support diversion projects that reuse or recycle," explains Batzel. "The mixer is operated by remote control by the front-end loader operator. We have a set recipe for ground yard trimmings and biosolids. The weight of each is recorded on a display. Material is discharged onto a conveyor, and then put in the windrows. In the future, it will be loaded into the ASP bunkers." St. Peters also owns a Vermeer tub grinder to process yard trimmings and wood waste, both for cocomposting and mulch production.

St. Peters has an interest in composting produce and floral wastes and has had inquiries from a local grocery store and a national discount chain but no action has been taken yet. "We are set up to receive and process more food waste streams, but we are not in the business of going out on routes and collecting it," says Bill Malach, Director of Utilities. "No one has pulled the trigger yet on doing collections, but the interest is definitely out there on the part of the generators."

COMPOST SPREADER FOR EROSION CONTROL, FARM APPLICATIONS

The city produces about 20,000 cubic yards/year of compost. It uses a Wildcat trommel to screen finished product. The compost is certified under the Seal of Testing Assurance program of the U.S. Composting Council. The City of St. Peters' is registered as a certified supplier of compost and filter media for Filtrexx, a company that sells sediment and erosion control products such as compost filter media in a filter sock, and compost blankets. The city also has been involved in wetlands construction and other soil restoration projects. One included construction of a 4-mile long levee.

"The original specifications for the project called for the contractor to strip and save topsoil for use on top of the completed levee," recalls Malach. "In practice, this

A box spreader is used by St. Peters to apply compost for erosion control, soil and wetland restoration and agricultural applications.
method is seldom effective and is costly because of the problems with double handling and storing large amounts of material and the care needed to accurately place the topsoil on the finished slopes to create a true topsoil horizon. Therefore, we required the contractor to amend the finished grade in place using compost to add organics and nutrients to the soil."

Because of the large surface to be treated — approximately 125 acres — 40,000 cubic yards of compost were transported to the site in walking floor trailers and placed in piles along the levee. It was then loaded into a Kuhn 2054 (20 cubic yard) ProPush spreader; a 2-inch blanket was distributed over the surface. The compost was tilled into the soil and the finished areas seeded. "This method was found to be effective at controlling erosion on the steep slopes because of the water retention capabilities of the compost and the quick sprouting of the grass to help hold the slope," adds Malach. "The levee construction was done during a drought year and we still had good germination."

St. Peters also uses the spreader to apply compost on its 200-acre farm growing crops of wheat, soy beans and corn. In addition, it land applies grass on the farm using the spreader. The grass is then incorporated into the soil as an amendment, providing a boost of nitrogen. "We run the grass through our grinder before we land apply to make sure there are no large sticks in it and to shred the paper bags," says Batzel. Another new market is a local winery. "We just sold our first batch of compost to them," he adds. "They like the nutrient value, and we've talked with them about developing special blends to meet their fertilization needs."

**COMPOST FACILITY EXPANSION**

The City of Cheney, Washington has been composting biosolids since 1994, using aerated static piles inside a building. It uses as much ground yard trimmings as it can produce, supplementing with purchased hog fuel (wood chips) as necessary. "It is getting hard to find and purchase hog fuel these days," says Don Mangis, Wastewater Collection Supervisor for the City of Cheney. He adds that the operation recovers and reuses the wood chips a number of times before they pass through the final screen.

Cheney completed an upgrade of its wastewater treatment plant in November 2009, which increased the volume of biosolids generated. "We were okay on the hydraulic loading side of the treatment plant, but were short on the solids side," explains Mangis. "Conditioning tanks were added for phosphorus removal and more aerators were installed in the aeration basins. The city added a second belt filter press and sludge storage tank. We also purchased two Roto-Mix stationary mixers, two holding hoppers located ahead of the mixers, a Bandit horizontal grinder for the yard waste and a Wildcat portable drum screen." The size of the composting building was doubled in length, from 140-feet by 200-feet long to 400-feet long. It can hold 16 windrows, each about 350 cubic yards. About 3,200 cy of compost are produced annually.

Yard trimmings are processed and placed into windrows until they are needing for mixing with the biosolids. Solids content of the biosolids averages about 15 percent; operators use a ratio of roughly one-third biosolids to two-thirds hog fuel/ground yard trimmings. About 260 dry tons/year of biosolids are generated. Materials are composted for eight weeks indoors, then screened and moved outside for curing. The facility expansion included a larger biofilter. "Originally we used a biofilter contained in a 40 cubic yard roll-off box," says Mangis. "The new biofilter is much larger. It is about 16-feet wide by 50-feet long and 8-feet high with alternating 18-inch layers of hog fuel and finished compost."

In the early years of its composting operation, the city had difficulty moving the finished product out the door. "We had mountains of the stuff and were mostly selling it to landscapers by word of mouth," he adds. "Then, about six years ago we turned a corner, and now we can't make enough!"