



Stearns & Wheeler  
Companies

*The* **CONPOREC**  
*Integrated Waste Management  
and Composting Technology*

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## COMPANY DESCRIPTION

### Conporec, Inc.

*Mission: To be recognized as the leader in the development and operations of municipal solid waste composting facilities by providing "solution-based" systems to client needs through the application of the Conporec technology.*

Conporec was created in 1987 by a group of private investors seeking to solve a local waste management problem in the Regional Municipality of Comte Du Bas-Richelieu, near Montreal, Quebec. The proposed solution was to use composting to reduce the reliance on landfill disposal. The composting technology developed around a component (the bioreactor) available on the European continent.

Conporec's initial challenges were: (1) adapting a proven technology to the colder North American climates; (2) processing multiple types of waste; (3) developing an efficient waste collection system; adhering to local laws and regulation; and (4) providing a marketable compost for local distribution.

Since 1993, Conporec has developed and significantly improved upon the European composting technology and has fully adapted it to the North American environment. In 1997, a patent application was filed both in the U.S. and Canada that identified the improved "Conporec Technology." On January 8, 2002, a U.S. Patent (No. 6,337,203) was issued for Conporec, Inc.'s "Odor-Free Composting Method and Installation."

Today, Conporec, Inc., owns and operates a state-of-the-art composting facility in Sorel-Tracy, Quebec. The plant can process 110 tons of MSW per day and achieves a landfill diversion rate of 75 percent. The process is odor free and complies with all government regulations. The compost produced is free of pathogenic bacteria and can be used in many horticultural and agricultural applications.

In 1996, the Company restructured its shareholders into Conporec, Inc., and is currently owned by a group of eight shareholders.

Conporec, Inc., is the legal owner and retains all rights to the composting technology.

As an integral part of the region's solid waste management program, Conporec built and currently operates an MSW composting facility, a transfer station for dry recyclables,

and a convenience area for residential use. In addition, Conporec has planned, implemented, and continually improved upon one of Canada's most successful recycling and waste collection programs, and for the last five years has achieved a landfill diversion rate greater than 70 percent. The Sorel-Tracy composting facility has a nominal waste capacity of 38,000 tons per year and is successfully processing 29,000 tons of MSW and has produced and sold over 12,000 tons of compost per year since 1993.

Since 1993, Conporec has achieved an average waste diversion rate (materials that have been diverted from the landfill) of 74%.

The accelerated composting process that is proposed is based on a rotating drum principle that was developed in the 1940s. The process was further developed and improved in France, resulting in a horizontal rotating drum bioreactor system to accelerate biological decomposition as an initial step in the composting process. The process has been utilized in Europe since the 1960s. A critical feature of this adaptation is the efficient and effective control of odor. Through experimentation and perseverance, Conporec has developed the most successful odor control system of its kind.

Conporec succeeded in proving the viability of an MSW composting process by:

- modifying its refining section (increased recycling of inorganics)
- installing a negative pressure system in all buildings (odor control)
- adding a forced-air maturation system (compost maturation)
- modifying compost handling and turning systems (process efficiency)
- adding biofiltration (odor control)
- incorporating secondary refining (compost quality)

Conporec's success has resulted in a U.S. patent for an odor-free composting process (January 2002) and also an Australian patent, granted in September 2002.

The system has been so successful in Canada that after five years of operation, Conporec received the Environmental Merit Award from the Quebec Ministry of the Environment in 1996. The selection committee members included the general manager of Green-Peace Montreal, the President of the EcoSummit (non-government environmental group), and a journalist from Radio Canada (CBC) specializing in the environment. Two years later,

Conporec was awarded the 1998 Environmental Phenix Award for sustainable development in the composting industry.

## **MIXED WASTE PROCESSING CAPABILITY**

The Conporec process can accommodate greater than 5 percent (by weight) of food-contaminated paper or waxy corrugated paper. The Sorel-Tracy facility processes 100 percent municipal solid waste, with a significantly high percentage of both paper products and inorganics (total waste diversion approximately 75 percent).

The Conporec process can accommodate the following waste types:

### *Biosolids (Wastewater Treatment Sludges)*

- Greater than 10 percent solids directly into the maturation area.
- Less than 10 percent solid as process liquid (8 to 10 percent by weight of the feedstock).

### *Yard Debris (Green Waste)*

As feedstock to the bioreactor.

### *Sawdust*

As feedstock to the bioreactor or as a bulking agent to biosolids in the maturation area.

### *Manure*

As feedstock to the bioreactor (quantity limited to moisture controls) or as a mix with raw compost in the maturation area.

### *Slaughter House Wastes*

As feedstock to the bioreactor.

### *Grease*

Limited quantities that can be mixed with the feedstock to the bioreactor.

### *Food-Contaminated Paper*

As feedstock to the bioreactor.

### *Non-Hazardous Liquid Wastes*

As feedstock to the bioreactor (quantity limited to moisture controls).

## PROCESS DESCRIPTION

Conporec can provide a facility that has the capability of processing and composting municipal solid waste and liquid waste. The utilization of the proven Conporec MSW composting technology allows the acceptance of a variety of wastes:

- MSW, commercial, and institutional wastes
- biosolids (although not necessary for this process)
- commercial organics
- yard waste and other organic-based material
- food processing waste
- process liquid for the bioreactor, such as stormwater runoff, liquid sludge from treatment plants, septage, and outdated food and beverage products

### Waste Reception and Inspection

Every vehicle hauling waste to the facility will be directed over the existing truck scale. Likewise, all outgoing trucks carrying compost will be weighed and their net weight recorded in an electronic database for recordkeeping and invoicing.

#### Receiving Area

Incoming trucks with approved waste will be unloaded in a fully enclosed receiving area. The waste is unloaded into a waste pit with a holding capacity of two to three days. The total size of the receiving area will be designed to manage existing collection operations. Waste will be loaded onto a conveyor that will deposit it in the feeding hopper of the bioreactor.

#### Waste Feeding System

After waste is fed into the bioreactor's feeding hopper, the hydraulic pushing mechanism is activated, and the raw waste is slowly pushed into the bioreactor's inlet shield feeding chute. The operator will add process liquid from a holding tank into the bioreactor's feed end. Once the pump is activated, a metering system measures the flow rate of liquid that is fed into the bioreactor, and a programmable logic controller (PLC) stops the system automatically when the correct quantity of process liquid is added to the waste.

### Bioreactor

The bioreactor is a long tube measuring between 48 and 60 meters in length by 4.25 meters in diameter (depending on waste volume). It is driven by an electric induction motor. The interior of the bioreactor is fully lined with steel channels that permanently collect a coating of compost to provide the following:

- . abrasion resistance to the shell
- temperature insulation
- permanent bacterial seed for rapid growth of thermophilic bacteria as new waste is added.

The front of the bioreactor (inlet shield) is equipped with a feed chute connected to a hydraulically operated pushing mechanism which is joined directly beneath the feeding hopper. This inlet shield is stationary, but it can be retracted easily for maintenance purposes. A seal system prevents the waste from leaking between the bioreactor's rotating portion and the inlet shield's fixed portion. The shield's interior is covered entirely with a movable wear plate made from abrasion-resistant steel.

The bioreactor's discharge (outlet shield) is mainly a closed weldment, with the exception of a hydraulically operated gate which can be controlled proportionally to allow more or less material to discharge from the bioreactor during operation. The outlet shield is permanently connected to a random perforated trommel-type shell that distributes the material uniformly on the conveyor belt outlet. The shield is also lined with an abrasive-resistant steel wear plate. The entire bioreactor discharge crib is enclosed and connected to the odor-control system. An access door and platform are provided for the operator and maintenance personnel.

The bioreactor provides accelerated waste composting and eliminates the need to crush or shred incoming wastes. The bioreactor's continuous rotating action carries out mechanical mixing and breakdown of the waste itself. Fragile organic matter is reduced, while non-organic material remains whole for easy separation from the compost through the subsequent sorting and screening processes. A significant advantage of this process is that organic and compostable material does not adhere to non-compostable material as it normally would if the waste had been crushed or shredded before processing.

The accelerated composting process begins immediately with the controlled addition of air and moisture. The temperature rises quickly above 50°C during a three-day period in which the waste stream remains within the bioreactor. Compost exiting the bioreactor will result in a heterogeneous mixture of compost and non-organic material (metal, glass, plastic, etc.). During this thermophilic phase, pathogenic bacteria are destroyed, and the compost product is pasteurized. Weed seed from yard waste is also destroyed.

The resultant product from this process provides safe handling conditions for workers in the refining area since pathogenic bacteria have been destroyed in the bioreactor.

### Primary Refining and Sorting

Following the accelerated composting phase, the product that results from this process must be separated from non-organic materials which might have been present in the original waste stream to obtain a good quality compost. This is achieved by feeding the product through a large trommel screen which divides this material into two fractions. The passing fraction will be conveyed to the maturation building, while the non-passing fraction, which contains non-organic material, is conveyed to the residual loading area.

### Maturation Area

The recovered compost from the bioreactor and primary refining process is transported via conveyor belt to the maturation area to continue the composting process. This area (completely enclosed within the primary structure) will contain separate bays to serve as windrows. A shuttle and tripper belt conveyor automatically feeds the front section of each bay at a constant level. This agitator/turning equipment can process different types of organic materials, amendments, and biosolids, as well as unrefined compost from the bioreactor. The system is designed to process a wide range of organic waste, including dewatered sludge (which can be injected directly), and combines the material with bulky agents to transform the material into a refined product that will be marketable.

During the 35- to 56-day maturation period, the agitating/mixing machine in the maturation building moves the product toward the conveyor outlet each time the machine travels through the bay. This process is repeated 10 to 13 times before the product is deposited onto the reclaiming conveyor.

One compost agitator will automatically mix and agitate the contents of the bays once every two to three days. During this five-week period, the product is further homogenized and aerated as the machine (agitator) moves the composting material down the bay, improving its maturation.

Each bay is divided into four aeration zones, with each zone having its own air supply from below. This process is carried out to maintain aerobic conditions and optimum temperatures (55°C — 60°C) during the maturation process. During the agitating process, water is added to the compost to increase its moisture content to the optimal level, while dust generated during the agitating process will be kept to a minimum. The last aeration zone will lower the compost's moisture content to allow small foreign particles to be separated effectively from the compost during the secondary refining process.

When the maturation building's active bays are completely filled with compost, the last section of the bay, which is the oldest product, will be discharged automatically onto a variable speed conveyor belt adjusted to meet the secondary refining feeding rate.

The proposed maturation system is a forced air, aerobic agitated bed and is located in a totally enclosed area. Moisture and aerobic conditions are monitored. The system is sheltered in a weatherproof building to allow year-round operation and effective odor control.

### **Product Preparation, Storage and Shipping**

Following the maturation period in the maturation building, the compost moisture content is lowered to about 35 percent to make separation of small foreign particles easier from the mixture. This is referred to as the secondary refining process within the multi-purpose building as described below.

### **Secondary Refining (Optional)**

Over the past several years, Conporec has experimented with several types of equipment layouts and ways to process the compost to produce a quality product with a minimum of foreign particles — a highly marketable product that will mix well with soil. Options for the secondary refining process (depending upon the incoming waste characteristics) are discussed below.

Before feeding the compost into the rotary screen, a drum magnet on the conveyor belt head pulley removes iron particles from the compost stream. The passing fraction from the rotary screen is fed through the pulverizer. Any sharp glass particles passing between these rollers will be reduced to this size, and glass will then look similar to sand particles.

Oversized material from the rotary screen will be separated into three more fractions. High-density particles extracted from the high-speed inclined conveyor belt will be conveyed to the compactor as residues. Light particles, such as small plastic film, will be extracted from the compost stream at the high-speed inclined conveyor's feed chute with a low-velocity air stream and aspiration to collect plastic film in a separate container. The remaining lightweight particles, such as wood, small lumps of compost, and waxed cardboard, will be cut into small pieces before they are added back into the finished compost product. This product and the compost from the pulverizer will result in a homogeneous texture which can be mixed easily with soil.

### **Compost Storage and Shipping**

As part of the secondary refining process, an area is dedicated for temporarily storing compost after it is processed through secondary refining. A totally enclosed truck loading station will be provided as part of this building.

### **Odor Control System**

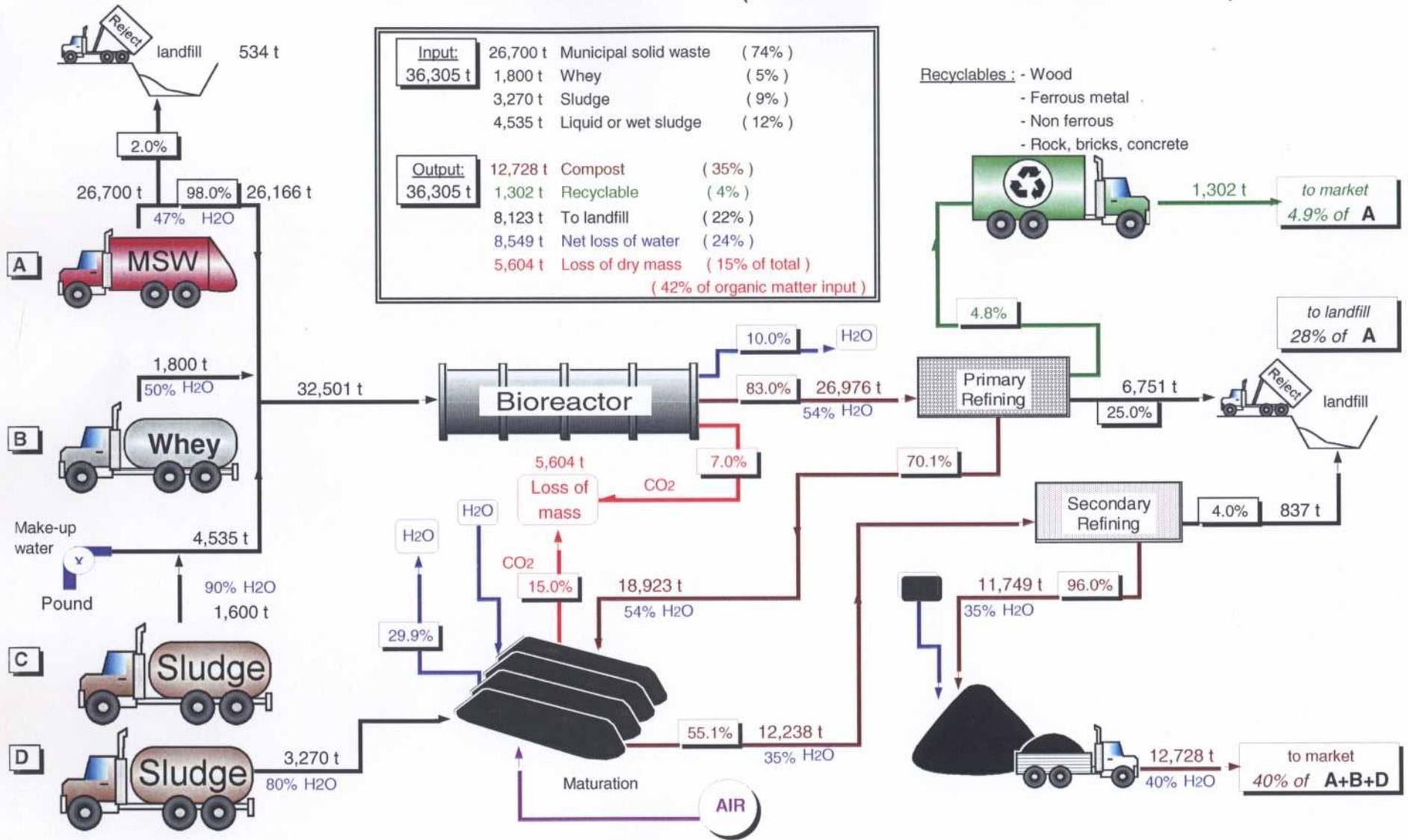
A fully enclosed odor control system will be installed. The design will be based on the system that has been in operation for the last five years at Conporec's Sorel-Tracy facility. The Conporec composting process, in each of its three phases, is carried out in an aerobic mode to minimize odor problems, and odorous gases are collected as close to the source as possible.

### **Biofilter**

All of the facility's process areas are kept under negative pressure, and several changes of air per hour are produced. Make-up air is transferred to another area or from outside via adjustable gravity dampers.

The key element to the odor control system is a highly effective biofilter that is sized to filter odorous gases. The biofilter will be constructed with an impervious subgrade material to collect leachate. The maximum flow rate will allow an approximate 10-inch w.c. pressure

# DELAWARE COUNTY ( Process Flow Chart, US tons )



drop. A sprinkler system will be installed above the biofilter to maintain the filtration medium moisture between 60 and 65 percent.

Drainage water recovered at the bottom of the biofilter from the impermeable membrane is collected and conveyed to a manhole. A pump with a level control sensor will discharge the drainage water to the process liquid tank to be used in the bioreactor.

Dust particles are collected throughout the air handling system to prevent the biofilter and the distribution piping network from clogging.

## **OPERATIONS & MAINTENANCE PERSONNEL**

Conporec's objective is to operate and maintain Municipal Solid Waste co-composting facilities in accordance with good management practices and in accordance with all environmental laws and regulations. Proposed staffing requirements are based on the amount of waste and liquid waste to be processed.

To meet these requirements, Conporec's team will provide all process control, routine preventative and corrective maintenance, sampling and analysis, composting, product marketing, reporting, and record keeping, as well as housekeeping needed to meet the conditions of current permits and other regulatory requirements.

Operators will be properly trained in material handling, safe work practices, use of personal protective and monitoring equipment, etc. We will maintain a program of safety and environmental compliance to meet state, federal, and local regulations.

Conporec is experienced in developing operations and staffing plans to operate MSW composting facilities. All employees undergo extensive training for operational and safety procedures. Safety and product quality are of the utmost importance for the proper and efficient operation of a composting facility.

### **Staffing**

The operating crew for the composting facility will work 12 hours per day, 7 days per week (except holidays). Two crews are required. The crews will be working an average of 42 hours per week on a regular basis on a staggered schedule (three days on, four days off, four days on, three days off, etc.).

## Operations and Maintenance Job Descriptions

Please note that these are preliminary estimates based on past projects. Final staffing requirements will be determined based on the specifics of the project and local considerations.

### Plant Manager

The plant manager will be responsible for overseeing all activities, including material handling and composting process operations. Administrative duties include staff management, regulatory compliance, record keeping, scheduling, and public relations in the community. The plant manager will be responsible for maintaining and scheduling MSW and other product deliveries. The plant manager will also participate in marketing the compost and coordinating work of the facility and staff. The plant manager will work closely with the operation foreman to ensure that the QA/QC plan, as well as the safety and health regulations, are met.

### Mobile Equipment

Mobile equipment operator(s) will be experienced in a variety of material handling equipment, as well as operating roll-off trucks and front-end loaders. The primary duties will include the following:

- moving finished compost from within the storage section
- loading compost on trucks
- keeping receiving and other areas cleaned from debris
- handling recyclable material in the sorting area
- handling the facility residual

### Typical Mobile Equipment for Facility Operation

- 3.5-cubic yard front-end loader(s)
- roll-off truck(s) for 40-cubic yard container (15 tons, 12 wheels)
- small "Bob Cat" loader(s) type
- 1/2-ton pick-up truck(s)

A truck to transport compost and recyclables is usually provided by a subcontractor or customer.

### Maintenance Mechanic/Electrician

The maintenance mechanic and electrician will possess extensive experience in the operation and maintenance of industrial process equipment, as well as equipment maintenance and troubleshooting. Candidates will also be familiar with material handling machinery.

Those individuals will be responsible for the day-to-day and scheduled routine maintenance of equipment, and facility activities would include the following:

- repair material-handling equipment and agitation machinery
- routine maintenance, lubrications, cleaning, as well as adjusting
- routine maintenance of exhaust and aeration blowers
- instrumentation control system for process system
- routing maintenance of mobile equipment and repairs
- routine building maintenance
- assist in facility operations as required

### Laborer

Laborer(s) will provide general assistance with daily operations and maintenance activities.

### Main Operator

The main operator (one per shift) will be responsible for running the facility in accordance with operating procedure(s) and in response to the process control supervisor's advice and the foreman's instructions. The operator will primarily work in the central control room to start and stop the facility's process equipment and take the necessary measures to ensure quality product and the repair of equipment as needed.

The operator from the enclosed observation area will inspect the incoming feedstock, remove any bulky or contaminated material from the waste pits by using the grapple, and report any discrepancies to the manager in the waste stream quality. The operator will be

trained at the Sorel-Tracy composting facility and will be knowledgeable in all aspects of the process and equipment.

### Assistant Operator

The assistant operator (one per shift) will be qualified to replace anyone in any job position at the composting facility and will be responsible for the consistent and continuous operation of the process.

### Operation and Maintenance Foreman

The foreman's main responsibilities at the facility will be to ensure a consistent operation of both operating crews in accordance with the operating procedures, and to work closely with the process control supervisor to improve the quality of the operation and end product. The foreman will ensure that routine maintenance is completed and that repairs are made to minimize equipment down time. The foreman will report to the plant manager to facilitate overall production, minimize down time, ensure product quality, and schedule personnel.

## **Quality Assurance / Quality Control**

The main elements of the QA/QC procedure applicable to operations will cover the following areas:

### Plant Management

- responsibilities of managers, supervisors, and operators
- personnel management and records
- general accounting procedures and records
- cost accounting procedures and records

### Plant Maintenance

- general plant maintenance procedures
- preventative maintenance
- emergency maintenance
- equipment records
- spare parts policies and records
- general upkeep of site and buildings.

## END-PRODUCT MARKETING

Conporec's project team is responsible for developing a marketing strategy which will focus on local needs that are specific to the area. Conporec has more than seven years of experience in marketing MSW compost and will provide a comprehensive, year-round compost marketing plan for a quality compost.

The Sorel-Tracy facility currently produces 12,000 tons of compost per year. A summary of its use and distribution follows (approximate quantities only):

|  | <b>USER</b>              | <b>APPROXIMATE QUANTITY (TONS/YEAR)</b> |
|--|--------------------------|-----------------------------------------|
|  | Agriculture              | 6,000                                   |
|  | Landscapers/Nurseries    | 4,000                                   |
|  | Private Users            | 800                                     |
|  | Sod Farm                 | 600                                     |
|  | Research and Development | 400                                     |
|  | Mine Reclamation         | 200                                     |

Note: All compost is sold in bulk form (picked up at the facility by the customer).

### Marketing Strategies

- A variety of marketing strategies will be established to introduce the compost product into the market and ensure complete distribution of the product. Different strategies will be adopted according to the end use market. This program will be financed with the revenue resulting from the sale of compost. The long-term objective of the marketing strategy is to inform the public and end users of its value.
- An effective public awareness program will be set up to outline the advantages of compost and match the various compost products with the respective end markets to maximize potential revenue.

- Local educational and promotional activities will positively heighten public perception among residents by demonstrating compost use and promoting recycling (integrated with current efforts).
- Educational seminars and tours of the composting facility for schools and environmental groups.
- Effective and co-operative use of the media.
- Potential users will be targeted for development.
- Promotional plans will be developed that include advertising and trade shows.
- Product testing will ensure the markets' compost quality. We will also maintain a records management system that ensures consistent compost quality.
- Conporec, Inc., will provide technical support, as needed, to end users.
- Conporec, Inc., will participate with local research projects, both publicly and privately financed.

### Product Quality

With reference to the performance guarantee and current operations at Sorel-Tracy, we are confident that we will consistently meet specified compost standards. With our secondary refining process, the particle size will match those of any other compost product. Analytical results for the Conporec compost are provided in comparison with Quebec and USEPA 503 standards and are included at the end of this section.

## TEAM RESOURCES

### S&W Services, Inc.

S&W Services, Inc., and its sister company, Stearns & Wheeler, LLC, have provided a complete range of engineering services to private and municipal clients since 1950. The success enjoyed by the firm is the result of a technical approach to client needs through innovative engineering designs, while remaining sensitive to economic considerations. Attention to detail and adherence to sound engineering, environmental, and site planning

principles has been the cornerstone of the more than 5,000 projects the firm has completed. As a result of thoughtful, competent, and practical services, over 80 percent of the firm's current assignments are additional projects from satisfied clients.

S&W Services, Inc., is a full-service environmental design/build/construction company. Founded as a means to provide clients with an additional avenue of project completion, S&W Services prides itself on quality and completeness of projects. S&W Services follows the Stearns & Wheeler commitment to quality, and understands that our success is based on the success of our clients.

S&W Services, Inc. provides a comprehensive package by completing the project planning, contracting with Stearns & Wheeler for engineering designs, working closely with Stearns & Wheeler on permitting, bidding, hiring contractors, managing construction work, and operating facilities. The benefits that we provide include cost savings, time savings, convenience, and assurance of quality completion in all aspects of the project. We have completed numerous projects in the design/build and construction management realm for clients throughout the northeastern United States.

The firm has in-house capabilities in environmental, civil, sanitary, structural, mechanical, and electrical engineering, as well as architecture, landscape architecture, environmental sciences, and hydrogeology. Presently, the staff numbers over 230 professionals covering the complete range of technical design disciplines, including graduate engineers, architects, landscape architects, and wetland and environmental scientists.

In addition to a diverse and experienced technical staff, our in-house computer capabilities allow us to provide innovative and cost-effective engineering solutions. Stearns & Wheeler has more than 15 years of experience working with computer-aided design systems. We have an extensive in-house computer system, including wide area networking, an internal intranet system, project web listing, project management systems, and business support systems. Interconnection of this network to a client's system is readily available for specific projects.

## **Mecatel**

Mecatel SA was established in 1932 under the name of Societe Loir et Cie. In response to greater opportunities to manufacture and install industrial equipment, two new companies were formed in the 1950s – Mecatel as the manufacturer of equipment and La Lilleroise as

the installer of the equipment. Shortly afterward, Andre Barre joined the companies and established a highly skilled engineering division to design and fabricate specialized equipment. As a result of the economic slowdown in the early 1980s, the companies consolidated into one company – Mecatel SA – and focused exclusively on their own specialized in-house design and fabrication of industrial equipment. Through European licensing, Mecatel designed and supplied their rotating drum bioreactor to more than 20 facilities in France, Italy, Portugal and Canada.

As a result of Mecatel's supply of the bioreactor to Conporec, Inc., for Sorel-Tracy (Quebec), Canada, a strategic alliance was formed in support of Conporec's efforts to market the Conporec Municipal Solid Waste Composting Technology in North America.

In 2001, a strengthening of this alliance occurred when a shareholder of Conporec, Inc. (Gilles Beaulieu) purchased Mecatel SA with the participation of three of their existing managers. Conporec and Mecatel are currently pursuing an option to merge the two companies in order to provide a seamless blend of technology and equipment support to operating compost facilities.