

## Composting Component

## 4.5 COMPOSTING COMPONENT

According to the 1995/96 Waste Characterization Study, yard debris represents 7% of the County's waste stream and other organics (food, wood, etc.) represents 26%. Therefore, composting continues to be a solid waste management option that can significantly reduce the amount of waste landfilled.

### 4.5.1 OBJECTIVES

In its 2000 Annual Report to the CIWMB, the SCWMA reported a diversion rate of 40 percent. As required by PRC Section 41820(a)(6)(B), the SCWMA filed a time extension request listing the estimated diversion from new and enhanced diversion programs. By the year 2003, the SCWMA member jurisdictions will increase residential recycling by 6.5 percent and commercial recycling by 4.5 percent. Goals for those programs that address this increased composting diversion are discussed below. The priority waste categories that will be targeted for diversion include paper, metal, wood, yard debris, and plastics.

Specific goals for the short term (2003 to 2008) for the SCWMA composting program are:

- Expand residential yard debris collection to weekly collection to divert an additional 25 tpd, equivalent to 1.7% of the disposal tonnage, by the end of 2003.
- Implement a construction and demolition debris diversion program as described in the Special Waste Component (section 4.6) which is anticipated to divert an additional estimated 65 tpd, equivalent to 4.5% of the disposal tonnage, by the end of 2003. This program will divert an undetermined amount of additional yard debris not currently captured by the existing programs.
- Expand existing floor sort activities at the solid waste facilities as described in the Recycling Component (section 4.4) which is anticipated to divert an additional estimated 20 tpd, equivalent to 2.1% of the disposal tonnage, by the end of 2003. This program will divert an undetermined amount of additional yard debris not currently captured by the existing programs.
- Continue to develop and promote local diverse uses for compost products including uses in landscape and nursery industries, vineyards and other agriculture, public works and Caltrans projects, mining (i.e., gravel) and reclamation projects, and uses by the general public.

As stated in the Sonoma County Solid Waste Management Alternatives Analysis Project final report ("Analysis"), the medium term goals for the planning period 2009 to 2018 include:

- Siting a Resource Management Facility (RMF) that will include organic waste processing and green waste composting as part of the planned operations.
- Developing a formal agreement among all the jurisdictions in Sonoma County to direct flow of refuse and green waste to the RMF.

Specific marketing goals for the SCWMA composting program are:

- Encourage and assist government agencies to develop compost specifications and standards that match the needs of large markets such as agriculture.
- Develop or support private efforts to develop an educational program that informs businesses and the general public of the beneficial uses of compost.
- Work with state and local agencies to encourage their use of compost in landscaping, construction, park, reclamation, and athletic field projects.
- Work cooperatively with other jurisdictions to acquire long-term contracts with compost buyers.

## **4.5.2 EXISTING COMPOSTING ACTIVITIES**

Title 14, Chapter 9, Section 18736.1 of the regulations requires a description of the existing composting program and existing local market development activities including government procurement programs, economic development activities, or consumer incentives.

### **4.5.2.1 Current Composting Programs**

#### **Yard Debris Composting**

Sonoma Compost Company (SCC) has been the contractor for the SCWMA's regional composting program since 1993. On average in 2001, the program processed 175 tpd of yard trimmings, representing a 14% reduction of the county waste stream and producing 50,000 to 60,000 cubic yard of compost and mulch annually. Twenty percent of the materials collected come from self-haul customers and 80% from the residential curbside collection and transfer stations.

Windrow composting occurs at the Central Disposal Site on about 20 acres covered with a cement treated base using the yard trimmings from residential curbside collection and the transfer stations after it has been sorted for contaminants. Materials collected from self-haul customers, which is more brush and less contaminants, are processed into mulch. Once the composting process is complete, mulches and compost are screened for size and to remove any remaining contaminants.

Material is ready for market once it is no longer fibrous, has a moisture content of 40 to 50%, and has a dark, soil-like appearance. Testing includes regulatory required tests, nutrient analysis and pesticide residue detection tests. This testing along with SCC's registration with the California Compost Quality Council, allows the products to be sold as "organic," giving customers confidence in the products. Ten percent of the final product is allocated back to the SCWMA members in direct proportion to the amount of materials generated from that jurisdiction. These allocations are used by parks departments, schools, and local non-profit organizations. Three quarters of the remaining final product is sold directly to customers, with the rest sold to the wholesale market.

#### **Biosolids Composting**

Although the 1995/96 Waste Characterization Study conducted for Sonoma County does not identify biosolids (sludge) as a significant part of the waste stream disposed at County disposal sites, biosolids can be landfilled if it meets specifications for more than 80% solids. The City of Santa Rosa Laguna Wastewater Treatment Plant uses a forced air, agitated bed system comprised of twelve, 6 feet by 10 feet by 210 feet, composting bays for its composting operation. The facility has a capacity of 50.5 wet tons which varies seasonally because additional moisture in winter months requires additional bulking materials. Laguna has been using approximately 35 tons/month of yard debris collected from residential curbside programs as a bulking material.

#### **Manure Composting**

Although the 1995/96 Waste Characterization Study conducted for Sonoma County do not identify manures as part of the County's waste stream, there is no prohibition from disposing manures at the solid waste disposal facilities. Therefore, it is possible that manures are being disposed at the facilities. Many large agricultural operations, such as dairies and horse ranches, manage their manures on site for economic reasons.

With a capacity of 10,000 cubic yards of active compost and feedstocks, Earthbound Compost processes horse and dairy manures and pomace into compost. In addition, Sonoma Valley Worm Farm uses from three to five cubic yards per week of dairy manure as feedstock for growing red worms and producing worm castings.

#### **Food Waste Composting**

From August, 2000 to April 2001, 42 businesses in the City of Rohnert Park participated in a food waste collection pilot program aimed at commercial facilities. Empire Waste Management designed a collection route that focused on collecting food waste separately from other generated wastes and delivered the food waste to the City of Santa Rosa Laguna Regional Wastewater Treatment Plant. During the pilot program, contamination of

the food waste was a significant issue that required some separation of contaminants prior to composting. Over 213 tons of food waste was collected, producing over 500 cubic yards of finished compost. After six months of operation, a cost analysis showed that this type of program would not be cost effective without a significant number of large generators to offset the costs of collecting and processing the separated compostables. The research results of this pilot program will help in the development of a future organics composting program.

#### 4.5.2.2 Current Composting Levels

Sonoma Compost Company produces 50,000 to 60,000 cubic yard of compost and mulch annually. The current diversion for yard debris is included in Table 4.10 (see section 4.4).

#### 4.5.2.3 Anticipated Change in Composting Activities

The SCWMA and the private companies operating composting sites do not anticipate a decrease in composting activities in Sonoma County.

### 4.5.3 EVALUATION OF COMPOSTING ALTERNATIVES

Title 14, Chapter 9, Section 18736.3 outlines the evaluations process to be used for the composting alternatives. Only those alternatives whose products result from the controlled biological decomposition of organic wastes source separated from the municipal solid waste stream or separated at a centralized waste processing facility may be considered. Composting alternatives do not include backyard composting or other composting that occurs at the site of generation which are considered source reduction.

#### 4.5.3.1 Evaluation Process

The purpose of the alternatives evaluation process is to choose appropriate composting programs for the various areas in Sonoma County by applying a set of technical, economic, and institutional criteria to a range of composting alternatives. Each alternative is evaluated using the criteria in Table 4.18, including the issues specified in Section 18733.3(b) of the regulations: consistency with local planning, barriers to implementation, implementation costs, and availability of end uses for compost products. In Table 4.18, the weight of the evaluation criteria represents the relative importance of one criteria to the others and is used in the evaluation of

Table 4-18: Criteria for Evaluating Composting Alternatives	
Criteria	Weight
• Waste Diversion Potential	10
• Ease of Tracking Diversion	5
• Environmental Impacts	11
• Operating Experience of the Alternatives	6
• Conformity with Local Markets	8
• Facility/Program Requirements	6
• Capital Cost	6
• Cost Effectiveness	9
• Operating Costs	8
• Conformity with State Hierarchy	4
• Time of Implementation	6
• Private-Sector Participation	6
• Changes in Waste Type, Generation/Use	7
• Adaptability to Changing Social Conditions	8
• Consistency with Local Policies and Conditions	7
• Barriers to Implementation	7
• Implementation Costs	7
• Availability of End Uses for Compost Products	7

any new programs that may be considered in the future. The alternatives evaluated are listed in Table 4.19, and the results are found in Table 4.20.

Additional information on the following specific assumptions include:

Environmental Impacts: MSW compost is relatively more contaminated than either yard debris or source-separated composts. The experience of existing MSW compost facilities combined with the evolving state of increasingly restrictive regulations point to much higher risk associated with the beneficial use of MSW compost.

Operating Experience: The components of source-separated organics composting are similar to the yard debris and MSW composting programs. Collection of source-separated organics would be an expansion of the yard debris program, and the composting facility would be less problematic than that for the MSW composting facility.

Conformity with Local Markets: MSW composting produces a lower quality product. If the public or end users do not accept the product, there is no small modification that can be done to improve the quality. An effective household hazardous waste source separation program or a switch to a different mechanical separation technology may improve the product quality.

Operating Costs: This criteria has been interpreted to mean that the alternative is less desirable if it does not moderately reduce the cost of collecting, transferring and disposing of the residual wastes. The criteria does not take into consideration the program's effect on the total cost of the integrated waste management program.

#### 4.5.3.2 Description of the Composting Alternatives

Table 4-39 (Section 4.8, Facility Capacity) includes the amounts of yard waste and other organics diverted, disposed and generated in Sonoma County according to the 1996/96 Waste Characterization Study. Determining which organic materials to collect and compost requires consideration of the following items:

- Although the LTF has stated its preference for source separation programs and has supported the existing back yard composting program, yard debris composting program and the food waste collection pilot program, the LTF also recognizes that targeting other organic materials including food waste, non-recyclable paper, diapers and other items for MSW composting would, if implemented, enable Sonoma County to meet a 70% diversion rate by 2015.
- The existing yard debris collection program has been designed to maximize participation and diversion rates while maintaining a high level of convenience for residents and businesses. In addition, yard debris has been banned from landfill disposal in Sonoma County and a reduced tipping fee exists for source-separated yard debris.
- Although curbside collection of yard debris occurs on the same day as other recyclables and trash are collected, the method of collecting other source-separated organics will require a detailed comparative analysis and testing of the options. This can be accomplished by a regional pilot program testing and feasibility studies.
- The higher the compost quality and the lower the level of contamination the greater the number of beneficial uses for the compost products. Along with effective source separation, this consideration is used to prioritize the alternatives based on the quality of the compost produced. The higher quality will have a cost that will need to be weighed against the benefits including greater marketability, less risks and liability, and the potential for greater revenues.

#### Separation and Collection Systems

Waste diversion, cost effectiveness and product quality determine how compostable materials are segregated from the waste stream and how they are collected and transported to the composting site. In fact, material

collection costs typically exceed actual composting costs. Collection system options are divided into the following four general categories.

### **No Source Separation of Compostable Materials**

Mechanical separation at a materials recovery facility (MRF) isolates a portion of the compostables. The disadvantages include high contamination of the compostables with inert materials such as glass, plastics, metals, and with toxics, such as household hazardous waste. Additionally, the recyclables are exposed to contamination by the wet organics during collection and their market value is correspondingly reduced. Using this method, typical diversion of organics is 30 to 40 percent of the waste stream. Collection costs are on a par with those of present refuse collection because one truck picks up everything at once (except recyclables, if a curbside recycling program exists). However, the need for capital-intensive mechanical separation equipment and the reduced marketability of the compost and recyclables may largely offset this savings.

### **Yard Debris Source Separation**

- Co-collection: Source separation of yard debris into bags which are collected with the trash and separated at a transfer station, MRF, or landfill. Combined with the dedicated collection of recyclables, this system would require only two distinct pickups: recyclables and trash plus bagged yard debris. Alternatively, the refuse is bagged and these bags are thrown in with the loose yard debris.
- Source separation of yard debris: Using bags or reusable containers or deposited loose by the curb, yard debris is collected by dedicated vehicles. This would require three different collection events: yard debris, refuse, and recyclables.
- Homeowners and businesses bring yard debris to drop-off facilities. This can be in place of or in addition to other collection options.
- Combination of drop-off facilities with co-collection or source-separation of yard debris.

### **Other Organic Material Source Separation**

In addition to yard debris, these systems could source separate and collect food scraps, soiled or wet paper, and other non-recycled paper.

- Food material could be placed in the yard debris bags to be collected with the trash and separated at a transfer station, MRF, or landfill. Along with curbside pickup of recyclables, this would require two distinct collections. Alternatively, the refuse is bagged instead of the yard and food debris.
- Same as above, with non-recycled paper added.
- Food scraps are placed with yard debris in a reusable container such as a 45-, 60- or 90-gallon can. These are picked up by a packer truck on a dedicated route. This would require three distinct collections.
- Same as above, with non-recycled paper added.
- Only commercial and industrial accounts would place food scraps with yard debris in a reusable container to be collected by a packer truck on a dedicated route.
- Wet/Dry Sort where yard, wood and food debris, non-recycled paper and all other clean organic materials are put in the "wet" container, and recyclables plus non-recyclable plastics and other non-compostables are put in the "dry" container; either the wet or dry container could be the default container for those who do not participate in the sorting process. This requires two

instead of three sorts by participants and two distinct collections – one for dry and one for wet. The dry materials are sorted into recyclables and non-recyclables at a processing facility.

- Same as above, but with the wet container being the default container.
- Homeowners and businesses bring organic materials to a drop-off facility. This can be in place of or in addition to other collection options.

### **Combination**

Mechanical separation at a MRF can be added to the options of yard debris source separation or other organic material source separation described above to add of those organic materials not already source-separated from refuse.

### **Composting Systems**

The composting technology employed is based on consideration of chosen organic ingredients, site parameters (e.g., size, environmental impact sensitivity) and availability of labor and capital. The organic material separation and collection method depends on the willingness of the generators to participate in source separation, the cost of alternative systems, and the desired product quality. Without source separation, mechanical separation prior to composting must accompany any additional pre-composting processing such as shredding and mixing of distinct materials. It is assumed that a portion of the processed materials will be sold as fuel and not proceed to the composting stage. Once prepared, the organic materials may be composted using the technologies discussed below.

**Table 4-19: Composting Alternatives Evaluated**

Yard Debris Composting	Least complex and least expensive composting method. Source-separated yard debris is collected from both residential and commercial generators on a dedicated route and taken to the composting site. Homeowners, landscapers, and other businesses may also haul yard debris to the Central Disposal Site or one of the transfer stations. Transfer trailers are used to transport the separated yard debris from the transfer stations to the Central Disposal Site. An outdoor windrow composting method is used. Some of the yard debris collected is also used as a bulking agent for municipal sludge composting.
Municipal Solid Waste Composting	Preprocessing includes material recovery operations to remove non-organic, hazardous materials, and/or valuable recyclables using human labor and/or mechanical equipment. No source separation is required, the collection system remains unchanged, and the composting technology would likely be in-vessel or fully enclosed. The composting process (i.e., anaerobic digestion) of organic materials (food waste, biosolids and septage, manures, waste straw, sawdust, lees and pomace, wash water, contaminated paper, etc.) would recover energy and produce, to the extent feasible, compost products. Volume of the MSW is greatly reduced. Screening is required for the final product to be marketed, although heavy metals and plastic contamination prevent many products from being marketable. Residuals are usually landfilled or used as ADC.
Source-Separated Organics Composting	Source-separated food, yard debris, and non-marketable paper (wet or contaminated) are either co-collected with trash or collected separately on a dedicated route. These materials are composted to produce a clean, agricultural grade compost. The composting process would be similar to either yard debris composting or MSW composting depending on the type of technology selected.

### **Windrow Composting**

The simplest composting systems amount to piling organic materials, such as leaves and brush, and leaving the piles alone for a year or more. If space and time are abundant, this is by far the least expensive option. Most existing yard debris composting operations use a quicker method involving building elongated piles (windrows) of compost material, periodically turning the piles, and monitoring and adjusting moisture and temperature levels. Composting time depends primarily on an appropriate carbon-to-nitrogen ratio, proper moisture levels, and frequent turning to provide sufficient aeration.

### **Aerated Static Pile**

This method operates on principles similar to windrow composting. Aeration is provided to the composting mass (e.g., by forming the piles over perforated pipes that draw air through the compost), which allows the size of the piles to be increased and largely eliminates the need for turning the piles. More controlled aeration leads to swifter decomposition and better odor control, especially in systems that filter air after it is drawn down through the piles. The land area needed can be less than that required for windrows.

### **In-Vessel Composting**

In-vessel composting takes place in an enclosed container rather than in freestanding piles. A number of proprietary systems are available, some which produce a finished product in the vessel, and others which use the vessel to "jump-start" the process and finish the compost in either piles or windrows. Most systems provide for frequent or continuous mixing of the composting mass and allow for monitoring and adjustment of temperature, moisture, and aeration. This process decreases the time needed for decomposition and controls odor. In-vessel systems have high equipment costs, but can require less land than open-air systems.

In addition, there exists a low maintenance, modular on-site in-vessel vermicomposting system, that processes soiled paper products as well as food scraps. It works well in urban environments for schools, restaurants, and educational camps producing concentrated fertilizer at a reasonable cost.

### **Anaerobic Composting**

This form of composting produces two usable commodities: biogas and a somewhat stabilized semisolid material having several uses, including animal bedding or feed, mulch, and as a composting ingredient. Biogas, a mixture of methane and carbon dioxide, can be used directly to generate electricity or can be upgraded and sold as pipeline-quality natural gas. Anaerobic composting includes in-vessel proprietary systems and operations resembling windrows or static piles sealed in plastic to exclude air. The high capital costs of these systems may be offset by the revenue produced by the biogas. Some systems are being developed that use both an anaerobic and an aerobic process to produce biogas and compost.

#### **4.5.3.3 Program Alternatives Evaluated**

Three composting programs were evaluated that incorporate some of the above separation and collection options. For the purposes of cost analysis, source-separated collection and windrow composting were assumed. The composting alternatives evaluated are described in Table 4-19 and the composting alternatives analysis is detailed in Table 4-20.



Table 4-20: Composting Alternatives Analysis

CRITERIA	Yard Debris Composting	MSW Composting	Source Separated Organics Composting
1. Waste Diversion Potential	Existing program diverts about 14% of Sonoma County waste stream.	Depending on collection and materials recovery, from 20 to 40 percent.	25-50%, depending on waste composition and participation rates.
2. Ease of Tracking Diversion	Diversion tracked by month.	Diversion can be easily tracked.	Diversion can be easily tracked.
3. Environmental Impacts	Potential for odor, leachate, blowing debris; impacts minimal and controllable through management.	Potential for odor, leachate, dust and vectors. Impacts of product contaminants being assessed and will determine use regulations.	Potential for odor, leachate, dust and vectors. Impacts generally can be mitigated. Product contamination is more than YD and less than MSW.
4. Operating Experience	3,800+ facilities operating in the U.S. 88+ facilities operating in California.	16+ facilities operating in the U.S.	Full-scale collection programs in Europe; several pilots in U.S. Technology is similar to MSW composting.
5. Conformity with Local Market Conditions	Strong local markets exist.	MSW compost has little history of successful marketing in US. due to contamination levels and product quality. Can be used as ADC.	Industrial organics compost is currently produced and marketed locally. Strong agricultural market potential exists.
6. Facility/ Program Requirements	Current program operates on approximately 18 acres.	Would require identification and permitting of composting site.	Would require modification of collection system. Siting and permitting of composting facility.
7. Capital Cost	No additional capital costs required.	Cost of fully enclosed composting facility is in range of \$30,000-\$50,000/tpd.	Composting costs are slightly lower than for MSW. Collection costs depend on system chosen.
8. Cost Effectiveness	Existing program costs are \$29/ton for processing.	Costs range from \$25 - \$140 per ton, depending on process chosen and degree of recovery attained.	Cost per ton is highly variable, depending on composting technology and collection technique.
9. Operating Costs	Existing program costs are \$29/ton for processing.	Significant avoided landfilling costs; collection costs unchanged.	Highest avoided landfilling costs; collection costs similar to yard debris composting if organics added to existing collection system.
10. Conformity with AB 939 Hierarchy	Consistent with second level of hierarchy.	Consistent with second level of hierarchy.	Consistent with second level of hierarchy.

Table 4-20: Composting Alternatives Analysis

CRITERIA	Yard Debris Composting	MSW Composting	Source Separated Organics Composting
11. Ease of Implementation	Program already established.	High capital costs require intensive planning and financial review. May take 2 to 3 years. Also dependent on product marketability	Implementation dependent on facilities, collection and marketing; could take 2 to 3 years.
12. Private Sector Participation	Private sector currently operates program and markets materials.	Large opportunity for private participation in development, operation, marketing, financing, etc.	Large opportunity for private sector participation; including development, operation, marketing, etc.
13. Changes in Waste Generation/ Use	None.	None.	None.
14. Adaptable to Social Conditions	Program includes educational components. Alternative promotes public awareness and waste reducing behavior.	Limited promotion of public awareness and waste reducing behavior. Product may be less adaptable due to contamination level.	Reliance on source separation promotes public awareness and waste reducing behavior. Product is more adaptable.
15. Consistency with Local Policies and Conditions	Consistent with local conditions.	Consistent with local conditions.	Consistent with local conditions.
16. Institutional Barriers to Implementation	Full solid waste facilities permit and other permits required.	Full solid waste facilities permit and other permits required.	Full solid waste facilities permit and other permits required.
17. Implementation Costs	No additional costs for existing program.	From \$40 to \$80 per incoming ton and produces residuals that must be landfilled.	Costs vary depending on scope of project and technology selected. Windrow composting of organic discards with source-separated yard debris could cost \$25 to \$100 per incoming ton. In-vessel program could cost \$50 to \$130 per incoming ton.
18. Availability of End Uses for Compost Products	Local markets established in residential, businesses, and agricultural sectors.	Higher quality compost can be used by landscapers, golf courses, and residential users. Low quality compost can be used as ADC, mining reclamation or land restoration.	Adding source-separated organics increases the quality of yard debris compost. Markets could include parks departments and landfill. Giveaway programs could provide an outlet for a large amount of the product and establish a market at the same time. Product would probably need to be proven to be accepted by agricultural markets.

#### 4.5.4 SELECTED COMPOSTING PROGRAMS

After an analysis of the characteristics of the solid waste stream and the level of existing waste diversion activities, the following composting programs were selected for implementation. Additionally information from the *Sonoma County Solid Waste Management Alternatives Analysis Project Final Report* (December, 2000) was used to determine how the SCWMA would meet and exceed the 50% diversion goal set by AB 939. This section describes the selected composting programs including costs, how the selected programs meet AB 939 diversion goals, and program needs.

##### 4.5.4.1 Description of Selected Programs

The selected composting programs are listed in Table 4-21. Program selection was based on the alternatives evaluations and data from the 1995/96 Waste Characterization Study that indicates that significant quantities of yard waste and other organics are still currently being disposed. Selected programs are yard debris composting in the short-term, source-separated organics composting in the medium-term, and MSW composting in the medium term.

Table 4-21: Composting Programs Selected	
Yard Debris Composting	<ul style="list-style-type: none"> <li>• Will contribute an additional 1.7% by 2003.</li> <li>• Focus is on diversion of yard and clean wood debris.</li> <li>• Self-hauled clean loads and curbside collection depend on public and business source separation.</li> <li>• Other materials such as grape pumice, sawdust, and manure will be accepted at the compost facility.</li> <li>• Compost product is used in city public works projects, agriculture and landscaping, as well as by home gardeners</li> </ul>
Source-Separated Organics Composting	<ul style="list-style-type: none"> <li>• Program will build upon and expand the existing yard debris composting program.</li> <li>• Other materials may include food debris, agricultural materials, non-recycled paper, municipal sewage sludge and septage, and other organic materials could be source-separated and composted.</li> <li>• A regional feasibility study and pilot program will be necessary to design and test program parameters.</li> <li>• A wet/dry collection system could be evaluated as an option to the present system and other collection options.</li> <li>• Aggressive marketing to farmers, residents and businesses, and public works and state highway departments will be necessary.</li> </ul>
RMF with MSW Composting	<ul style="list-style-type: none"> <li>• New facility would include preliminary waste sorting, primary organic waste processing, and potentially, an on-site energy generating element using the fuel created by the organic waste processing.</li> <li>• Would process solid waste not recycled or diverted by other programs such as MSW, biosolids, food waste, non-recyclable paper, manure, waste straw, sawdust, lees and pomace, and wash water.</li> <li>• Facility would serve commercial haulers only.</li> <li>• Will require 5 acres for building and traffic circulation, a building of 40,000 to 50,000 square feet with utilities.</li> <li>• Could be co-located with a landfill or located at a separate site.</li> </ul>

## **Yard Debris Composting**

Yard debris composting is a selected ongoing activity because of its diversion potential. The existing system includes residential curbside collection, reduced tipping fees for source-separated materials brought directly to the solid waste facilities, and a landfill ban of yard debris and wood waste.

In the medium term, it will be necessary to relocate the existing yard debris composting operations in order to capture the air space identified for landfill capacity. This new location would continue to be able to serve the entire county and would include features for water quality control such as roofing or a collection system to treat runoff. The new facility will include approximately 15 to 20 acres with an additional 20 acres for curing and storage.

## **Source-Separated Organics Composting**

Once the yard debris composting program has been relocated to a new location in the beginning of the medium term, there is a potential of expanding the types of organic materials processed as part of the program to include food waste, non-recyclable paper, manure from horse and other small farms, waste straw and sawdust from animal bedding, lees and pomace from wineries and wash water from milk barns and creameries.

Participation in a regional study and pilot project similar to the food waste collection pilot program conducted in 2000 will be necessary to explore the collection options and identify efficiencies and constraints. While the emphasis on source separation of organics may require substantial preliminary study and effort, it is likely to preclude later marketing problems.

## **Resource Management Facility Including MSW Composting**

A major new component of the solid waste management system planned for later in the medium term for Sonoma County is a resource management facility (RMF). This facility would include several waste processing steps, all conducted inside a building, including preliminary waste sorting, the primary organic waste processing operation, and potentially, an on-site energy generating element using the fuel created by the organic waste processing operation.

The RMF would process solid waste that is not recycled or diverted in other county programs, ranging from approximately 1,300 tpd in 2010 to approximately 1,600 tpd (annual averages) in 2050. Typical materials potentially used for processing include mixed municipal solid waste (MSW) from garbage collection, as well as biosolids, food waste, non-recyclable paper, manure from horse and other farms, waste straw and sawdust from animal bedding, lees and pomace from wineries and wash water from milk barns and creameries. It is assumed that approximately 25% of this tonnage would remain as residue following processing. This residue would be processed, to the extent feasible, into marketable compost products. The RMF would be open to commercial haulers only.

The preliminary waste sorting step would be intended to remove non-organic, hazardous materials, and valuable recyclables. This step may include human labor and/or mechanical equipment to physically remove these items from the waste stream before further processing.

The major function of the RMF is to process the solid waste in a manner that recovers energy from the organic portion of the waste and produces, to the extent feasible, compost products. There are various conversion technologies available to accomplish this objective, including anaerobic digestion. Although the specific technology will be selected at a future date, they would all share several elements including an initial grinding step to reduce the various waste items to a relatively homogeneous size, mixing of the solid waste with water in a closed container followed by either chemical or biological digestion, extraction of a clean fuel in the form of methane, and screening the composted material. It is expected that residual wastewater that is not recycled would

be treated and disposed of similarly to leachate treatment and disposal currently done at the Central Disposal Site.

After processing the organic fraction of the waste, the clean fuel can be used on site to produce electricity or transported off site to be used as vehicle fuel or as a clean, renewable source of energy for other activities. If an on-site energy plant is built, it may be similar to the existing power plant at the Central Disposal Site.

The RMF, regardless of technology selected, will require about 5 acres for the building and related traffic circulation with a building a minimum of 40,000 to 50,000 square feet in size, as well as electric, water, and wastewater service. The RMF could be co-located with a landfill or it could be at a separate location.

#### **4.5.4.2 Selected Program Costs**

##### **Yard Debris Composting**

The yard debris composting program is currently funded through tipping fees according to a three-party agreement between the SCWMA, the DTPW, and the contractor. Tipping fees at the solid waste facilities are lower for source-separated yard debris to encourage residents and businesses to bring clean materials for composting. These tipping fees are passed through the DTPW accounting system directly to the SCWMA to pay for the processing, composting, and marketing of all yard debris and wood waste collected. For fiscal year 2001/02 the budgeted amount for this agreement is \$1,535,760. In addition, some of the tipping fee revenues are used to fund hauling yard debris to the Laguna Subregional Composting Facility for use as a bulking material for biosolids composting. For fiscal year 2001/02 \$26,010 was budgeted for hauling and \$48,960 was budgeted for composting at Laguna.

##### **Source-Separated Organics Composting**

Cost per ton to operate a source-separated organics composting program will be similar to those for operating the existing yard debris composting program, although the increased tons of material accepted by this program would increase the overall contracted amount. Additional costs will include purchasing land for relocating the composting facility on a site other than the Central Disposal Site and implementing stormwater management systems.

##### **Resource Management Facility Including MSW Composting**

A cost analysis was included as part of the Sonoma County Solid Waste Alternatives Analysis Final Report (December, 2000) including:

- Material recovery facility operations of the estimated 530,000 tons of MSW at a cost of \$30 per ton for a total annual cost of \$15,900,000.
- Transfer and disposal of residuals estimated at 182,850 tons per year at a cost of \$22 per ton for a total cost of \$4,022,700.
- Organics processing component of the estimated 238,500 tons remaining after material recovery operations at a cost of \$40 per ton for a total annual cost of \$9,540,000.
- Screening and marketing of compost products from residual solids. Value of products estimated to cover the cost of processing, resulting in a zero annual cost.
- Total program cost for the RMF is estimated at \$29,462,700.

#### 4.5.4.3 Role of Composting in Meeting State Diversion Goals

The yard debris composting program has been in operation since 1993 and currently contributes 14% towards the existing 2001 diversion rate of 40%. Additional processing, composting and marketing of yard debris materials is anticipated to increase the diversion rate by 1.7% or 25 tpd to enable the SCWMA to meet the 50% diversion goal by 2003.

Although many of the organic materials that could be processed (biosolids, manures) are not currently identified as part of Sonoma County's waste stream, expanding the yard debris composting program to a source-separated organics composting program will divert more materials.

The RMF with MSW composting will provide additional diversion above the 50% diversion goal currently required by AB 939. It is estimated that this program would allow the SCWMA to reach a diversion goal of 70% of the total waste stream in Sonoma County by 2015, the end of the medium term.

#### 4.5.4.4 Composting Program Needs

The selected composting programs have various operational and facility needs. They are broken into three basic categories: educational programs, collection programs, and facilities. The program and facility needs are listed in Table 4-22 and briefly described below.

##### Operational or Handling Requirements

The existing yard debris composting program is currently on about 20 acres at the Central Disposal Site, using a cement treated base. Sufficient space is allotted to divide the incoming materials into three areas of self-haul, curbside collected, and wood waste. A two to four person crew sorts the material by hand on a continuous basis to remove contaminants. After grinding, the material is hauled in 40 cubic yard trucks to the composting pad where windrows are formed using front-end loaders. Windrows are 18 feet wide by 7 feet tall and up to 500 feet long. Turning is done 8 to 12 times during the 12 to 14 weeks that composting occurs.

Storage: 20 acres provides sufficient space for processing, composting, and storage. The existing site can accommodate the additional 25 tpd goal.

Delivery: Delivery to customers depends on end-user or market contracts. Local markets exist and users can pick up compost products or have the products delivered for a fee.

Residuals Disposal: All compost is screened to remove oversized materials and remaining contaminants. Overs are either recirculated through the composting process or used as ADC at the Central Disposal Site.

##### Facility Needs

The new facility, located off the Central Disposal Site, will, to a great extent, be determined by the siting and technology studies performed in the short-term. The selected composting technology will determine the site requirements and specific acreage needs. Undoubtedly siting will be a major issue. All methods will require a considerable amount of land. Some methods will require curing piles, while others will keep the composting in the active stage for a longer period of time. Other compost site criteria, recommended by Richards and Shelton of the Cornell Waste Management Institute (CWMI, 1989) include the following.

- Vacant flat land (1 to 3 percent slope)
- Open field except for buffer area
- Low residential density (distance from sensitive receptors)
- Ability to address and mitigate Environmental Impact Report criteria

- Good truck access
- Low water table (more than 2 feet below the surface)
- Potential for visual buffer
- Availability of water on-site
- No drainage problems.

### Educational Programs

The yard debris composting and the source-separated composting programs rely heavily on source separation for their success. This demands an emphasis on an educational program that encourages participation. Currently, the annual Recycling Guide is the main educational tool developed by the SCWMA used to provide detailed information on how residents and businesses need to source separate yard debris materials for composting. In addition the Eco-Desk would have up-to-date information about the changes to provide to callers with specific questions. The contractor also produces other educational pieces such as newsletters and definitions of products. The source-separated organics composting program would use the same educational tools.

### Collection Programs and Equipment

A pilot collection program is planned to test the viability of the selected collection option. Some collection programs will require additional trucks and crews. Co-collection programs will require separation equipment and

Table 4-22: Composting Programs Needs	
<b>Educational Programs</b>	<ul style="list-style-type: none"> <li>• Annual Recycling Guide.</li> <li>• Materials prepared by the contractor, including newsletters, definitions, brochures, etc.</li> <li>• Eco-Desk hotline.</li> </ul>
<b>Collection Programs and Equipment</b>	<ul style="list-style-type: none"> <li>• Specific containers such as 90-gallon totes, paper bags, and dedicated debris boxes.</li> <li>• Haulers provide trucks to provide dedicated collection of compostable materials.</li> <li>• Possible modification of existing or construction of new transfer facilities depending on collection option chosen.</li> <li>• DTPW provides transfer trailers to transport organic materials to composting facility.</li> <li>• Drop-off sites and equipment.</li> </ul>
<b>Composting Facility</b>	<ul style="list-style-type: none"> <li>• Great variability of design, dependent on feedstock quality and quantity, and size of site.</li> <li>• Possibility of expanding yard debris program to a source-separated organics composting program where facility would be able to compost a wider range of compostable organics once facility is relocated off the Central Disposal Site.</li> <li>• Significant acreage necessary, with considerable site development.</li> <li>• Equipment includes screens, shredders, turners, watering system, as well as dust, noise, and leachate mitigation equipment.</li> </ul>
<b>Ongoing Market Development</b>	<ul style="list-style-type: none"> <li>• Develop and disseminate promotional material to prospective end-users.</li> <li>• Organize product demonstrations.</li> <li>• Work with targeted end-users such as County Public Works Department, landscapers, and nurseries to encourage use of products.</li> <li>• Organize a cooperative marketing effort with other jurisdictions to tap large and/or outside markets.</li> </ul>

crews at the transfer station or landfill and transfer trailers to transport separated yard debris or separated organics to the composting facility. Paper, plastic bags, or permanent containers will be needed at the points of generation.

### **Composting Facilities**

Yard debris composting facility requirements vary greatly according to the size and level of technology the SCWMA chooses. A regional yard debris composting facility using windrows will likely need at least 40 acres.

A source-separated organics composting facility requires greater process control. This is accomplished by enclosing the facility and/or managing it more intensively. A larger site will likely be required than that for a yard debris composting because of the greater volume processed.

## **4.5.5 MARKETS AND LOCAL END-USES FOR COMPOST**

This section assesses the usability and/or marketability of compost products. All possible products from the evaluated programs are discussed to provide as much relevant information as possible. A general description of how compost is used or marketed is followed by a listing of the local end-uses and markets currently existing. Table 4-23 lists end-use and marketing options for compost. The section ends with a discussion of how end-uses and markets can be expanded or developed.

### **4.5.5.1 The Role of Markets for Composts**

The selected composting alternatives would generate three compost products requiring end-uses or markets. These are yard debris, source-separated organics, and sludge composts. Possible end-uses, or ways in which compost can be used, include:

- Agricultural soil amendment
- Landscaping soil amendment
- Greenhouse potting medium
- Additive to upgrade substandard topsoil
- Tree or shrub transplant medium
- Land reclamation amendment
- Landfill cover (daily or final)
- Lawn maintenance.

The criteria for expansion or development of compost markets vary for each type of compost produced. Some of the factors that influence the marketability of compost include:

- Buyer's specifications
- Product availability (volume and output timing)
- Product consistency
- Buyer education
- Availability and price of substitutes
- Institutional directives specifying the use of compost.

### **4.5.5.2 Yard Debris Compost**

Yard debris compost can be relatively clean, which allows it to be used for food and horticultural crops. Its nutrient content is relatively low, and its primary value is in its organic matter content.

The SCWMA's yard debris composting program is operated by Sonoma Compost Company (SCC). SCC produces the following products from organic material generated in Sonoma County:



- Sonoma Compost produced from curbside collected and self-hauled yard trimmings.
- Sonoma Compost with additives and/or amendments, such as agricultural lime or gypsum, as requested by customers.
- Early Mulch is ground, self-hauled yard debris that has undergone a pathogen reduction process, used for agricultural and landscape applications.
- Screened Early Mulch/Vineyard Mulch is screened Early Mulch and has a neater, less woody appearance. This product can reduce soil erosion up to 95% while suppressing weeds, adding organic matter, and providing a modest nutrient boost.
- Alternative Daily Cover is ground yard debris and non-marketable “overs” from the screening process that is used as a soil alternative to cover refuse at the Central Landfill.

Speciality products, also produced by SCC, may contain additives or amendments or require different or additional processing. Speciality products are created to:

- provide materials that can be blended with Sonoma Compost to extend the supply of this popular product;
- offer alternatives when the program’s primary products are not available; and
- provide products that meet a specific need in the marketplace.

#### **4.5.5.3 Municipal Sludge Compost**

The possible uses for this compost are determined by federal and state laws and regulations. It is relatively high in nutrients, heavy metals (depending on the analysis of the sludge), and potential residual pathogens. Sludge compost generated in Sonoma County by the City of Santa Rosa’s Laguna Compost Facility is sold to wholesale customers.

#### **4.5.5.4 Source-Separated Compost**

If organic materials such as food scraps, processing debris, and yard debris are collected separately from MSW and composted, a relatively clean product results. This compost has a higher nutrient content than yard debris compost and can be used in the same applications. There are many such compost operations in the United States and California. These operations usually use industrially-generated organics as the feedstock. In Sonoma County, wood debris, spent mushroom growing medium, and seafood processing debris are the most common ingredients.

#### **4.5.5.5 Current Local Compost Markets and End-Uses**

The following markets exist in Sonoma County or the surrounding area for the three different types of compost. Table 4-24 shows the current availability of markets and end uses for compost products.

#### **Yard Debris Compost**

Locally marketed compost products produced by SCC are defined above (section 4.5.5.4). In addition, other small producers or yard debris compost and similar mushroom and sawdust composts are available.

## Municipal Sludge Compost

Garden centers sell bagged sludge compost produced in other parts of the state to residents and landscapers. Locally, sludge compost generated by the City of Santa Rosa's Laguna Compost Facility is sold to wholesale customers.

## Source-Separated Organics Compost

A well-developed market exists for products that are made by several composting companies in Sonoma County, using source-separated grape pumice, manure, and yard debris. This type of compost is also produced and used by home composters.

### 4.5.5.6 Markets of Last Resort

Section 18736.4.(b) calls for a description of the measures to be taken if poor market conditions prevent the SCWMA from satisfying the requirements of AB 939. Contingencies have been listed in Section 5.7.7, which could significantly improve the marketability of the compost products. Although ADC is not the highest and best use of compost products, the DTPW is authorized to use ADC as daily cover material for refuse. Daily cover requirements are sufficient to use all the compost produced, if necessary.

**Table 4-23: Options for the Use of Compost Products**

#### Local End-Uses

- On farms as a soil amendment to improve soil texture, water retention, aeration and fertility
- By landscapers for lawn establishment, transplanting, and top dressing
- Greenhouse potting and seedling medium
- Residential garden, shrub, and lawn enhancement
- Golf course and cemetery top dressing
- By nurseries as a soil amendment for perennials
- Sod farmers and sodding services
- City, county, and state highway shoulder vegetation establishment, maintenance, and erosion control
- Mine and quarry land reclamation
- Construction erosion control
- Recreation and parks departments
- Soil manufacturers or blenders

#### Potential Regional Markets (long-term, stable contracts may be possible with these groups)

- State Department of Transportation, Forestry and Fire Protection, Parks and Recreation and General Services (as directed by legislation to use where possible)
- Agricultural cooperatives or organizations which would help distribute compost to farmers on a regional or state level
- Soil contractors serving large geographical areas
- Fertilizer companies which deal with soil amendments
- Brokers who market on a statewide or interstate level

#### 4.5.6 IMPLEMENTING COMPOSTING PROGRAMS

This section identifies the parties responsible for implementing the selected composting programs, as well as a detailed discussion of implementation tasks, responsible entities, dates for implementation, and costs of composting programs. This section contains sources of that information.

##### 4.5.6.1 Responsible Entities

The responsible entities have been divided into two categories: public and private. Public agencies have ultimate responsibility for reaching the waste diversion goals mandated by AB 939, and this is reflected in the tasks assigned to them. Table 4-25 identifies the responsible public and private entities for each program.

##### 4.5.6.2 Required Tasks

Specific tasks have been identified for each composting program. The tasks have been identified either in Table 4-25 or below with a level of detail that should be adequate for the responsible entities to establish a work plan, allocate hours, and obtain funding. For each task, the responsible entities have been identified and their roles specified.

##### Yard Debris Composting (short-term 2003 to 2008)

- Continue the existing yard debris composting program as described under Existing Composting Activities (section 4.5.2).
- Continue monitoring and evaluation functions with respect to diversion effectiveness, cost effectiveness, product quality, and market development
- Continue to evaluate options for expanding markets.

##### Yard Debris Composting (medium-term 2009 to 2018)

- Relocate operation to permanent location off the Central Landfill.
- Integrate program with the source-separated organics program.

**Table 4-24: Current Availability of Markets and End-Uses for Compost Products**

<b>Yard Debris Compost</b>	Screened compost products and mulches are being bought and used by home gardeners, organic farmers, landscapers, greenhouses, nurseries and soil blenders. Overs (larger pieces left after screening) are used as ADC.
<b>Sludge Compost</b>	Compost products from biosolids composting is sold by retailers to homeowners and landscapers. Sludge compost produced by Laguna Compost Facility is marketed to wholesale customers.
<b>Source-separated Organics Compost</b>	Markets are similar to the markets for yard debris compost. Also produced and used by home composters.

**Source-Separated Organics Composting (medium-term 2009 to 2018)**

- Participate in a feasibility study to identify materials, costs, design parameters, and product quality needs for options within this alternative. More specifically, identify:
  - which organic materials (e.g., commercial food debris, residential food debris, soiled paper or otherwise unmarketable paper) to target for collection and composting with yard debris, sludge, or separately;
  - type of collection method (e.g., wet/dry, dedicated routing, co-collection) and how to integrate it with any existing recycling collection programs;
  - compost method and materials to co-compost, if any;
  - product characteristics and marketability;
  - program to monitor and control product quality.; and
  - appropriate public/private ownership and/or operation of collection program and composting facility.
- Based on these findings, participate in the design, permitting, and implementation of a pilot program that collects and composts these source-separated organic materials. Implement:
  - a public education campaign to encourage businesses and residents to participate in source separation;
  - a market development program for the product; and
  - monitor and evaluate the pilot program.
- Based on the findings of the pilot project, design, site, permit, and implement an on-going program.
- Explore product diversification, such as blended soils, and market expansion possibilities such as cooperative marketing and export of product.

**Resource Management Facility (medium-term 2009 to 2018)**

The Sonoma County Solid Waste Management Alternatives Analysis Final Report (“Analysis”) identified the following required tasks for siting, designing, and constructing the RMF:

- Conduct siting study/options evaluation utilizing exclusionary criteria identified in the Analysis.
- Select a limited number of alternative sites, and conduct preliminary technical/economic analysis of alternatives sites, utilizing comparative criteria identified in the Analysis.
- Conduct public hearings on preferred sites.
- County of Sonoma Board of Supervisors approve preferred site(s).
- Conduct site specific environmental investigations of preferred site(s) to identify major environmental issues and fatal flaws.

- Land option agreement on purchase of land by County.
- Conduct CEQA analysis of preferred site/facility and alternatives. Includes preparation of engineering drawings, land use planning documents, field investigations, and supplemental EIR.
- Certify EIR.
- Solid waste facility permitting, including preparation of Joint Technical Document, Preliminary Closure/Post-Closure Maintenance Plan, waste discharge requirements, air quality permit to construct, and local land use permits.
- Bond proposal and financing.
- Facility design and pre-construction, including design studies, plans and specifications, local permits, and contractor bidding.
- Facility construction including infrastructure/civil improvements, material resource facility for sorting recyclable materials from waste stream, green waste facility construction, organics processing facility, and landfill.

#### **4.5.6.3 Schedules and Funding**

Table 4-26 contains implementation schedules for each selected composting program.

Program costs for composting programs are discussed in section 4.5.4.2. The funding source for the composting programs is the tipping fee charged at the solid waste disposal facilities (currently \$29/ton) which is collected by the DTPW and passed through to the SCWMA for payment of the contractor's monthly invoices. No changes to this funding source is anticipated for the source-separated organics composting program or the Resource Management Facility.

#### **4.5.7 MONITORING AND EVALUATION**

The monitoring and evaluation process is critical to the planning process. The programs recommended in the composting component will require periodic review to ensure that the anticipated diversion goals are being achieved. Section 18733.6 of the AB 939 regulations outlines the requirements of the monitoring and evaluation section. This section covers the monitoring and evaluation process by identifying the criteria to be used for evaluation, frequency of the monitoring, entities responsible for evaluation, funding sources for the monitoring, and contingency measures to be implemented if programs do not fulfill the expectations.

##### **4.5.7.1 Monitoring and Evaluation Process**

The monitoring and evaluation process for the composting programs identifies the percentage of wastes the programs divert from the landfills, evaluates the effectiveness of the programs, and describes contingency steps that can be taken to improve the program's diversion potential.

##### **4.5.7.2 Data Needs**

In its preparation of the AB 939 Annual Report, the SCWMA requires the yard debris composting contractor to submit reports that identify the types and amounts of materials recycled, including yard debris, wood waste, and ADC.

#### 4.5.7.3 Monitoring Programs

The following are monitoring techniques used to review implemented composting programs:

- Waste Generation Study: Used to determine the quantities, by specific waste categories, of materials being diverted from disposal and the materials disposed. Every five years, the SCWMA plans on performing waste characterization studies that may focus on specific material types or may address all materials in the waste stream.
- Targeted Organic Waste Characterization Studies: Used to determine the quantities of certain materials in the waste stream produced by specific generators would be far less expensive and feasible to do more frequently than the above study. Every five years, the SCWMA plans on performing waste characterization studies that may focus on specific material types or may address all materials in the waste stream.
- Surveys: Telephone, mail, or windshield surveys may be performed to identify participation levels in programs, quantities diverted through such programs and any changes in outreach or education programs that may increase effectiveness.
- Review of Required Information: The composting contractor is required to prepare an annual report for the yard debris composting program and to provide annual tonnages for yard debris and wood waste diverted and compost and ADC produced. This information is included in the AB 939 Annual Report prepared by the SCWMA.

#### 4.5.7.4 Evaluating Program Effectiveness

Program effectiveness can be evaluated based on quantitative measures such as the program's ability to divert waste from the landfill and qualitative measures such as the availability of the services to waste generators. A specific set of criteria are used to measure program effectiveness and to identify areas where improvements are required. The criteria are described below.

- The key quantifiable criterion will be the actual tonnage reduction compared to the projected reduction.
- Participation rate, set-out rate, and overall capture rate by material type for each collection program implemented.
- Total cost of composting program and cost per ton of diverted material.
- Successful task execution by responsible entities.
- Environmental and public health impacts of the composting program activities and conformance with federal, state, and local regulations.
- Sustainability of program effectiveness and vulnerability to uncontrolled variables.

#### 4.5.7.5 Parties Responsible for Monitoring

Table 4-25 lists the parties responsible for monitoring and evaluating composting programs.

#### 4.5.7.6 Funding Requirements for Monitoring and Evaluation

The cost of monitoring and evaluating the composting programs is determined by the amount of staff time required. One half-time staff member reconciles the invoices from the composting contractor with the tags issued at the solid waste facilities to confirm the amount of yard debris and wood waste collected and processed by the contractor. That information is also used to prepare the quarterly allocation reports for SCWMA member jurisdictions. The cost of this staff person is estimated at \$23,000 per fiscal year.

Table 4-25: Responsible Parties and Schedule for Monitoring and Evaluating Composting Programs			
Program Monitoring Method	Responsible Party		Interval
	Data Collection	Evaluation / Reporting	
Waste Generation Study	SCWMA	SCWMA	Every five years
Targeted Organic Waste Characterization Study	SCWMA	SCWMA	Every five years
Surveys	SCWMA	SCWMA	Every five years
Review of Required Information	Haulers, Composting Contractor	SCWMA	Annually

#### 4.5.7.7 Contingency Measures for Improving Composting Programs

Not only will the monitoring and evaluation process identify programs that do not meet their goal, but where programs do meet the goals, the process can also pinpoint areas that can be improved beyond the established goals. Contingency measures to improve composting programs are described below. These measures will be implemented if the monitoring and evaluation program identifies program deficiencies.

- If the composting diversion objectives are not attained, the SCWMA will consider the following:
  - Use monitoring data collected and survey the sectors involved to identify the reasons for the program's lack of success.
  - Work with DTPW to pass an ordinance mandating source separation of organic materials.
  - Work with DTPW to modify disposal rates to provide greater economic incentive to source-separate.
  - Modify performance standards or requirements of private companies providing program services, or evaluate contract obligations and terminate contract if necessary.
  - Require the composting contractor to increase public education and technical assistance efforts in terms of frequency and/or target audience.
  - Reevaluate program alternatives, including a feasibility study and/or pilot of an alternative program.
  - Revise objectives to reflect realistic conditions.
- If required tasks are not executed by the responsible entities, the SCWMA will consider implementing the following:

- Reevaluate staffing adequacy.
  - Revise job and task descriptions.
  - Reestablish coordination between city divisions, contractors, and the public.
  - Identify reasons for insufficient private-sector participation..
3. If markets or end-users prove inadequate, the SCWMA will consider requiring the contractor to implement the following:
- Perform market studies to determine problems with, or constraints to, marketing or using recovered products.
  - Investigate cost-effectiveness of end-use alternatives
  - Explore alternative markets and end-uses
  - Increase market outreach, education, promotion, and advertising
  - Investigate cooperative marketing opportunities and coordinate with other jurisdictions to improve the sale of material.
4. If some aspect of the composting program does not meet local, state, or federal regulations, the SCWMA will work with the DTPW to implement the following:
- Identify the problem area.
  - Modify the program to comply with local, state, and federal regulations as appropriate.
  - Provide reports and documentation to regulatory agencies to serve as evidence for a variance for a particular problem area.



Table 4-26: Implementation Schedule for Composting Programs																											
PROGRAM AND IMPLEMENTATION TASK	RESPONSIBLE ENTITY	2000				2001				2002				2003				2004				2005					
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4		
COMPOSTING																											
Yard Debris Composting																											
Continue operations of existing program	SCWMA																										
Continue monitoring and evaluation functions with respect to diversion effectiveness, cost effectiveness, product quality, and market development	SCWMA																										
Continue to evaluate options for expanding markets.	SCWMA																										
Monitoring and Evaluation	SCWMA																										

X - Designates the initiation of a task. Shaded bars indicate the continuation of the task and/or program.

Note: Years are broken into quarters designated by 1,2,3,4.

Table 4-26: Implementation Schedule for Composting Programs (continued)																																					
PROGRAM AND IMPLEMENTATION TASK	RESPONSIBLE ENTITY	2006				2007				2008				2009				2010				2011				2012				2013				2014			
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4				
COMPOSTING																																					
Yard Debris Composting																																					
Continue operations of existing program	SCWMA																																				
Continue monitoring and evaluation functions with respect to diversion effectiveness, cost effectiveness, product quality, and market development	SCWMA																																				
Continue to evaluate options for expanding markets.	SCWMA																																				
Source Separated Organics Program																																					
Perform feasibility study	SCWMA																																				
Implement pilot program	SCWMA																																				
Evaluate effectiveness of program	SCWMA																																				
Monitoring and Evaluation	SCWMA																																				

X - Designates the initiation of a task. Shaded bars indicate the continuation of the task and/or program.

Note: Years are broken into quarters designated by 1,2,3,4.

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