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COMPOSTING AS A WASTE MANAGEMENT STRATEGY NEW DIRECTIONS—NEW QUESTIONS

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Few communities have escaped the solid waste management crisis of the 1980's. As we enter the 1990's still searching for cost effective and environmentally safe alternatives to landfills and incinerators, interest and enthusiasm for composting are rapidly on the rise. Composting systems are being proposed for many parts of the waste stream, from leaves and yard waste to sludge and even mixed municipal solid waste (MSW).

Most organic materials can be composted, but some materials pose considerable challenges that should not be overlooked. And some other materials, while they may easily produce a quality compost product, may have other uses which are economically or environmentally more appropriate. While composting does have a vital role to play in responsible solid waste management, we should not expect it to be a panacea to all our waste problems.

CONTROLLING THE CONTAMINANTS

A central issue for all recycling programs is the tradeoff between collection ease and contamination concerns. Potential contaminants in compost range from tennis balls and broken lawn furniture found in yard waste collection programs, to heavy metals and toxic organic chemicals in sludge, to the various and sundry household hazardous wastes found in MSW. Even inert material, such as glass or plastic debris, can seriously compromise the eventual marketability of the final compost product. Insuring the production of a high quality, marketable product is critical to successful composting. Without markets, contaminated compost may eventually end up in a landfill, to everyone's dismay.

Keeping contaminants out of compost can take considerable effort. For yard waste composting the task is fairly straightforward and probably easier than most other source separation programs. But while yard waste is commonly handled separately from other waste, it is still important to design collection systems that minimize the potential for contaminants. Several strategies have been developed to help address this problem. Collection containers such as clear plastic bags (possibly biodegradable) allow workers to see the contents. If yard waste is collected in bulk, keeping it out of the streets minimizes contamination by automobile fluids. Effective public education about waste preparation requirements and collection schedules is critical to community cooperation.

If municipal sewage sludge is being considered for composting, distribution and marketing regulations prohibit high levels of heavy metals or toxic organic chemicals. Wastewater contamination can come from large industrial sources, but also small commercial enterprises such as dry cleaners, automobile garages, metal plating shops and photographic

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labs. Pretreatment of contaminated wastewater is required by federal law, but enforcement has been lax in many municipalities. If sewage sludge is going to be transformed from a waste material into a useful soil amendment, our sewers cannot serve as a dumping ground for toxic wastes. Composting can help provide the encouragement communities need to develop effective pretreatment programs.

Municipal solid waste composting is the ultimate challenge to producing a clean compost product. Separation of the large chunks of glass, metal, and plastic can produce a visually acceptable product, but as we have all learned in this chemical age, what you can't see can hurt you. Some companies marketing MSW composting systems have failed to address adequately the additional task of hazardous wastes. Both at home and at work, seemingly small quantities of hazardous materials are routinely dumped down the drain or into the trash can. When all the heavy metals and toxic organic chemicals in household batteries, cleaners, paints, oils, and pesticides are added together, they can create a serious contamination problem. Although some toxic wastes will biodegrade during the composting process, metals and persistent organic chemicals will not. Grinding them into indistinguishable grit does not make them go away. Dilution is not a solution to hazardous waste management, and responsibly designed and managed MSW composting facilities must take steps to insure that contamination does not occur.

To produce a safe, marketable compost from MSW, extensive pre-processing is required. The most sensible way to preprocess organic waste is with a comprehensive metal, glass, and plastic recycling program combined with a separated household hazardous waste collection. Even with an effective recycling program, MSW compost still will need to be carefully monitored for contaminants. When a community starts producing compost from mixed waste material, it has to take a hard look at what is in that waste.

In composting, as with other forms of recycling, there is a tradeoff between compost quantity and compost quality. The level of quality control needed will vary with the source and nature of the waste, alternative disposal options, and especially the markets for the finished compost. When deciding on an approach to contamination control, the question I pose to solid waste managers is: "Would you use this compost in your garden???"

TO COMPOST OR NOT TO COMPOST?

Having the technical capability to produce clean compost from a given waste material does not necessarily mean that that is the best possible option. Composting, as with all types of recycling, should be viewed in terms of the entire materials manufacturing and disposal/reuse cycle. Nearly everyone recognizes that true recycling requires that materials return to productive use. Unfortunately, not nearly enough attention is paid to minimizing the number of steps in that re-manufacturing cycle, or to maintaining the quality of the new product. Aluminum recycling, for example, is a very direct process: Old beverage cans can be made into new cans easily , saving 95% of the energy required for production from virgin materials. Recycling automobiles and appliances is not nearly as easy, requiring extensive disassembly, disposal of non-recyclable and sometimes toxic components, and results in a relatively low grade raw material for re-manufacturing. This longer cycle has a host of economic and environmental costs along the way, which, while they may not be part of any individual business's balance sheet, affect both the market value of the scrap material as well as externalized but very real societal costs.

These different re-manufacturing path lengths are relevant for many different materials and provide another way of classifying different levels of recycling. To borrow language from the virgin materials industry, we might call recycling paths which allow direct conversion into similar manufactured products "high grade," and more circuitous paths, or those which generate products of less utility, "low grade." Examples of high grade recycling include the remanufacture of aluminum glass containers and some office paper recycling. Making "glassphalt" out of bottles or landscape "lumber" out of plastic are examples of recycling to a somewhat lower grade. Lower grade processes arise when materials separation is expensive, or when high grade markets are not fully developed or accessible. While low grade recycling is usually preferable to traditional disposal options, it should not be as high on our priority list as the higher grade alternatives.

Where does composting fit in these categories? The answer depends in part on what material is being composted and the end

use for the compost. Composting food processing waste is clearly a high grade process, producing an agricultural input that can be used in growing more food. Similarly, yard waste composting can be directly returned to the landscape, insuring healthier plants in the coming years. Sewage sludge composting (with a fairly clean sludge) also would be fairly high grade recycling, returning human waste to agricultural or horticultural production. However, many of the other material which feasibly could be composted might alternatively be recycled to a considerably higher grade.

With the sustained shortage of newspaper mill recycling capacity, a great deal of attention has been focused on alternative paper recycling options. Composting is one option being considered. From a technical perspective it is certainly feasible, although it is not a trivial task. However, when compared with the high grade recycling alternative of deinking and processing into new paper, composting produces a product of considerably lower grade. The complete composting/recycling process requires composting, land application, planting and growing trees, logging, pulping, and then finally processing into paper. While this long route around the cycle generates a number of commercial opportunities, it also incurs societal costs in terms of fossil fuel consumption, soil erosion, stream sedimentation, and reserves land which might otherwise be allocated for other uses.

The current shortage of newspaper mill recycling capacity will eventually be resolved, and the market for recycled paper should rise to reflect the value of the higher grade process. In the interim, composting waste newspaper certainly seems preferable to landfilling this material. But recognizing the existence of higher grade options is a reminder that the composting of waste paper is ideally only a temporary solution, and communities should plan their long term strategies accordingly.

The waste newspaper example also serves to illustrate a more general point: not all recycling or composting options are equal. We need to consider those differences broadly in developing solid waste management programs. Recycling should be viewed not just as part of the solution to our solid waste disposal crisis, but also as a means to conserve and replace natural resources used in production. Evaluating the total manufacturing/remanufacturing cycle and considering both market and societal costs can help in deciding which recycling path to take.