

# TIMELY INFORMATION

## Agriculture & Natural Resources

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### By-products and Wastes for Land Application

Land application of by-products and wastes seems to be an inexpensive alternative to rising disposal costs. Some entrepreneurs often reason that selling some by-products as soil amendments is another way to make easy money for themselves or their company. County agents and specialists are often asked to help clients make difficult decisions regarding land application. Clients want to know: "Is it worth anything as a soil amendment?" "Can I sell it?" "What do I have to do to land apply it?" "Will farmers buy it?" However, along with these types of questions, one should answer four basic and practical questions before committing to a land application program whether it involves selling a product for profit or disposal.



#### 1. "Does my by-product have any obvious properties that could be potentially harmful to the environment (soil, plants, animals, water) if land applied?"

This question can often be answered by knowing the origin of the material or through laboratory analyses of suspected material. Composted yard waste made in one's own backyard is clearly suitable for use in your garden. You know what's in it and where it came from. No one questions the use of pine bark as a garden mulch because we know it's all pine bark. However, composted municipal sewage sludge can come from anywhere in the city. The processor has little control over the source of the waste. Therefore extensive testing for heavy metals and pathogens are necessary to assure the sludge meets EPA's criteria for "exceptional quality sludge." Many industrial by-products such as boiler wood ashes have been extensively evaluated in tests all over the U.S. If the source is mostly wood ashes, then the product is safe to use as a soil liming material. If it contains more than 50% coal ashes, then it should be tested. The producer of the material is totally responsible for what is in the material. He should be willing to provide anyone with a complete analysis, particularly if there are suspected materials that would make the materials unsuitable for land application, e.g. high concentrations of heavy metals, organic carcinogens, biological pathogens, or high salts. Some components such as high salts may be rate-dependent. Like fertilizers, it may be beneficial at low rates and could be harmful if over-applied.

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Therefore, if the answer to the first question is clearly, "No, it does not have any harmful properties", then it may be a candidate for land application and one can proceed. If the answer is, "Yes," then it is probably already regulated by EPA or, in Alabama, the Alabama Department of Environmental Management (ADEM).

## **2. "Does it have any value if land applied?"**

If it is inert and has no value as a source of plant nutrients, alternative soil liming material, source of soil organic matter, or other environmentally advantageous properties, then one will have a difficult time selling the landowner, a regulatory agency or the public on a land application program. For example, ashes from a coal-fired boiler are low in plant nutrients and have little soil neutralizing value. If metals are low, it could be land applied just to get rid of it, but it certainly has little value to a landowner or farmer. Boiler wood ash, on the other hand, has demonstrated properties of benefit to the land, primarily its neutralizing value as an alternative soil liming material (Ohno, 1992; Ohno and Erich, 1990; Muse and Mitchell, 1995) , its plant nutrient content (Naylor and Schmidt, 1989; Naylor and Johnson, 1985; Erich and Ohno, 1992; Ohno, 1992), and, possibly, its positive effect on soil physical properties, e.g. bulk density. Early in the twentieth century, basic slag, a by-product of the steel industry, became a valuable soil amendment because it limed the soil and added phosphorus and micronutrients to the land. If it has value as a soil amendment, then registration as a liming material, fertilizer, or soil amendment should be investigated through the Alabama Department of Agriculture and Industries.

## **3. "Can we logistically and economically apply it to either our own land or offer it for public use?"**

Some materials may be too wet, too dusty, too bulky, or too odorous to move and spread economically. If the logistics of handling the materials cannot be economically overcome, then a land application program may not be the best alternative. Boiler wood ash is a product that can be handled and spread successfully, but some companies are not willing to make the commitment at the present time. Some industrial sludges make excellent soil amendments. But it costs too much to dredge them from settling ponds, dry the material, and haul it to a land-application site. Therefore, most are relegated to landfills or the settling ponds are sealed once they fill up. The bottom line is economics.

## **4. "Will there be any public objection to a land application program?"**

This is the most difficult question to answer. Carefully following all local, state, and federal regulations is no guarantee that someone will not complain. Most government agencies are very sensitive to public concerns and react to complaints about the misuse of regulated materials. Odors from some organic by products are the most difficult to handle. Because of this risk and the potential cost of litigation, many valuable by-products are being landfilled rather than used to improve our soils. Sometimes, this last issue can often be overcome by a good public relations campaign. However, if public objections and potential litigations seem insurmountable, then an alternative to land application may be appropriate.

Regulations and attitudes toward land application are certain to change as the cost of alternative disposal increases and the value of some by-products and wastes are realized. Industrial processes and waste treatment technologies are resulting in cleaner by-products that are more suitable for land application as a soil liming material, a source of plant nutrients, or as a general soil-improving conditioner (organic matter).

SOME MATERIALS THAT HAVE BEEN INVESTIGATED  
FOR LAND APPLICATION IN ALABAMA

By-product or waste material	#1 Harmful properties?	#2 Land value?	#3 Application logistics?	#4 Public objections?	Land application status as of 2009
Acetylene/carbide lime	No	Yes <sup>2</sup>	too wet	No	Some used
Ammonium sulfate	No	Yes <sup>1</sup>	Yes	No	Widespread
Animal lagoon effluent	No	Yes <sup>1</sup>	too wet	Odor	In use
Basic slag	No	Yes <sup>1,2</sup>	Yes	No	Widespread
Boiler coal ash	Maybe/metals	No	No	?	No
Boiler wood ash	No	Yes <sup>2</sup>	Some	Rare	Some used
Brass mill waste	Metals	Limited <sup>1</sup>	No	Probably	No
Cotton gin trash	weedseed	Yes <sup>3</sup>	Yes	No	Some used
Dry wall (ground)	No	Yes <sup>1,4</sup>	Yes	No	Demonstrations
Eggshells (from processing)	No	Yes <sup>2</sup>	Yes	Odor	Landfills
FGD gypsum	No	Yes <sup>1,4</sup>	Yes	No	Some used
Phosphogypsum	Radium	Yes <sup>1,4</sup>	Yes	No	EPA prohibited
Other food processing wastes (yeast wastes, tankage, bone meal, etc.)	No	Yes <sup>1,3</sup>	Some	Some odor	Some used
Newsprint/paper (ground)	No	Some <sup>3</sup>	Some	No	Research
Septage (treated)	No	Yes <sup>1</sup>	Yes	Yes	Regulated
Sludge:					
Alum sludge (from water treatment plants)	No	Some <sup>4</sup>	too wet	No	Landfills
Municipal sludge (exceptional quality)	No	Yes <sup>1,3</sup>	Some	Yes	In use
Industrial sludges	Maybe	Yes <sup>1,2,3</sup>	Some	Yes	Landfills
Textile sludges (treated)	No	Yes <sup>1,3</sup>	too wet	?	In use
Paper mill lime	No	Yes <sup>2</sup>	too wet	No	In use
Poultry litter	No	Yes <sup>1</sup>	Yes	Rare	Widespread
Woodyard trash	No	Yes <sup>3</sup>	Yes	Odor/vectors	Some used
Yard waste compost	No	Yes <sup>3</sup>	Yes	No	Widespread

<sup>1</sup> Fertilizer material

<sup>2</sup> Soil liming material

<sup>3</sup> Soil organic amendment

<sup>4</sup> Soil conditioner

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