

10.0 IDENTIFIED OPPORTUNITIES & IMPEDIMENTS TO BIOSOLIDS REUSE

10.1 Permitting

Under the Clean Water Act Amendments of 1987, the Environmental Protection Agency (EPA) developed regulations to protect both the public health and the environment from any reasonable anticipated adverse effects of certain pollutants that may be present in sewage sludge biosolids. This regulation, The Standards for the Use or Disposal of Sewage Sludge (Title 40 of the Code of Federal Regulations [CFR], Part 503) went into effect March 22, 1993 and is the basis of all regulations concerning biosolids. Part 503 establishes requirements for the final use or disposal of biosolids when they are applied to land as a soil conditioner or fertilizer, placed on a surface disposal site for final disposal, fired in a biosolids incinerator, or placed in a municipal solid waste landfill (Walker, 1994).

The Georgia EPD enforces its own rules based on the EPA's Federal Part 503 Regulations. The EPD says that Part 503 is an unfunded mandate that has not been officially delegated to Georgia, though the EPA would like Georgia to take it on. Within the EPD, various departments regulate the different disposal methods. The EPD Water Protection Branch regulates all municipal wastewater treatment facilities that land apply biosolids. The EPD Land Protection Branch or Solid Waste Management Program regulates all solid waste processing facilities including composting, pelletizing and landfilling.

Obtaining permitting and procedural information is laborious due to the difficulty locating the right person in the correct department that can answer the questions posed. For lay people, those not directly involved in the system, knowing where to look for information, whether it is for educational or procedural purposes, is once again a difficult task. Once the regulations are located, reading and understanding thoroughly the rules is difficult.

In an effort to ease the burden of locating and understanding permitting information and the processes that need to be followed to obtain permits, the following section includes both a simple check list of necessary tasks and all the forms needed to fulfill requirements. Contact names and phone numbers of those in the correct department that will be able to help are also included.

10.1.1 Land Application

(Water Protection Branch of the Environmental Protection Division)

The steps that need to be taken to obtain a land application permit are as follows:

- 1) A Sludge Management Plan must be reviewed and approved by the EPD. A copy of the sludge management plan application is included in Appendix B.
- 2) A public notice must be circulated by publication in one or more of the newspapers in the area of the treatment facility.
 - There is a 30 day period where the EPD will accept written views on the permit.
 - A copy of the public notice needs to be sent to the EPD.
- 3) An acceptance letter from the division director will be sent to the facility once items 1 and 2 have been reviewed and completed.
- 4) The Letter and The Sludge Management Plan will be attached to the existing permit and the land application of biosolids may begin.

Included in Appendix B are three documents directly related to land application of biosolids:

- Checklist for Submitting a Sludge Management Plan for Land Application of Municipal Sludge (Biosolids)
- Guidelines for Land Application of Sewage Sludge (Biosolids) at Agronomic Rates
- General Permit - Land Application System Requirements 391-3-6-.19

Contact Information:

Rachel Cochran
EPD Water Protection Branch
Office (404) 362-2617
rachel_cochran@mail.dnr.state.ga.us

10.1.2 Composting

Composting procedures are different than land application. The determining factor of who regulates composting is based upon whether it is done on site at a wastewater treatment facility or if it is taken off site and composted by a third party. If composted on site, the Water Protection Branch is the regulating body and an amendment then needs to be made to the existing NPDES or LAS permit. This is done on an individual basis with the wastewater facility operator contacting his EPD contact in writing, requesting an addition be made to the permit.

If the composting is to be done off site by a third party, the Land Protection Branch is the regulating body. The rules are entirely different and more stringent for an off site location sometimes causing permittees to annex new locations to circumvent the stiffer requirements for offsite composting. The following process needs to be followed for a third party or off site composting permit:

- 1) An application for a Solid Waste Handling Permit and Request for Site Suitability needs to be filled out and sent in. This form is included and can be photocopied for use.
- 2) Site Demonstration. The site must conform to all local zoning and land use ordinances. This includes all regulations concerning flood plains and wetlands. Refer to Criteria for Siting 391-3-4-.05.
- 3) A site visit will be done by the EPD and they will write a site suitability notice.
- 4) A Solid Waste Processing Design and Operation Plan needs to be made for the facility. The information needed to make this plan is included.
- 5) A public notice must be circulated by publication in one or more of the newspapers in the area of the treatment facility.
 - There is a 30 day period where the EPD will accept written views on the permit.
 - A copy of the public notice needs to be sent to the EPD.
- 6) An acceptance letter from the director will be sent to the facility once items 1 through 5 have been reviewed and completed.

Included in Appendix C are five documents related to composting facility design and permitting process.

- Composting Amended - 391-3-4-.16.
- Application for Solid Waste Handling Permit and Request for Site Suitability
- Solid Waste Processing Design and Operation Plan - Supplemental Data for Solid Waste Handling Permit
- Processing Facility - Check List for Use by EPD Review Team
- Criteria for Siting - 391-3-4-.05.

Contact Information:

Jeff Cown
Project Manager I
EPD Solid Waste Management Program
Office (404) 362-2566
Fax (404) 362-2693
jeff_cown@mail.dnr.state.ga.us

10.1.3 Vermicomposting

Vermicomposting is the process of composting substrates with worms. This method of disposal for biosolids is now in the research and development stage in Georgia. Due to the novelty of this technique, the EPD has no regulations at the present time. The Land Protection Branch has assumed responsibility for this process and considers it as a recovered materials process. The process to obtain the permit to vermicompost for individuals or companies is as follows:

- 1) Contact in writing the Land Protection Branch of the EPD and state that you wish to compost biosolids using vermiculture. State that you will meet all the requirements for consideration under the Recovered Materials regulations 391-3-4.04(7). The Land Protection Branch may wish to visit your facility before replying in writing.
- 2) The wastewater operator will then need to contact the Water Protection Branch and inform him of the situation. A letter will be sent from the Branch to the wastewater operator explaining that this procedure is approved and regulated by the Land Protection Branch. The letter should also state that the transfer of biosolids to the vermicomposting individual or company is allowed.

Included in Appendix D are two documents related to composting facility design and permitting process:

- Recovered Materials 391-3-4.04(7). This document states all necessary parameters and records that need to be kept.
- A copy of a letter from the Water Protection Division to a vermicomposting operation stating that his operation is permitted.

Contact Information:

Jeff Cown
Project Manager I
EPD Solid Waste Management Program
Office (404) 362-2566
Fax (404) 362-2693
jeff_cown@mail.dnr.state.ga.us

10.1.4 Landfilling

Landfilling is the default method for biosolids for every wastewater treatment facility in the state. To establish disposal, contact the local landfill operator and meet the conditions for the type of biosolids that are acceptable. This usually entails a specific percent solids concentration. Each landfill may have different rules therefore this is a site specific process. Once the agreement has been reached with the wastewater treatment facility, a letter needs to be written to the Water Protection Branch stating the disposal method. This is the easiest of the five disposal permitting processes and may greatly influence a municipality's decision.

10.1.5 Incineration

Incineration facilities are regulated and controlled by the Environmental Protection Agency (EPA). The Georgia EPD does not handle the general permitting of these facilities. The Air Quality Branch of the Georgia EPD does regulate the air permits for incineration facilities. The permitting process for incinerators is done on an individual basis and will not be included in this document

10.1.6 Pelletizing

Pelletizing facilities follow the same process as does composting operations with regard to on and off site processing. The same application form for a Solid Waste Handling Permit is used.

10.2 Communication & Information

When speaking with individuals across the state, the University of Georgia, Engineering Outreach Program has encountered numerous examples where citizens and wastewater professionals did not know where to look for information concerning biosolids and/or the beneficial reuses of biosolids. This is a great untapped opportunity in which correct and important information should be readily available to concerned individuals who may not necessarily want to begin an operation, but may want to fully understand some pressing issues at hand.

Providing information to the public that is easy to access and educational should be of primary importance. So often the information is scattered between various sources that obtaining

it seems very difficult. Besides the logistics, many times the information is slanted or biased by agendas that may not necessarily present accurate data. A biosolids database containing information ranging from generation to disposal and general information could be developed and maintained as a resource for the state. This information should be published in both printed and electronic versions and also be available on the web.

One concern that can be addressed relatively easily is that of educating local leaders on the issues of biosolids that probably affect their constituents. Each year, newly elected local government officials (i.e. mayors, city councilmen and county commissioners) are required to attend short workshops where they receive training on issues pertinent to their responsibilities within their communities and offices. The Carl Vinson Institute of Government at the University of Georgia is the Department responsible for organizing and teaching the classes and seminars. These workshops are prime opportunities to introduce community leaders to this issue in such a manner where they can be comfortable asking questions and learning before they are faced with making important decisions. A member of the University of Georgia Engineering Outreach Program will be responsible for teaching this class and distributing information packets that can be used as reference and guides that will benefit communities.

10.3 Public Opinion

Besides the technical and economic shortcomings of the different sludge management techniques, the siting of any new biosolids treatment process is proving to be extremely onerous even for relatively simple operations. The difficulty in siting can be ascribed to several intangible factors including aesthetics, odor, and traffic. These issues have been frequently and vigorously embraced by the public, often forming the basis of strong opposition. Although these issues are somewhat subjective, they can often become the deciding factor in choosing the appropriate biosolids management technology (Shahani, 1994)

Public perception and opinion sometimes play an equally significant role in the decision making process as does economics. It is not the point of this paper to ignore public opinion but rather to endorse learning the public's concerns and addressing those concerns. Before an informed decision can be made, it is proper to have a handle on the feelings of those whom it

might directly affect.

In an effort to get a representative opinion, various groups that deal with biosolids issues were contacted and asked the same set of questions. This set of questions can be found in Appendix F. The groups or individuals that were contacted included Sam Booher, President of the Georgia Chapter of the Sierra Club, county extension agents from both rural and urban sections of the State, and two academic professors. This section will include a brief synopsis of answers from this survey and is not the opinion or represents the views of the Georgia Environmental Partnership (GEP).

10.3.1 Sierra Club

One of the most active environmental groups in Georgia is the Sierra Club. Sam Booher, president of the Georgia Chapter, took some time to explain his club's feelings on biosolids. The topic of conversation revolved around problems allegedly caused by land application of biosolids in the Augusta area. He feels that problems "do not stem from the application of biosolids derived from domestic waste but rather from the application of biosolids that are derived partly or completely from industrial wastes." In his opinion, "total separation of the two waste streams needs to be done in order to completely eliminate industrial wastes from being land applied." He believes that this "will never be done because there are no incentive for this to happen." He continues by saying "there must be a financial benefit for a company to follow the law, i.e. a tax break for reducing pollutants that comes from the state funding mechanisms." Mr. Booher also states that "the biggest impediment to beneficial reuse of sludge is the industrial lobbyist that work to keep industrial sludge going to municipal wastewater treatment facilities." Another of his major concerns is the inability of the EPD to enforce all the laws there are. "More laws without enforcement mean nothing. It is necessary to be able to regulate and enforce those regulations."

10.3.2 County Extension Agents

A geographical representation of county extension agents from Bibb (Middle GA) , Dougherty (SW GA), Gordon (N GA) and Jefferson (E GA) counties were interviewed to

determine local opinions about land application of biosolids. A common thread was observed in all of the interviews. In each instance, land application operations began with management and/or public resistance problems.

The management problems stemmed from lack of education, management skills and experience. In the beginning, many farmers knew that biosolids were good for the land but did not know how to properly manage the application rates. These early mismanaged operations resulted in:

- eleven dead cows when a “farmer got nervous and put out ammonium nitrate because the biosolids application didn’t green up his crop quick enough”
- a lawsuit concerning contaminated soils from an overused feedlot
- and negative public opposition resulting from “one farmer stock piling biosolids in his field (before land applying) that produced strong odors.”

One county agent, when asked concerning the cattle deaths commented that it was “a good lesson that would not be forgotten shortly.” In most of these situations, lessons of what to do and what not to do have laid the ground work for operations that are more aware of the potential impacts of improper management.

When asked “What are the major impediments in Georgia to beneficial reuse?” the same resounding answer was “EDUCATION.” Over and over the agents stated that education of farmers, the general public, local government leaders and the EPD was necessary. The question “What educational tools need to be developed?”, resulted in answers such as:

- “easy access to accurate information”
- “government agencies need to be educated to answer questions correctly”
- “training for local governmental leaders”
- “published success stories “
- “open meetings” or forums taught by an unbiased source.

10.3.3 Academic Professor

Dr. David Gattie is an Assistant Professor in The Biological & Agricultural Engineering Department at the University of Georgia who has publicly presented opposition to biosolids utilization. From the beginning of the interview, Dr. Gattie was quite specific when he said that "biosolids are a potential health hazard, not an environmental hazard and should be managed as such." "If they (EPA) wants to regulate it, it needs to be regulated strictly. The EPA has a list of pathogens and vectors they monitor for, thus admitting up front that it is a potential health problem."

When asked how he thought the biosolids should be disposed of, Dr. Gattie responded by saying that it is "dependent upon the Class of biosolids. If Exceptional Quality (EQ), I see no harm in applying as fertilizer to NON food crops, provided strict adherence to worker occupation regulations are adhered to during application. If Class A, landfill, or incinerate, or process such that the by-products are used for alternate purposes."

The question regarding what are the major impediments to beneficial reuse resulted in a simple and definite answer, "Politics." So many times politics controls what is allowed to be presented or stated. Referring to science and politics Dr. Gattie exclaimed, "when politics interferes with science, we have forsaken our cause." Dr. Gattie recommended that "independent researchers from universities not economically tied to waste management industries must take the lead in conducting research to determine guidelines and regulation standards. Also, state governments must be given resources to monitor existing and future land application sites for compliance." He stated that "by and large the majority of the public doesn't know anything about biosolids. For those who do know something about biosolids, the majority of them believe it's the best fertilizer ever developed, but they are shocked when they hear that it is human waste...this being the result of the sales job from bureaucrats."

When asked what educational tool need to be developed, Dr. Gattie replied, "The majority of the public does not know that biosolids are being applied in their back yards. At the local level, commissioners and councilmen need to be educated as to what land application really is. Someone other than the engineering firm who wants to win the contract bid to construct the system should do this." Dr. Gattie summed up his view on biased education when he concluded

that the "EPA would rather spend its time convincing the public that its ok instead of monitoring the land application sites out there."

10.3.4 Summary of Public Opinions

Several threads common to most of the interviews conducted were:

- 1) The need for unbiased education of the public, local and community leaders and regulatory agency personnel. With this education comes the need for easy access to centralized information so individuals can make educated decisions for themselves.
- 2) The need for some type of incentives, monetary being the primary, to promote honest and accurate management of biosolids.
- 3) The fact that the public perceives a lack of regulatory oversight and enforcement.

Public perception can and does effect biosolids production and disposal. As discussed earlier, education is a key that may help disperse many negative connotations that are commonly applied when anything to do with sewage is mentioned. The lack of adequate information to provide better understanding among the public is causing high-level concern and rejection of beneficial reuse (EPA Audit Report, 2000). Granted, some of the negative feelings are rooted in good reason. One area that has received a great deal of negative public opinion is the lack of regulatory oversight associated with biosolids. In many conversations with informed individuals across the state, their general consensus is that there is a definite public perception that there is no oversight by the EPD within the state. Saying there is "no" oversight is indeed not founded but the perception of "little to none" is a definite problem. In defense of the EPD, it is acknowledged that they do not have adequate personnel and resources necessary to monitor and regulate each and every operation within Georgia that requires oversight.

10.4 Biosolids Quality

When faced with questions about developing new technology to improve the quality of biosolids, it is important to understand the scope of the present circumstances. In the situation with biosolids, it is assumed by some that a quality enhancement to the product will make it more

desirable and less likely to be sent to the landfill. That may be so in some situations but the question should be asked, ‘why does a wastewater treatment facility produce biosolids in the first place?’ Biosolids are produced as a by-product of the wastewater cleansing process. Since wastewater treatment facilities primary purpose is to clean wastewater, the resulting biosolids are simply a function of performance. It is important to realize that the primary goal for treatment plants is clean water that can be discharged to streams and rivers or land applied. There are some process enhancements that can be added or performed that will continue to produce clean water and at the same time enhance the quality of the waste sludge.

Before changes can be done on the quality of biosolids being produced by wastewater treatment facilities, it is important to know the actual quality of the biosolids that are going to landfill. The majority of POTW’s have an idea of what classification of biosolids they produce but it is not exact, especially those operators that send their biosolids to landfill. Since landfills do not have a classification requirement on the types of sludge they accept, it is seemingly not important for an operator to determine the specific class. Knowing this type of classification information from each facility could greatly increase the ability to institute beneficial reuse programs on a wide scale basis.

Trace quantities of many metals, such as nickel, manganese, lead, chromium, cadmium, zinc, copper, iron and mercury are components of some biosolids. Because of their toxicity the presence of any of these metals in excessive quantities can interfere with many beneficial uses. Another potential obstacle for beneficial reuse is that prior to extensive treatment, biosolids contain microorganisms that are potentially pathogenic, or capable of causing diseases in humans. While the list of microorganisms in biosolids is extensive, most of them are not pathogenic. Due to the extensive variety of pathogenic microorganisms that require different analyses, determining exact numbers or concentrations present is difficult. Indicator coliforms, organisms that exist in large numbers in the intestines of mammals, are easily detected and are used to suggest the degree of contamination (Reynolds and Richards, 1996). Table 28 contains the type and concentration of some pathogens present in biosolids.

Table 28. Typical pathogen levels in unstabilized and anaerobically digested liquid sludges.^a

Pathogen	Typical Concentration in Unstabilized Sludge (No./100 milliliters)	Typical Concentration in Anaerobically Digested Sludge (No./100 milliliters)
Virus	2,500-70,000	100-1,000
Fecal Coliform Bacteria ^b	1,000,000,000	30,000-6,000,000
Salmonella	8,000	3-62
<i>Ascaris lumricoides</i> -Helminth	200-1,000	0-1,000

^a Adapted from Stein (1994).

^b Although not pathogenic, they are frequently used as indicators

The Georgia Environmental Partnership suggests the development of a state supported systematic program to classify biosolids around the state to determine class ranking of EQ, A, B, or C. Such a program would do the samplings and the initial assessments for each POTW.

Typical characterization data that will be gathered include:

- Appearance
- Total Solids Content
- Free Liquid
- pH
- Nitrogen
- Phosphate
- Potassium
- Metals Content
- Pathogen Reduction
- Soluble Metals

The data collected would be available to all wastewater facilities and law makers as part of an ongoing database. This information can be used as a benchmark of comparison when facilities receive technological upgrades. Such information would be beneficial as a decision making tool for municipalities and law makers when incentive programs are developed.