

**JOINT LEGISLATIVE AUDIT AND REVIEW COMMISSION
OF THE VIRGINIA GENERAL ASSEMBLY**

COMMISSION DRAFT

**Review of Land
Application of Biosolids
in Virginia**

October 11, 2005

In Brief...

Review of Land Application of Biosolids in Virginia

The 2005 General Assembly directed JLARC staff to review the land application of biosolids in Virginia. Biosolids are residues generated when sewage sludge is treated to reduce the concentrations of nine regulated chemicals, pathogens, and vector attraction. More than 232,000 dry tons of biosolids were spread on roughly 50,000 of Virginia's agricultural acreage in 2004.

Biosolids have been a source of controversy both nationally, and in Virginia, making some people wary of its use. Federal and State regulatory bodies share the perspective that when biosolids are generated and disposed of in compliance with the established standards, they are safe for human health and the environment. During this review however, JLARC staff found that biosolids applications occur with little oversight, making it difficult to ensure compliance. For example, in 2004, more than 1,100 separate biosolids applications took place, but VDH inspected only 19. EPA regional staff are performing even fewer on-site inspections. Despite efforts to increase oversight at the local level, few counties have an effective testing and monitoring program.

Opportunities exist for improving the State's biosolids use program. These measures include using the proceeds from the underutilized biosolids fee fund to increase the State's oversight capacity. VDH could also provide greater support to the counties wishing to perform their own oversight.

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REVIEW OF LAND APPLICATION OF BIOSOLIDS IN VIRGINIA

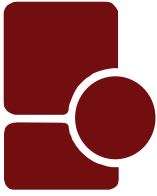
Commission Draft

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Joint Legislative Audit and Review Commission

October 11, 2005



JLARC Report Summary:

Review of Land Application of Biosolids in Virginia

Biosolids are sewage sludges that have been treated to remove certain chemicals and reduce disease-causing organisms. Biosolids are disposed of in landfills, incinerated, and, most frequently, applied to land as a fertilizer. During 2004, more than 240,000 dry tons of biosolids were land applied to approximately more than 50,000 acres of cropland, hay and pastureland, and forestland in Virginia. Biosolids are considered a good source of crop nutrients, such as nitrogen and phosphorus, that are essential for plant growth, and also contain soil enhancing properties.

The land application of biosolids generates some controversy, as the material can negatively impact residents that are nearby the applications. Potential negative impacts include foul odors and anxiety over perceived and possibly real health effects (citizens have complained of headaches and health problems that are alleged to stem from biosolids).

At the federal level, the land application of biosolids has been regulated for decades by the Environmental Protection Agency (EPA). The federal regulations are designed to provide a baseline of regulatory protections that can be broadly applied across the country. To effectively meet varying in-state conditions and expectations, many states supplement federal requirements with additional requirements.

In Virginia, the Department of Health (VDH) regulates the land application of biosolids, and permits and oversees approximately 94 percent of the tonnage that is applied to soils in the Commonwealth. The Department of Environmental Quality (DEQ) regulates and permits the remaining tonnage. Under VDH permits, land applications are carried out by companies, also known as land appliers and contractors, which have contracted with wastewater treatment facilities for the disposal of the biosolids generated by the treatment plant.

A 2002 report by the National Academy of Science's National Research Council (NRC) said that there is a lack of evidence that governmental regulations of biosolids have failed to protect health. However, the report also noted that additional scientific work is needed to reduce persistent uncertainty about the potential for negative health impacts. There appears to be

a consensus on the point that biosolids should continue to be applied under regulatory controls, as it is not a material that should be applied haphazardly or without oversight.

House Joint Resolution 643 from the 2005 General Assembly Session directed the Joint Legislative Audit and Review Commission (JLARC) to evaluate the land application of biosolids in Virginia. The focus of the review is upon the oversight of biosolids land applications and the enforcement of the regulations. Several findings have resulted from the review, including the following.

- Citizens in Virginia localities in which biosolids are applied are reportedly wary of the material, based on a survey of county administrators.
- EPA dedicates few resources to biosolids oversight, and is not in a position to assure the public that its regulations are being followed.
- VDH's regulations contain some more stringent requirements than federal regulations; and, in addition, department staff generally go to biosolids sites and investigate complaints within a day or two of receiving the complaint. However, the department's routine oversight and enforcement functions are weak.
- Although four years have passed since an authority to conduct biosolids testing and monitoring has been extended to localities, few counties have an effective program. Some localities object to the idea of providing the oversight of an activity that the State regulates, and have not established a testing and monitoring program. In counties that do have a program, almost all monitors go on-site to observe spreading operations at least some of the time, but their expertise is limited, and testing is rare.
- Limitations in federal, State, and local oversight capabilities raise credibility issues for the biosolids program. There are some measures that could be taken to improve the credibility of the oversight and enforcement that is provided. These measures include authorizing the use of some of the proceeds from the already-existing biosolids fee to increase the State's capacity for routine oversight, and also making improvements in the training provided for local monitors (in those localities wishing to have their own testing and monitoring program).

Localities in Virginia Are Wary of Biosolids

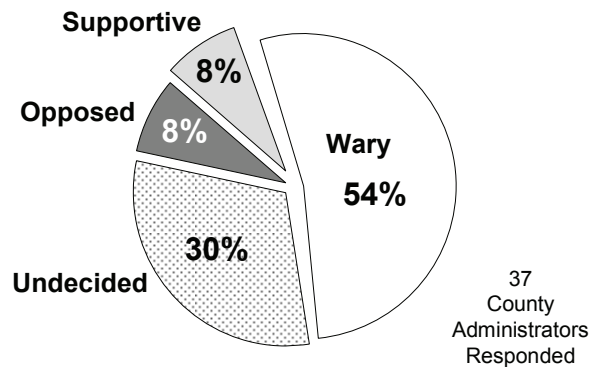
In 2004, five Virginia counties passed resolutions encouraging the General Assembly to review the effectiveness of the State’s capacity to oversee the use of biosolids. The counties cited conflicting information as to the safety of biosolids as a factor in their decision to request an evaluation.

The use of biosolids as a soil amendment to agricultural crops has been a source of controversy for some time in Virginia. EPA, State regulators, and proponents of biosolids use claim that when used within the established federal and State regulations, biosolids are a safe and cost-effective fertilizer. Supporters of biosolids use also claim that a system of checks and balances exists to ensure compliance with the regulations. Critics of biosolids contend that biosolids contain far more harmful components than initial research efforts looked for or found. Biosolids opponents also say that land applications occur with little oversight and only limited enforcement.

JLARC staff conducted a survey of county administrators in each of the 56 counties in which biosolids applications have been permitted. More than half of the 37 respondents indicated that they considered the public in their localities to be wary of biosolids applications (see figure below.) Another 11 respondents indicated their county citizens are undecided.

County Administrators’ Assessment of the Attitude of Their Citizens toward Biosolids Applications

Source: Staff analysis of data from summer 2005 JLARC survey of administrators in counties in which the land application of biosolids has been permitted by VDH or a permit is being considered. Surveys were completed by either the county administrator or designated staff, including local biosolids monitors.



EPA Dedicates Few Resources to Biosolids Oversight

As required by the Clean Water Act, EPA developed regulations to protect public health and the environment from potential problems resulting from the use of biosolids. These regulations are known as the Part 503 rule. Part 503 guides the production and disposal of biosolids. To be classified as “biosolids,” sewage sludge must be treated to reduce the concentrations of nine chemical pollutants (mainly heavy metals). In addition, sewage sludge must undergo accepted treatment processes for reducing pathogen content and the material’s attractiveness to animals and insects. Standards and guidelines exist for proper disposal of the material, including land application to agricultural sites.

EPA’s perspective is that when biosolids are used in compliance with the standards and guidelines established by Part 503, there is little risk to human health or the environment. The regulations focus on ensuring that biosolids are generated by approved means and that land applications meet general and site-specific standards.

EPA has given the biosolids program a low priority, and, as a result, has assigned few resources to the program. For example, in 2002 there were approximately nine FTE positions assigned to perform biosolids work in EPA’s ten regional offices. Responsibilities of these positions include oversight and enforcement of the biosolids activities that occur within each region. According to EPA staff, current staffing levels remain about the same as the reported 2002 levels.

Virginia is in EPA’s Region 3, which also includes Delaware, Maryland, Pennsylvania, and the District of Columbia. There is one position assigned to oversee biosolids activity of both the generators and land appliers in the region. To ensure compliance with the Part 503 requirements, the Region 3 biosolids coordinator reviews annual reports submitted by the wastewater treatment facilities to evaluate whether the chemical concentration limits have been met and that appropriate methods were used to reduce pathogens and vector attraction. However, because of resource issues, little facility oversight is performed. Also, since 2002, EPA staff have observed only one biosolids application in Region 3, and that was in Pennsylvania.

VDH Regulations Provide Some Increased Requirements for Land Applications, But VDH Oversight and Enforcement of Regulations Has Been Weak

In Virginia, the land application of biosolids is regulated and permitted under two separate regulatory programs administered by VDH and DEQ. However, the vast majority of tonnage is applied under VDH permits.

The regulations adopted by VDH are more strict than the Part 503 rule. For example, the biosolids use regulations create minimum separation distances between applications and features such as houses, wells, and waterways that are not addressed by Part 503. VDH has also responded to many complaints about biosolids applications on a timely basis, according to local government survey respondents.

However, VDH is currently unable to ensure that biosolids applications are conducted according to the established management practices and site-specific requirements. As shown in the table below, VDH staff conduct few routine inspections simply to check if permit requirements are being met. For example, in 2004, more than 1,100 total land applications occurred, but inspections were performed on only 19 of these applications. This lack of inspection presence in the field puts VDH in a reactive position concerning any issues that may arise, instead of proactively being able to address such issues.

Number of Inspections Performed by VDH DWE Staff Related to Biosolids

Source: JLARC staff analysis of data supplied by VDH.

Year	Permit Issuance	Routine	Complaint
2000	Not indicated	12	28
2002	Not indicated	20	12
2004	71	19	55
2005 (as of August)	28	10	27
Average for full years	71	17	32

Note: Routine and complaint inspections for 2000 and 2002 were best estimates made by VDH and reported in their correspondence (prior to the time of the JLARC review). Data for 2001 and 2003 were not obtained for this review.

Several factors appear to contribute to the department’s ability to perform routine inspections. These factors include limited staffing resources to perform on-site inspections, the presence of out-of-state monitors at a number of applications throughout the State, and limited knowledge of where the applications are occurring on a daily basis.

Since 2001, DWE has taken few formal enforcement actions. During that time, the division has issued eight notices of viola-

tion and six consent orders. It is difficult to determine to what extent these eight violations represent the universe of violations that have occurred on-site, because VDH is not conducting routine inspections on any type of schedule. However, among the cases that VDH has pursued, there are some indications that VDH tends to be relatively lax in enforcement, including in dealing with repeat offenses of a similar nature by the same company. For example:

In 2002, VDH staff cited a single contractor for compliance issues on several occasions. Issues included applying biosolids directly from a tanker truck after having been previously advised not to do so, twice exceeding the permissible rate of application, and applying to slopes greater than 15 percent. VDH issued notices of violation (NOV) to the contractor concerning each issue. However, the agency withdrew the NOV for the slope issue based on the contractor's re-measurement of the slopes. It does not appear that VDH performed its own measurement. Furthermore, VDH took no enforcement action with regards to the other issues.

Additionally, VDH has not been fully collecting the fees that contractors are required to pay based on the amount of tonnage they apply in counties with ordinances. In response to JLARC staff inquiries, VDH found that in calendar year 2004, contractors underpaid the biosolids fee fund by more than \$50,000. Contractors were also \$28,000 behind in payments for 2005, as of September. The fact that VDH had been unaware of this gap indicates that more rigorous oversight of fee payments is needed.

Recommendations in the chapter of the report on State oversight include the following:

- VDH should allocate two full-time positions to the division of wastewater engineering for the purpose of conducting routine inspections more frequently.
- VDH should develop an inspection schedule for conducting routine inspections. The plans should provide for a sufficient level of routine inspection activity, both announced and unannounced, in different geographic regions and involving different generators and land appliers.
- VDH should ensure that the complaint database maintained by the department is up-to-date.

- Local governments should notify VDH of all biosolids complaints they receive.
- VDH should develop a guidance document to assist the department and the localities with administering the program. The document should include a section on enforcement issues.
- VDH should offer localities additional training opportunities for local governments that wish to monitor biosolids applications.
- The department should develop and implement a method to inform localities about the biosolids program.
- The Commissioner of Health should increase or reconstitute the membership of the Biosolids Use Regulatory Advisory Committee to provide greater representation for local governments and knowledgeable public citizens.
- The department should require the posting of signs identifying land application sites for a minimum of 30 days after an application.
- VDH should develop a “medium” public access designation for biosolids sites, providing for somewhat longer access restrictions and signage requirements in areas that are not remote from the public.
- VDH should develop language with regard to its current animal access restrictions requiring fencing or physical barriers to biosolids fields on properties upon which animals are grazed, to prevent animal access to the sites. In addition, VDH should clarify the responsibilities of property owners and biosolids appliers for ensuring that animals are kept out of biosolids fields for the prescribed time periods, and ensure that the expectations upon appliers (who do not own and control the property) is specific and practical.

Few Local Biosolids Programs Are Effective

State and federal appeals courts have ruled that the State biosolids program in Virginia preempts the authority of individual localities to enact ordinances which are more strict than the State’s regulations in this area. However, current State law adopted in 2001 permits localities to adopt local ordinances that allow for monitoring and testing biosolids that are applied

in the county. Additionally, in 2003 the State established a fee fund to reimburse those localities that have adopted ordinances for their costs associated with biosolids oversight.

Nonetheless, few localities have chosen to fully use all the powers available to them concerning biosolids oversight. Biosolids use is permitted in 54 Virginia counties. However, only 19 of those counties have adopted VDH-approved ordinances.

Among localities that have adopted ordinances and designated monitors, most monitors do go on-site to observe applications at least some of the time. However, many local staff assigned to oversee applications lack the technical expertise to properly ensure the applications are compliant with State regulations. In addition, little on-site testing is being done. Interview and survey results show that monitors are drawn from non-environmental, non-public health backgrounds, such as building code enforcement officer, planning directors, and administrative positions.

Localities gave different reasons for not being more active with regard to biosolids oversight. However, two primary themes emerged from JLARC staff interviews and analysis of survey results. First, many localities view biosolids oversight and enforcement as a State function and appear to resent having to carry out a State program with limited authority and little assistance. Second, biosolids oversight appears to have a relatively low priority, and as a result, the majority of programs do little more than respond to complaints.

Biosolids Fee Fund Could Be Used to Enhance Oversight Capacity and Program Credibility

The biosolids fee fund could be used to improve VDH's oversight capacity, and with it the credibility of the program in general. The biosolids fee fund is currently underutilized by the localities. Counties eligible for reimbursement from the fund have only requested about \$60,000 since May 2003. About \$250,000 is paid to the fund annually, and there is currently a \$300,000 balance in the fund.

With an authorizing change in State statute, some of the proceeds from the biosolids fee fund could be used to hire additional inspector positions at VDH. The primary function of these positions could be to plan and conduct routine inspections of biosolids applications throughout Virginia. Increasing VDH's staffing levels is also supported by members of the regulated community. Two major land appliers told JLARC staff that public confidence in the program would likely increase if VDH had additional staffing.

Recommendations in the chapter are:

- The General Assembly may wish to consider amending the *Code of Virginia* to allow VDH to collect and use fee fund proceeds to cover the costs associated with hiring two additional staff positions at VDH to perform biosolids work, particularly routine inspections.
 - If the General Assembly provides for the use of biosolids fee funds to pay for increased VDH oversight, then the collection of fees should not be limited to only those localities that have adopted an ordinance. Instead, fees should be based on the total amount of dry tons applied in Virginia. VDH could then adjust the fee to reflect costs associated with the additional positions, and other related activities.
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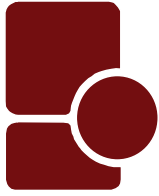


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Introduction

In Summary ...

Biosolids are sewage sludges treated to remove certain chemicals and reduce disease-causing organisms. Biosolids are disposed of in landfills, incinerated, and, most frequently, applied to land as fertilizer. The material is nutrient rich and available free of charge to farmers, which is an inducement for its use. Due to concerns about potential health and environmental risks, biosolids applications are regulated. Despite federal and State regulations, the land application of biosolids continues to generate controversy, nationally and in Virginia, regarding the risks and impacts of its use. For example, in 2004, the governing bodies of five Southside Virginia localities adopted resolutions calling for an investigation of the existing biosolids program. House Joint Resolution 643 from the 2005 General Assembly Session (see Appendix A) directed this JLARC review of biosolids oversight in Virginia.

In 2004, five Southside Virginia counties adopted resolutions calling for the General Assembly to “fully investigate the existing state programs governing the land application of biosolids.” The counties expressed concern with the extent to which proper regulatory and environmental oversight and controls are in place to fully protect the citizens of the Commonwealth of Virginia. Several of the resolutions noted that the boards of supervisors had “heard conflicting reports from their citizens, the Virginia Department of Health, and the Environmental Protection Agency regarding the long-term health and environmental effects of the land-application of biosolids.”

What are biosolids, and why is there an interest in applying biosolids to land? Are biosolids regulated? What is the nature of the controversy that surrounds biosolids? What is the current state of knowledge about the health and environmental impacts of biosolids? This introductory chapter addresses these questions and discusses the mandate for this JLARC review.

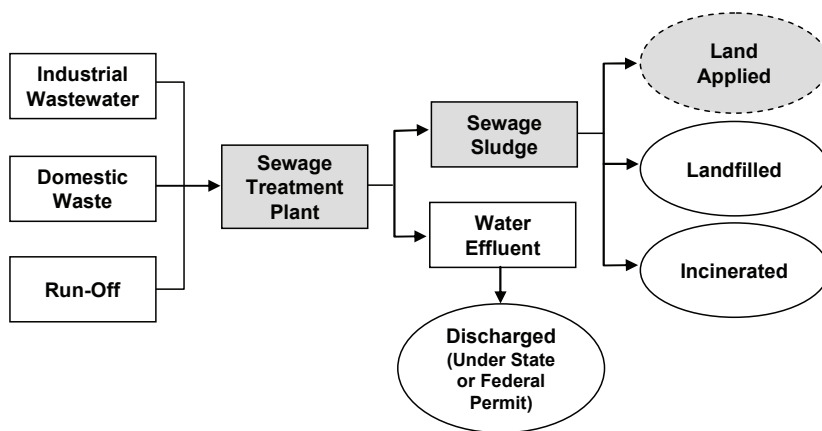
OVERVIEW OF BIOSOLIDS AND THEIR DISPOSAL

“Biosolids” is the term applied to sewage sludge that has been treated to reduce pollutant levels, pathogens, and the material’s attractiveness to animals and insects. Wastewater treatment plants (WWTP) collect and treat raw or pre-treated sewage, resulting in the production of both a liquid effluent and

solids. The effluent produced by the treatment process is discharged into a waterway under the requirements of a State or federal permit. The solid or semi-solid portion is referred to as sewage sludge, and is typically disposed of in one of three ways: it is dumped in landfills, incinerated, or applied to land as fertilizer (Figure 1).

Figure 1
Production and Disposal of Biosolids

Source: Illustration from EPA report, "Land Application of Biosolids," March 2002, Office of the Inspector General.



In order to be available for agricultural purposes, sewage sludge has to be treated to reduce pollutant concentrations, disease-causing organisms, and its attractiveness to animals and insects.

Each year, more than 5.6 million tons (dry weight) of sewage sludge are generated in the United States from municipal or industrial WWTPs. In order to be available for agricultural purposes, sewage sludge has to be treated to reduce pollutant concentrations (mainly heavy metals), disease-causing organisms (pathogens), and its attractiveness to animals and insects (vector attraction). Sewage sludge that has been processed in this manner is referred to as biosolids.

Biosolids, then, are solid, semi-solid, or liquid materials that are produced primarily through biological treatment of domestic (household, septage, and, in some cases, industrial) wastewater at a municipal or industrial wastewater treatment plant. For example, the Blue Plains Advanced Wastewater Treatment Facility in Washington, D.C., is a municipal facility and a source for much of the biosolids that are land applied in Virginia. The term biosolids has been adopted by the U.S. Environmental Protection Agency (EPA) to differentiate between treated and untreated sewage sludge.

According to EPA, approximately 60 percent of the total sludge produced annually in the United States is applied to farmland.

The majority of the 5.6 million dry tons of sewage sludge annually produced in the U.S. is land applied. According to EPA, approximately 60 percent of the total sludge produced annually is applied to farmland, 20 percent is incinerated, and another 17 percent is buried in landfills.

Biosolids are usually brought to a site for spreading as fertilizer by one or several trucks, depending on the size of the job. The photograph below shows biosolids being dumped on a farm site in Frederick County, Virginia, in preparation for spreading.



Three main methods are used to apply biosolids to land: surface application, incorporation, and injection. With surface application, the biosolids are spread onto the field and are not physically worked into the soil at or anytime soon after the time of application. This method is reportedly common for hay crops and winter months applications of biosolids. With incorporation, biosolids are applied to the surface, and then physically disced or plowed into the soil (if incorporation is required, it normally is done within 24 to 48 hours. The material is usually incorporated to a depth of about six to nine inches. With injection, liquid biosolids are injected six to nine inches into the soil. This is a more expensive type of application, and it cannot be used for hay crops or when the ground is frozen. However, it is the most effective method for odor and vector control, and it reportedly minimizes the risk of runoff to surface waters. Practices vary from state to state with regard to the methods most commonly used.

Agriculture accounts for the vast majority of land applications, but biosolids are also land applied to some forestland. Although agricultural land application is the most common form of disposal for biosolids, it also should be noted that biosolids applications are estimated to occur on less than 0.1 percent of the agricultural acreage in the United States each year.

Biosolids are considered a good source of crop nutrients.

Biosolids are considered a good source of nitrogen and phosphorus, crop nutrients that are essential for plant growth. Biosolids also contain other soil property-enhancing organic matter. Plants that lack sufficient nitrogen usually become yellow, have stunted growth, and are smaller than average flowers and fruits. Adequate phosphorus is needed for root formation

and growth, and seed formation. Research shows that applying fertilizers containing nitrogen and phosphorus to soils that are low in these nutrients can increase crop growth and yields. For example, a wet ton of biosolids contains 30 pounds of total nitrogen and 10 pounds of total phosphorus. According to the Virginia Cooperative Extension Service, biosolids also contain other essential plant nutrients, such as sulfur, manganese, zinc, copper, and iron, as well as valuable organic material that occurs in less than optimum amounts in soils in Virginia.

The use of biosolids on agricultural and non-agricultural sites has also been viewed as a form of recycling. The application of biosolids to land has been seen as a beneficial reuse of the material, by returning nutrients back to the soils that lost them during crop production. This recycling of the material from fields to the public and back to the fields has been heralded as an environmentally friendly disposal method for a product that would otherwise be landfilled or incinerated – alternatives which also raise environmental and health concerns.

Farmers can achieve cost savings by the use of biosolids.

Certain economic factors help stimulate demand for the application of biosolids to agricultural land. Farmers can achieve cost savings by the use of biosolids. A 2001 U.S. Department of Agriculture report cited three case studies that were done on farms in Virginia (the farms were in Hanover, New Kent, and Louisa counties). In these case studies, the cost savings to the farmers due to biosolids applications were estimated to be \$40.90, \$55.98, and \$70.73 per acre. These estimated savings per acre translated into savings averaging about \$1,173 per farm.

REGULATION OF BIOSOLIDS

The federal government provides minimum requirements for biosolids regulations under the Clean Water Act of 1972. The standards for the treatment of sewage sludge and for how biosolids are applied have been set by the EPA. Federal standards are contained in Part 503 of Chapter 40 of the Code of Federal Regulations (often referred to as the “Part 503” regulations). Federal standards are supplemented by state regulations.

In Virginia, the vast majority of biosolids land applications are regulated by VDH.

In Virginia, the land application of biosolids is regulated and permitted under two separate regulatory programs, based on the entity that is performing the application. The vast majority of the tonnage (about 96 percent) is applied under the governance of regulations and permits issued by the Virginia Department of Health (VDH). VDH issues permits to companies that have contracted with wastewater plants to land apply the biosolids. Each VDH permit issued to an applier enables that company to apply biosolids to certain farms within a given

county. VDH currently oversees more than 100 active biosolids permits. Three companies account for about 80 percent of the permits in Virginia (see Appendix B for additional information about these permits).

In addition to the biosolids activity regulated by VDH, a small proportion of the tonnage of biosolids (about four percent) is regulated by the Virginia Department of Environmental Quality (DEQ), under its discharge permit programs. DEQ administers applications by treatment facilities which choose to apply their own biosolids.

Localities in Virginia do not have the authority to regulate biosolids applications, but may perform a testing and monitoring role.

Localities in Virginia do not have a major role in the setting of conditions for biosolids applications. For example, localities do not have the authority to impose regulatory conditions on biosolids applications on the VDH-permitted farms. Local governments can, however, provide input into VDH's permit process. Local governments are also able to pass ordinances guiding applications within their jurisdictions, as long as the requirements are no more strict than those at the State level. Because they may not impose more stringent conditions, some localities see little point in having an ordinance. However, those localities with ordinances are empowered to monitor biosolids applications, conduct tests (for example, tests of the biosolids content, the soil, or nearby wells), and receive reimbursements from a biosolids fee fund for certain biosolids monitoring work.

Untreated sewage sludge contains numerous chemicals and disease-causing organisms. Since biosolids are treated sludge applied to land, two regulatory questions are particularly salient. First, to what standard(s) should the treatment of sewage sludge be held, in order to deem the product "biosolids"? Second, what standards govern how biosolids are to be applied to land to reduce the potential for any public health or environmental problems?

The following discussion provides some details about the EPA and VDH regulations. Understanding the nature of the regulations is helpful to understanding the controversy surrounding biosolids and the strengths and weaknesses in the oversight program that will be discussed in Chapters 2, 3, and 4.

Standards for Transforming Raw Sewage Sludge into Biosolids

EPA standards for biosolids include pollutant limits for nine chemicals.

To be classified as "biosolids" under federal regulations, sewage must be treated using an accepted treatment process and must not exceed certain limits for nine heavy metals. The heavy metals that are covered by federal regulations and the potential health risks associated with these metals are shown in Exhibit 1.

Exhibit 1 Nine Heavy Metals in Biosolids Regulated by EPA

Source: JLARC staff review of *Life Support: The Environment and Human Health* (2002) and U.S. EPA, Risk Assessment Information System.

Element	Health Consequences of Human Exposure
Arsenic	<ul style="list-style-type: none"> High-level exposures can result in acute encephalopathy, congestive heart failure, stupor, convulsions, paralysis, coma, and death Health effects from low-level exposure include skin lesions, peripheral nerve damage (numbness, tingling, weakness in the hands and feet), and elevated risk for cancers of the skin, lung, kidney, etc.
Cadmium	<ul style="list-style-type: none"> High-level exposure can result in severe respiratory irritation Chronic, low level exposure can lead to kidney failure as well as a weakening of the bones and bone fractures
Copper	<ul style="list-style-type: none"> Oral exposure can cause severe abdominal pain, vomiting, and diarrhea among other symptoms Chronic exposure to drinking water containing copper can cause gastrointestinal problems and liver toxicity, cirrhosis of the liver, and other symptoms of Wilson's disease Exposure to copper dust in work environments has been associated with gastrointestinal upset, headache, dizziness and drowsiness
Lead	<ul style="list-style-type: none"> Children under five years and fetuses are particularly vulnerable to lead, suffering neurological and developmental effects at even low levels of exposure Adults generally require higher exposure levels before the onset of symptoms Acute exposure in children or adults will result in convulsions, coma, and renal failure
Mercury	<ul style="list-style-type: none"> Exposure during pregnancy can harm the fetal nervous system, causing mental retardation and other developmental disabilities High-level exposure can fatally damage the lungs and neurologic system Chronic exposure results in hand tremors, excitability, memory loss, insomnia, and marked neurobehavioral decline
Molybdenum	<ul style="list-style-type: none"> Although evidence of oral exposure is limited, studies from regions of India and Armenia with high soil levels of molybdenum found biochemical defects, gout-like symptoms such as erythema and edema, and genu-valgum (knock-knees) syndrome Regarding inhalation toxicity, studies of workers consistently exposed to molybdenum have found high rates of weakness, fatigue, headaches, weight loss, and dizziness
Nickel	<ul style="list-style-type: none"> Oral exposure at high levels can harm the kidneys High-level inhalation exposure can affect the respiratory tract and immune system, and may result in headache, nausea, and respiratory disorders There is limited, contradictory evidence that exposure to nickel can have reproductive / developmental effects on females Allergic reactions from skin contact with items such as jewelry and cooking utensils are common and well-documented
Selenium	<ul style="list-style-type: none"> High-level oral exposure can produce shallow breathing, diarrhea, pulmonary edema, and death Additional symptoms of selenium exposure include muscle aches and pains, irritability, chills, and tremors Chronic exposure can result in loss of hair and nails, skin lesions, numbness, paralysis, and motor disturbances
Zinc	<ul style="list-style-type: none"> Acute oral exposure can cause nausea, vomiting, diarrhea, abdominal cramps, and sometimes gastric bleeding Inhalation exposure effects, mainly documented in occupational studies, include "metal fume fever," which includes nasal passage irritation, cough, headache, and other symptoms

Since the time that the regulation was adopted, a national panel of experts in toxicants concluded in 2002 that under the existing state of technology, the limits set for these chemicals in biosolids "can be achieved easily."

In addition to these metals, biosolids contain four major types of human pathogens: bacteria, viruses, protozoa, and helminths (worms). More than 140 viruses that can impact the human intestine are found in biosolids. Appendix C contains a list of the principal pathogens of concern that have been found in sewage sludge. The pathogens in biosolids are addressed in federal regulations through a combination of technologically-based treatment requirements, and through site access restrictions (discussed further in a following section).

Several biosolids treatment techniques are used by wastewater treatment plants to reduce the pathogens in biosolids. Techniques that combine physical, chemical, and biological processes are used to obtain the greatest reduction in pathogens. There are, however, numerous methods or processes that may be used to disinfect or inactivate the pathogens.

Depending on the condition of the treated sludge, biosolids may be classified as:

- **Class A, EQ** (Exceptional Quality) – Treated sludge that meets all chemical concentration requirements for pollutants (chemicals), pathogens, and vector attraction. To produce Class A, EQ biosolids, high temperatures, or high pH are usually used to inactivate highly resistant pathogens. These biosolids can be used with no more restrictions than any other fertilizer.
- **Class A, Non-EQ (Annual Pollutant Loading Rate, or APLR) Biosolids** -- Treated sludge that meets the ceiling concentration and cumulative loading rate limits but not the pollutant concentration limits for chemicals, and meets the pathogen control criteria that include management practices and physical barriers from vectors. Class A, Non-EQ biosolids can still be distributed to the public, but must include an information sheet specifying a maximum annual application rate.
- **Class B** – These biosolids, which are the focus of this report, undergo treatment to significantly reduce pathogens, but detectable levels of pathogens are still present. To qualify as “Class B,” the sludge must be below a certain fecal coliform count per gram of dry solid at the time of disposal, or be treated by certain processes that have been rated as adequate to “significantly reduce pathogens.” Alkaline stabilization agents, typically lime, are often used to disinfect biosolids to a level needed to achieve a Class B designation. Class B biosolids cannot be sold or given away for land application at public contact sites (such as parks or golf courses), or for lawns and home gardens, but can be

Class B biosolids contain detectable levels of pathogens, and cannot be sold or given away for lawn or home garden use, but can be applied under regulated conditions.

applied in bulk quantities – provided that the biosolids meet limits on pollutants, vector-attraction reduction, and other requirements for managing the material under governmental regulations.

Standards for the Land Application of Class B Biosolids and Subsequent Site Access Restrictions

Biosolids that meet the EQ (Exceptional Quality) designation can generally be applied as freely as any other fertilizer. Thus, these biosolids are not generally subject to any application controls. However, Class B biosolids applications fall under the jurisdiction of federal and State regulations that do specify management practices governing how these biosolids are to be applied. Federal and State regulations also contain provisions requiring that landowners of sites receiving Class B biosolids restrict the access of animals and the public to places where the material has been applied. These restrictions are intended to prevent the exposure of people or animals to pathogens during time frames when pathogens may still be present.

EPA has limited requirements in terms of management practices for the application of biosolids.

Management Practices Governing the Application of Class B Biosolids. Federal requirements regarding the application of biosolids (that is, rules regarding where and how biosolids may be applied to land) are limited. Although EPA has been encouraged to set more detailed constraints on application practices, it has declined to do so. EPA contends that the restrictions that are appropriate depends on the nature of the sites where the biosolids are to be applied, so setting standards that can be reasonably used across the nation is difficult. Therefore, more specific criteria for applications should be determined by states and localities through regulations and permit processes. Federal requirements do include the following stipulations:

- Biosolids must not be applied to land at a distance of less than ten meters (33 feet) from any waters of the United States, unless otherwise indicated in a National Pollutant Discharge Elimination System (NPDES) permit.
- Biosolids must be applied at a rate that is equal to or less than the amount of nitrogen that is needed by the crop to be grown.
- Biosolids must not be applied to land that is frozen, flooded, or snow covered, except as provided in a NPDES permit.

- Biosolids must not be applied to land if it is likely to adversely affect a threatened or endangered species or its critical habitat.

VDH regulations contain requirements that are supplemental to and more restrictive than the federal law. Some key VDH requirements include the following:

- A permit must be obtained before biosolids may be land applied within the Commonwealth.
- Total applications are not to exceed 15 dry tons per acre, unless a higher loading is specifically justified.
- Liquid sludges shall not be applied at rates exceeding 14,000 gallons per acre, per application.
- Application operations are only to proceed if wind velocity is less than or equal to 15 miles per hour. If high-pressure spray is used, windless conditions are preferred.
- Once biosolids are applied at the agronomic rate, no further applications are to be made for a period of three years. (Applications can be made more frequently if nitrogen levels available to the crops are less than crop needs).
- The pH of the biosolids and soil mixture shall be 6.0 or greater at the time of each biosolids application if the biosolids cadmium concentration exceeds certain levels. Lime-amended biosolids should not result in a pH value above 6.5 for soils in the Coastal Plain, and 6.8 in other areas of Virginia. (pH is a measure of acidity or alkalinity, ranging between 0 for “very acidic” and 14 for “very alkaline.”)
- Biosolids shall not be applied to site slopes greater than 15 percent. Additional slope requirements are in place, providing several restrictions, often seasonally-based, when slopes are greater than five percent.
- Depth to bedrock at the site should be a minimum of 18 inches. Depth to the seasonal water table should exceed 18 inches.
- Sewage sludge is required to be classified as “biosolids” and must be from VDH-approved sources in order to be land applied within the Commonwealth.

- A permit must be obtained for distribution of Non-EQ biosolids.

In addition, VDH regulations address minimum distances in feet that are to separate the land application area from adjacent features. These distances are summarized in Table 1. The minimum distances in the regulation for adjacent property boundaries, surface water, and certain drainage ditches may be reduced by 50 percent if subsurface applications are made (including incorporation on the same day as the application). However, “the written consent of the affected landowners” is required to reduce buffer distances from dwellings and property lines. In addition, the regulations note that minimum distances may also be increased or decreased, depending on site-specific features.

Table 1
Minimum Separation Distances Under VDH Regulations

Source: VDH Biosolids Use Regulations (12 VAC 5-585-510).

Adjacent Feature	Minimum Distance, in Feet		
	Surface-Applied Biosolids *	Incorporated Biosolids	Winter Applications
Occupied dwellings	200	200	200
Water-supply wells or springs	100	100	100
Property lines	100	50	100
Perennial streams and other surface waters except intermittent streams	50	35	100
Intermittent streams / drainage ditches	25	25	50
Rock outcrops and sinkholes	25	25	25
All improved roadways	10	5	10
Agricultural drainage ditches with slopes equal to or less than two percent	10	5	10

* Under the regulations, surface-applied biosolids are those not incorporated into the soil within 48 hours.

After land application of the biosolids, animals are not to be grazed on the site for 30 days, and public access to the site is to be restricted for a period of 30 days to one year.

Restrictions Upon Public or Animal Access to Sites Receiving Class B Biosolids. Both federal and Virginia biosolids regulations contain restrictions on the access that is to be allowed to sites that have received biosolids applications. The federal restrictions include the following:

- Food crops are not to be harvested from the site for periods of time, ranging from 30 days for crops such as hay and field corn, to 14 months for crops whose harvested part touches the soil, to 20 to 38 months for food crops which grow in the soil.
- Animals shall not be grazed on the land for 30 days after application of the sludge.
- Public access shall be restricted from the site for 30 days where there is a low potential for public exposure

(sparsely populated areas) to one year in places where there is a high potential for public exposure.

A SUBJECT OF CONTROVERSY: ARE BIOSOLIDS SAFE?

The most comprehensive report to date on the subject of biosolids health risk is the National Academy of Science's National Research Council (NRC) report *Biosolids Applied to Land* (2002). As part of EPA's requirements under the Clean Water Act to periodically reassess its technical standards, the agency commissioned the NRC to review the technical methods used to establish the chemical and pathogen standards for biosolids as they apply to human health.

The NRC Report and EPA's Response. The NRC report, in a sentence often quoted by biosolids supporters, said, that "There is no documented scientific evidence that the [federal regulation] has failed to protect public health." On the other hand, the next sentence of the report said that "additional scientific work is needed to reduce persistent uncertainty about the potential for adverse human health effects from exposure to biosolids."

The report indicated that EPA's assessment work to develop the chemical standards for Part 503 was out of date, as well as the sewage sludge data used. The current federal standards for this group of nine restricted "chemicals" or "pollutants" were adopted in 1993. EPA used various screening processes to reduce a list of 200 potential chemicals of concern in biosolids to ten (following the adoption of the regulation, one of the ten metals identified, chromium, was dropped from the regulation as the result of two lawsuits). Many of the decisions made in this selection process were based on a 1988-89 national survey that provided information on the content of sewage sludge.

The NRC report stated that "some chemicals that were undetected because of analytical problems or detection limits that exceed risk-based concentrations were likely eliminated mistakenly." The report also stated that "some categories of chemicals, such as pharmaceuticals, personal-care products, and chemicals added to condition and de-water sewage sludge, that are especially likely to be present in domestic sewage, remain unstudied in biosolids."

The report said that "the land application of biosolids has occurred for many years with little, if any, systematic documented evidence of adverse effects." On the other hand, the report indicated that, in reality, "there is a lack of exposure and health information on populations exposed to biosolids." The NRC report concludes that: (1) a lack of documented evidence

(at this time) of health harm cannot be interpreted as a lack of health risk, and (2) a great deal more study is needed. The report offered “numerous recommendations to update and strengthen the scientific credibility of the biosolids regulations and to ensure their consistent implementation.” One of the recommendations was that in future revisions to the Part 503 rule, EPA should consider “additional risk-management practices,” such as “setbacks from residences or businesses, setbacks from private and public water-supply wells, slope restrictions, soil permeability and depth to groundwater or bedrock,” and whether “a greater setback distance to surface water is warranted.” The report did not make a determination of “whether EPA should continue to promote land application of biosolids.”

EPA responded to the NRC report in 2003 with a 14-point plan. The time for initiating and completing these projects was given by EPA as 2004 through 2006. The proposed projects include: designing and conducting a targeted survey of select chemical pollutants, improving methods for detecting pathogenic pollutants in sewage sludge, initiating field studies to evaluate biosolids management techniques to determine whether pathogenic and chemical requirements are being met, and investigating alleged health incidents. Reactions to EPA’s plans appear to be mixed, and to a great extent, the “success” of the projects depends upon whether objective, quality studies of the issues outlined in the NRC report are conducted.

Since the time of the NRC report, both supporters and critics of biosolids have cited studies as buttressing their point of view. However, no studies have been done that are sufficient in scope to definitively address the questions raised by the NRC report. In fact, efforts are still underway to develop protocols for studies that are hoped to be sufficient to provide some definitive answers in the future. One point of current agreement between many proponents and critics of biosolids, however, is that Class B biosolids are not a material that should be applied haphazardly or without oversight.

VDH Perspective on Biosolids and Public Health. In 2004, a VDH epidemiologist noted that the health department “has been dealing with possible public health consequences of biosolids land applications.” The epidemiologist explained that local advocacy groups allege that there are short term and chronic health conditions associated with the use of biosolids, and noted that “we have reviewed the medical / scientific and public health literature and have not been able to confirm or unequivocally deny these allegations.”

VDH regulatory staff indicate that public health is protected by numerous checks and balances that exist in the regulatory

system for biosolids. For example, in June 2004, VDH's Director of the Office of Environmental Health Services (an office which includes the division overseeing biosolids) wrote, in response to a citizen inquiry, that:

There are numerous checks and balances within the [biosolids] regulatory system that ensure that the producers of the biosolids and the appliers of the biosolids comply with requirements designed to protect human health.

In its reference to "numerous checks and balances", this communication repeated a theme that was previously stated by VDH biosolids staff in communications with citizens in December 2001 and September 2002.

The production of biosolids material as well as the application of material is regulated under the current system. With regard to biosolids producers, the VDH office director's correspondence indicated that biosolids that are to be applied "must be tested routinely for trace metals and a number of other parameters." In addition, "the wastewater treatment facility producing the biosolids must utilize approved processes to reduce pathogens and organically stabilize the material prior to land application."

With regard to appliers, the correspondence noted that the regulatory system: sets standards such that applications do not exceed nutrient requirements, provides set-back distances based on various features of the site and adjacent properties, and provides "site specific operational restrictions" that "can be implemented to prevent permit violations or nuisance conditions from developing or re-occurring". Finally, the correspondence noted, "inspections by local monitors and our staff can detect irregularities either in the application process or in the farm sites land applied with biosolids."

The points noted by VDH staff seem to be encouraging as to the public health protection that is provided by the regulatory framework. However, VDH staff comments indicate that site specific operational restrictions "can" be implemented, and inspections by local monitors and VDH staff "can" detect irregularities. Chapters 2, 3, and 4 of this report will examine the extent of oversight that is actually in place to ensure that biosolids are applied under the terms of regulations. The chapters examine the capacity for oversight that exists at the federal level, and at the State and local levels in Virginia, to provide the types of checks and balances noted by VDH.

BIOSOLIDS APPLICATIONS IN VIRGINIA

In Virginia, there has been growth in the amount of agricultural acreage to which biosolids have been applied, and in the tonnage of biosolids that has been applied. The spreading of biosolids in Virginia has led to contentious debate between those who support the permitted application of biosolids, on the one hand – for example, VDH, biosolids appliers, and farmers – and, on the other hand, some local governments and concerned citizens and citizen groups. While there are some very vocal supporters and opponents of biosolids applications, other citizens have less clear-cut views. In a JLARC staff survey of local government managers in localities in which biosolids are permitted, relatively few respondents indicated that their citizens can be considered supporters or opponents of biosolids. Most respondents indicated that citizens in their locality are either “wary” or “undecided” with regard to these applications.

Number of Acres Permitted and Receiving Biosolids Application in Virginia

Approximately 380,000 of Virginia’s more than eight million agricultural acres are permitted by VDH for the land application of biosolids (Table 2). The permitted sites include cropland, pasture and hay land, and forest land. Among these usages, spreading on pasture land appears to be the most common. Only about 51,000 of the permitted acres, or less than one percent of the State’s total agricultural acreage, actually received a biosolids application in calendar year 2004.

**Table 2
Agricultural Acres Permitted for and Receiving Land
Application of Biosolids, 2000 to 2004**

Source: JLARC staff analysis of data provided by VDH.

Calendar Year	Acres Receiving Biosolids Applications	Cumulative Acreage Under Permits	Percentage of Permitted Acres Receiving Applications
2000	36,633	246,353	15 %
2001	42,448	273,807	16
2002	42,115	322,032	13
2003	48,503	356,198	14
2004	50,488	380,775	13

As shown in the table, the number of acres receiving biosolids and the permitted acres has increased since 2000. In fact, the amount of permitted acres has increased by more than half.

Likewise, the acres receiving an application has increased by more than a third during that time.

Figure 2A identifies the counties in which VDH permits were granted for land application and the amount of acreage that was permitted in 2004. Figure 2B also indicates the amount of acreage by county on which biosolids were applied in 2004.

Five counties (Culpeper, Fauquier, Louisa, Orange, and Westmoreland) each had more than 20,000 acres permitted in their jurisdictions. In 2003, VDH estimates that approximately 70 percent of the permitted acres were used for hay, pasture, or forest land.

The amount of biosolids applied annually in a county can vary substantially. Because of harvesting restrictions and biosolids availability, biosolids applications generally occur only once every three years. (Applications can occur more often; however, the applications are spread out over the growing season and do not occur at the full agronomic rate.) Therefore, application amounts and acreage used can fluctuate from year to year and county to county. For example, in 2001, almost 2,500 acres in King William County received biosolids applications. During the next three years, however, the number of acres receiving applications averaged about 740 acres per year.

Tons of Biosolids Applied to Land in Virginia

Almost 242,000 dry tons of biosolids were spread in Virginia in 2004. Of that amount, approximately 232,000 dry tons were spread in the State under VDH permits. Only about 9,100 dry tons were spread in 2004 under permits written by DEQ.

According to VDH, approximately 61 percent of the total tonnage spread in 2002 was from out-of-state sources. The major source of out-of-state biosolids is the Blue Plains plant, discussed earlier in this section. (The District of Columbia Water and Sewer Authority that operates the plant estimates that about 20 percent of the raw sewage that is treated at Blue Plains is from Virginia sources.) Biosolids from the Blue Plains facility accounted for roughly 60 percent of the out-of-State biosolids applied in 2002. Other out-of-state sources have included treatment plants in Maryland, New Jersey, New York, and Pennsylvania.

Figure 2A
Acres Permitted for Biosolids Applications, by County, 2004

Source: JLARC staff analysis of VDH data.

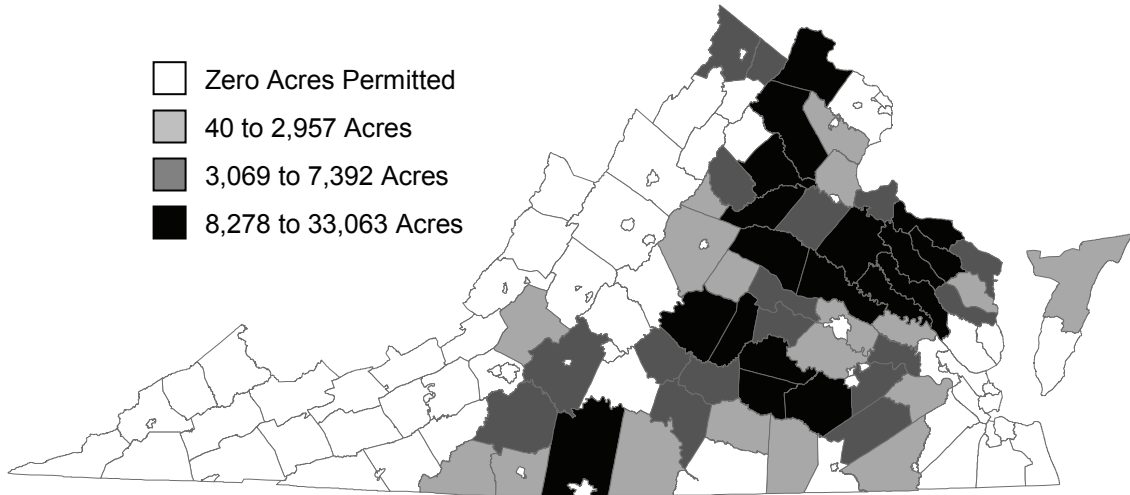
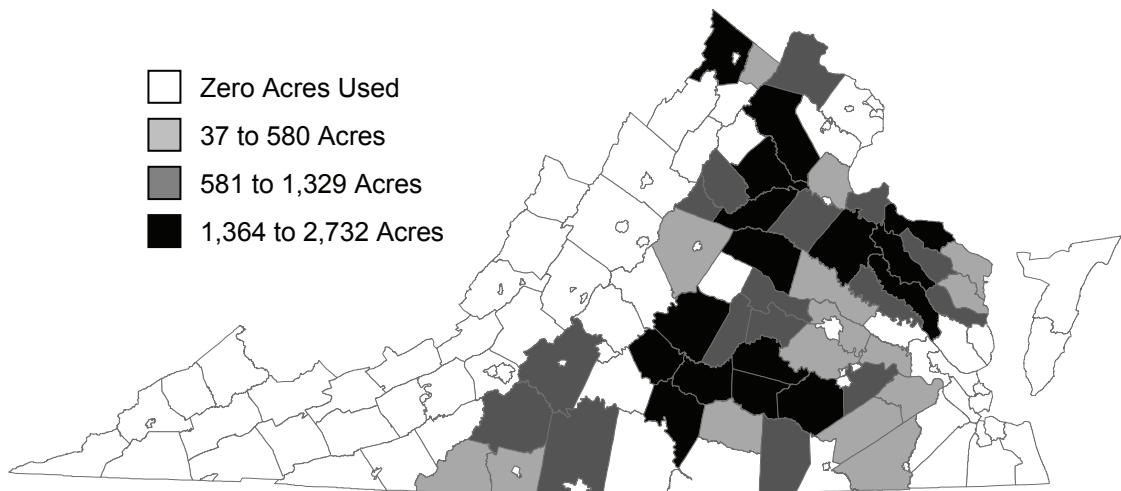


Figure 2B
Acres Receiving Biosolids Applications, by County, 2004

Source: JLARC staff analysis of VDH data.



While land in 54 counties is permitted for biosolids use, ten counties have accounted for close to half of the total dry tonnage applied in the State in 2003 and 2004 (Appendix D). About 47 percent of the 465,000 dry tons spread during that time was applied in these ten counties. Foremost among this group were Buckingham County, which received more than 33,000 dry tons, and Dinwiddie County, which received more 32,000 dry tons.

Nitrogen and Phosphorus Content in Biosolids Applied to Land in Virginia

Biosolids are a source of nutrients such as nitrogen and phosphorus. As noted, in 2003 and 2004, about 233,000 and 232,000 dry tons of biosolids were applied under VDH permits in each year. This quantity of biosolids is estimated to contain about 19.3 million pounds of nitrogen and about 8.4 million pounds of phosphorus.

Still, sewage sludge accounts for a relatively small proportion of the total nutrient content of all fertilizers applied in Virginia. In 1997, for example, when about 200,000 tons of biosolids were being applied in Virginia, the nitrogen and phosphorus in the biosolids accounted for about 3.6 and 5.1 percent of the nitrogen and phosphorus across farm animal manure, farm and non-farm fertilizer, and sewage sludge (Table 3).

**Table 3
Nitrogen and Phosphorus Content in Virginia Animal Manure, Commercial Fertilizer, and Sewage Sludge, 1997**

Source: Based on information from the USDA Economic Research Service (its Confined Animal and Manure Nutrient Data system), VDH, and DCR.

Category	Nitrogen Pounds	Nitrogen, Percent of Total	Phosphorus Pounds	Phosphorus, Percent of Total
Farm Animal Manure	250,500,000	53.6%	79,100,000	56.1%
Farm Fertilizer	188,300,000	40.3	48,400,000	34.3
Non-Farm Fertilizer	11,600,000	2.5	6,400,000	4.5
Sewage Sludge	16,600,000	3.6	7,200,000	5.1
Total	467,000,000	100.0%	141,100,000	100.0%

Note: For a more detailed note about the data in this table, see page 8 of the JLARC report *Review of Nutrient Management Planning in Virginia*, January 2005. The table has not been updated from 1997 because USDA has not, as of August 2005, updated the farm animal nutrient data it reports to take into account more recent census information. Since the release of the JLARC Report in 2005, VDH staff revised the total tonnage figure applied in 1997 to 165,000 dry tons. As a result, VDH believes nitrogen from biosolids would be approximately 13,200,000 pounds and phosphorus would be approximately 5,700,000 pounds.

According to the Department of Conservation and Recreation, nutrient runoff from agricultural sites is considered a leading cause of impairment affecting the Chesapeake Bay and Virginia's rivers and streams. While biosolids are not abundantly used, the material does contain significant levels of nitrogen

and phosphorus, similar to other agricultural fertilizers. These nutrients, if applied incorrectly and in excessive amounts, can produce harmful effects on water quality. Policymakers in Virginia have made a commitment to reducing nutrient runoff and cleaning up the Bay as a signatory to the Chesapeake Bay Agreement, and through such initiatives as the Chesapeake Bay Preservation Act and tributary strategy planning.

Differing Perspectives in Virginia About the Land Application of Biosolids

Although biosolids are materials that have been treated, their application to fields can negatively impact the neighbors of farms where field applications are made. Potential negative impacts on neighbors include foul odors and anxiety over perceived and possibly real health effects (citizens have complained of headaches and gastrointestinal disorders that are alleged to stem from biosolids). Further, under the current system, there is no compensation for any negative impacts of biosolids applications on the quality of life of neighboring residents. Thus, where biosolids applications have an impact upon neighbors, the applications represent an example of “an externality effect,” where:

One individual’s actions affect the well-being of another individual – whether for better or for worse – in ways that need not be paid for according to the existing definition of property rights in society.

Regulatory controls, however, can be put in place, in an attempt to minimize the possible health risks and other potentially objectionable impacts on the neighbors and others, as well as to promote environmental protection.

Given the potential benefits of biosolids applications to application companies and to farmers, as well as the potential for some noxious impacts upon neighbors, perceptions about the land application of biosolids can vary considerably. Exhibit 2 provides some example comments from Virginians illustrating some of their differing perspectives.

Controversy over biosolids issues is often most heated at public hearings on permits that are about to be given to an applier in a given locality. A recent example occurred in Amherst, Virginia, where there was a permit application to spread biosolids on a farm bordering a river and across from a recently completed trailway. The application provoked a three-hour meeting, with more than 100 people reportedly “squeezed into” a

Exhibit 2
Examples of Differing Perceptions in Virginia of Biosolids Applications

Source: VDH staff correspondence with citizens, JLARC staff notes from interviews with farmers, and news articles from the Lynchburg News and Advance and Staunton News Leader.

Comments Supporting or Defending Biosolids

“I have been in the field observing biosolids operations for 20 years and I have been involved in visiting every large sewage treatment facility in the State... including those with incinerators. I personally would prefer to have biosolids applied to fields up to 200 feet of my house every 3 years than live within several miles downwind of an incinerator... I did live... adjacent to a dairy farm. The animal waste spreading odors each spring were stronger there than any biosolids land application operation that I have observed as of today.” (VDH staff member)

* * *

“It’s continually frustrating to justify every new project. You justify it through all the screaming and yelling during the permitting process. Then once its in, people say it’s not that bad.” (A manager of biosolids applications for a permitted company)

* * *

Biosolids are a ‘win-win’ for everyone. If the material is landfilled, it just passes the problem on to the community because it takes up landfill space and creates environmental problems. Biosolids are good for the land because they improve the quality of the soil. I used it on 140 acres of land three years ago. There were houses all around the fields on which it was applied and there were no complaints.” (Dinwiddie farmer comments, based on JLARC staff notes)

* * *

There is not a definitive answer to biosolids that will please all interested parties... Most of my farms are larger tracts, removed from denser populations... this helps limit complaints. In a best case scenario, I can save \$120 to \$150 an acre by applying biosolids. Savings can be about \$45 an acre for nitrogen, \$40 an acre for lime, and \$60 an acre for phosphorus. (Essex County farmer, based on JLARC staff notes)

Comments of Concern or Opposition

“I do take exception to 2 points. First of all there is not a musty smell that is not offensive associated with sludge. It is instead a very very offensive stench that cannot be described. I have lived near the old chicken houses in years past and they did not come close to this odor. I pass a hog farm when we go to our place at the lake. This comes close in smell but at least we know it is hogs and the odor is bearable because you know what you are breathing... Second, I am not sure I agree that our symptoms are stress-related. I teach emotionally-disturbed teenagers. The headaches I get from there are stress-related. A sore throat and congestion from stress I have never developed. Of course it is possible that having this dumped upon us and not being able to even go outside to do what we need to do without the smell making you ill could produce stress.” (Citizen comments to VDH)

* * *

“My husband suffers from [leukemia], a disease of the blood for which he has been receiving chemotherapy, and which renders him susceptible to serious bacterial and viral infections... exposure to pathogens such as those found in Class B sludge could be fatal to him. I have emphysema... The added presence of airborne pollutants, and strong odors from the application of sewage sludge near our home, could exacerbate the symptoms... [this is] a scheme whereby rural landowners [are] enticed and encouraged with the promise of free fertilizer to provide their land as a disposal site for this human and industrial waste, and pose a threat to our health, well-being, and property rights... My husband and I are hereby notifying you of our legitimate fears and concerns over the proposed spreading / storage of sludge near our home, and we request that you deny [the permit] due to the real and serious threat that this would pose to our health and lives.” (Citizen comments to VDH)

* * *

“We have chickens and we put chicken manure in our yard, but we know what we feed our chickens. I think they need to test this stuff long and hard. I think they need a health official to... make sure farmers are doing what they are supposed to do.” (Citizen comments to VDH)

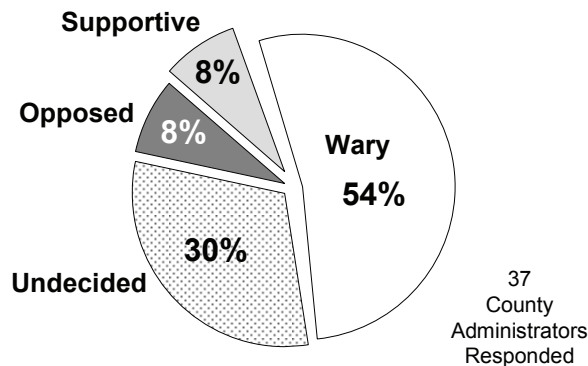
school board meeting room to question VDH staff about the proposal, and another 20 people standing in the hallway.

JLARC Survey Results Suggest That Citizens in a Majority of “Biosolids” Counties Are Wary of Biosolids Applications. Virginia’s counties have often been at the center of the controversy surrounding biosolids use. JLARC staff surveyed the county administrators in each of the 56 counties in which land has been permitted for the application of biosolids, or a permit is pending. The survey inquired as to the extent of concern among the public in their jurisdictions. Of the 37 respondents, almost two-thirds suggested that environmental and public health issues surrounding biosolids applications are a local concern. (In some cases, the administrator distributed the survey to the local monitor or another staff person for completion.)

More than half of the administrators indicated that their communities are wary of biosolids applications (Figure 3). Among the 37 county responses to the survey question, 20 respondents indicated that the public in their jurisdictions is wary of biosolids applications. Another 11 respondents identified their counties as undecided on the issue. Six respondents indicating that their citizenry is either supportive or opposed to biosolids applications were evenly split between the two positions.

Figure 3
County Administrators’ Assessment of the Attitude of Their Citizens toward Biosolids Applications

Source: Staff analysis of data from summer 2005 JLARC survey of administrators in counties in which the land application of biosolids has been permitted by VDH or a permit is being considered. Surveys were completed by either the county administrator or other designated staff, including local monitors.



Survey responses also indicated that almost six in ten county administrators who responded to the survey believe their public’s concern for biosolids applications was medium to high, but, as would be expected, that there would be a much higher level of concern among those living close to a biosolids appli-

cation site (Table 4). In this case, 85 percent of the 33 respondents to this question indicated that they thought the people living closest to those sites would have a medium to high level of concern.

Table 4
County Administrator Assessments of the Level of Concern About Biosolids Applications Among Their Citizens

Source: JLARC staff survey, Summer 2005.

Reported Level of Concern	Among the Public in General	Among Citizens Nearby Applications
High	3 % (n = 1)	38 % (n = 13)
Medium	53 % (n = 18)	47 % (n = 16)
Low	38 % (n = 13)	15 % (n = 5)
None	6 % (n = 2)	0 % (n = 0)

Note: Three counties indicated "No Response" to these questions.

When asked to identify what they believed to be the public's main concerns, odor was selected almost unanimously, as well as two items relating to the protection of the environment and public health. Almost all (34 of 35) administrators selected the odors associated with an application as a main concern for their populations (Table 5). In addition, 28 county administrators identified potential groundwater contamination as a main public concern, and 23 identified long-term concerns about public health.

Table 5
Public's Main Concerns Regarding the Land Application of Biosolids, According to County Administrators

Source: JLARC staff survey, Summer 2005.

Main Public Concerns As Identified by County Administrators	Number of Responses
Odors from biosolids applications	34
Concerns about potential groundwater contamination	28
Long-term concerns about public health	23
Biosolids trucks tracking the material on local roads	18
Public safety concerning truck traffic (e.g., speeding trucks, trucks exceeding bridge weight limit)	11
Possible allergic reactions for people nearby an application	10

Note: Respondents were allowed to choose more than one item.

The survey responses of the county administrators did not indicate a clear trend as to the level of public concern about biosolids applications. Among respondents, 54 percent saw no clear trend in their county, and 31 percent saw a trend to an increased level of concern (Table 6). Only 16 percent of respondents saw a trend toward decreased concern.

Table 6
Assessment by County Administrators of Trend in Public Concern Involving Biosolids Use

Source: JLARC staff survey, Summer 2005.

<u>Response</u>	<u>Number of Responses</u>	<u>Percentage</u>
Trend is to an increasing level of concern	11	30 %
Trend in to a decreasing level of concern	6	16 %
No clear trend	20	54 %
TOTAL	37	100 %

STUDY MANDATE AND JLARC REVIEW

In 2004, governing bodies in at least seven Virginia localities passed resolutions expressing concern about biosolids applications and the State’s biosolids program. Five of these localities (Appomattox, Charlotte, Cumberland, Nottoway, and Prince Edward) were Southside Virginia localities, a region of the State where a substantial quantity of biosolids is applied. These localities requested that the General Assembly fully investigate the existing State program governing the land application of biosolids “to insure that proper regulatory and environmental oversight and control are in place to fully protect the citizens of the Commonwealth of Virginia.” Also, the local governing body of Shenandoah County passed a resolution in 2004 requesting that the General Assembly provide local governments with the opportunity to “participate fully” with VDH and DEQ in the promulgation of regulations governing the land application of biosolids. Northumberland County requested a moratorium on the issuance of biosolids permits “until the scientific data is uniform and is proven safe.”

Study Mandate: House Joint Resolution 643

At the 2005 General Assembly Session, the legislature passed House Joint Resolution 643, requiring this study. HJR 643 directs JLARC staff to study the State’s regulatory program governing the management, treatment, and beneficial use of biosolids in order to protect public health, safety, and the environment, including an assessment of the current level of

funding, staffing, and resources available to VDH for oversight and enforcement of the biosolids program. In addition, JLARC is required to assess the resources available to assist local governments with implementation of their biosolids inspection and monitoring authority. JLARC staff are also directed to examine the adequacy of the training and support being provided to the biosolids monitors at the local government level. The use of incentives to encourage sharing of information and resources among local governments, including the use of regional or multi-jurisdictional monitors, is also to be reviewed. HJR 643 requires JLARC to recommend measures for making the complaint response and enforcement efforts more consistent and efficient by enhancing the cooperation between VDH and the local governments.

Study Scope

As noted earlier, VDH and DEQ both have some responsibility at the State level for biosolids oversight. This study focuses on VDH's role, because the department is responsible for permitting the vast majority of land applications that occur in Virginia. (DEQ only permits about 9,000 of the approximately 240,000 dry tons that are annually applied in Virginia.)

To meet the mandate, this JLARC review of the land application of biosolids in Virginia focuses on performance in regards to the federal, State, and local oversight and enforcement of Virginia's biosolids use regulations, the adequacy of the resources available to perform those functions, and ways to improve State and local as well as intra-local cooperation in this area. (This study is not an evaluation of whether biosolids affect public health, although a description of the current status of that debate is included as background material.) Research activities for the review are described in Appendix E and a glossary of terms and acronyms is provided in Appendix F.

Chapter
2

Federal Oversight of Biosolids Generation and Disposal

In Summary...

The Environmental Protection Agency (EPA), charged at the federal level with biosolids oversight, has indicated that if biosolids are produced and utilized in accordance with standards and guidelines, then the material constitutes a relatively low risk to public health and the environment. Although acknowledging the need for biosolids producers and applicators to meet standards, EPA has given oversight of whether standards are met a low priority. The agency has assigned few resources to the program and does few inspections. The agency's own inspector general office, as well as others, have questioned EPA's ability to ensure compliance with its biosolids regulations. As a result of EPA's position on biosolids, state and local governments bear the primary responsibility for ensuring that applications are properly conducted. (Chapters 3 and 4 of this report discuss the role of State and local governments in Virginia, respectively.)

At the federal level, the U.S. EPA is responsible for ensuring that biosolids production and use are effectively managed under the Part 503 rule. The agency currently has approximately nine FTEs assigned across its ten regional offices, and another seven staff at the central headquarter. Virginia is in EPA's Region 3 along with four other states (Delaware, Maryland, Pennsylvania, and West Virginia) and the District of Columbia.

According to EPA, the safe use of biosolids is based on the extent to which the material is used in accordance with guidelines and standards established in Part 503. The regulations focus on guaranteeing that biosolids: (1) meet quality control requirements when being produced, and (2) are applied in a manner that is consistent with established management practices. For Class B biosolids, the quality control criteria are achieved when the material meets or is below the concentration ceilings for the regulated chemical pollutants and the material has been treated using accepted practices to reduce pathogen content and vector attraction. The application is considered to be in compliance when the material is applied in a way that meets the general and site-specific requirements guiding land applications.

EPA has several opportunities to ensure compliance with the Part 503 rule. EPA staff can review publicly-owned treatment plants' annual reports that identify the annual average chemi-

cal concentrations of the nine regulated pollutants and the methods used to meet pathogen and vector attraction reduction requirements. Furthermore, EPA can conduct inspections of the generating facilities to evaluate the technological processes used to obtain Class B biosolids and sampling records. EPA staff can also be involved in complaint resolutions and can conduct on-site inspections of applications. This chapter examines how EPA staff provide oversight of biosolids activity.

EPA OFFICE OF INSPECTOR GENERAL CRITICIZED EPA'S BIOSOLIDS EFFORTS

In 2000, the EPA's Office of Inspector General (EPA OIG) issued a highly critical report of the agency's compliance enforcement with regard to Part 503. The report found that:

EPA does not have an effective program for ensuring compliance with the land application requirements of Part 503. Accordingly, while EPA promotes land application, EPA cannot assure the public that current land application practices are protective of human health and the environment. (*Biosolids Management and Enforcement*, EPA Office of Inspector General, March 2000.)

Specifically, the report faulted the agency for not adequately performing the critical oversight functions related to quality control and site inspections. In particular, the report found that EPA was not reviewing annual reports that are required from publicly-owned treatment works and performing few actual on-site inspections of POTWs and land applications sites. The report stated that the cumulative weight of these problems may not only result in risks to human health and the environment, but also result in a loss of public confidence.

USE OF ANNUAL REPORTS TO OVERSEE BIOSOLIDS PRODUCTION HAS SOME LIMITATIONS

EPA's OIG reported that the agency was reviewing few of the required Discharge Monitoring Reports (DMR) annually submitted by wastewater treatment facilities. DMRs identify the recorded metal concentrations and pathogen and vector attraction treatment options used by the wastewater facilities. EPA also requires facilities to report the highest concentration, or spike, recorded for each of the regulated chemical pollutants as part of their DMR submissions. The EPA OIG reported that in 1998, staff in EPA Region 3 did not review any of the 485 reports that were submitted.

Since the 2000 EPA OIG report, EPA Region 3 has improved its oversight of the data reported by the generators. The agency now enters the technical data from the DMRs into a database that produces a single report. This report presents each plant's average chemical concentrations (by reporting frequency) from the reporting year and which options were selected to treat pathogens and vector attraction.

DMRs May Not Consistently Detect Short-term Spikes in Pollutant Concentrations

An evaluation of the DMRs prepared by many of the treatment facilities that land apply in Virginia shows that average chemical concentration levels are well below the ceiling limits established by Part 503, at least during the 2004 report period. This is not particularly surprising, as the 2002 NRC report noted that the limits for the nine chemicals regulated by EPA are relatively easy to achieve. In addition, under Part 503, facilities are only required to sample the biosolids being produced from one to 12 times annually, depending on the amount of tonnage that is land applied or given away. Therefore, the representativeness of the data available for the DMR reports is somewhat limited to begin with.

Problems can occur if facilities produce a material that contains a concentration greater than the limit (representing a spike) of one of the chemical constituents and that material is subsequently land applied. While on a monthly or annual basis chemical pollutant concentrations may be low compared to the established limits, greater variation can occur on a day-to-day basis. Short-term spikes above the concentration limits, though rare, have occurred. This creates potential problems for land applications of biosolids from facilities that produce biosolids on a frequent basis. The biosolids coordinator in EPA's Region 3 office said that when reviewing the DMRs, if the highest recorded value is greater than the allowable limit, then EPA questions whether the biosolids were land applied. If so, the federal agency may take action against the POTW.

At least one incident has occurred in Virginia involving an exceedance of the chemical concentration limits according to VDH staff. The incident is described below.

During 2002, the Henrico County POTW generated biosolids with molybdenum (a metallic element used to harden other metals) concentrations higher than the ceiling limits. Upon learning of the problem, the facility was required to landfill the material until the issue was resolved. According to VDH staff, it is possible that some of the biosolids containing the high molybdenum concentrations were land applied.

DMRs Contain Information on Pathogen Reduction Processes, But No Data on Effects of Such Treatment

Part 503 requires that POTWs record and report the methods used to reduce pathogens and vector attraction. Each facility is required to include this information in its annual Discharge Monitoring Report to EPA. In order to achieve Class B status with regards to pathogens, the POTW can use one of three accepted alternatives established by Part 503. The regulations also establish ten options for achieving vector attraction reduction requirements.

However, when submitting their annual DMRs, POTWs are not required to report any data identifying to what extent the methods used were successful at pathogen or vector attraction reduction. As a result, if one of the processes used by a plant fails to achieve the necessary pathogen or vector attraction reduction requirements, that information will not be reported on the DMR.

EPA HAS A LOW PRIORITY AND FEW RESOURCES FOR OVERSEEING BIOSOLIDS ACTIVITY

The 2000 OIG report concluded that limited federal oversight of biosolids stemmed from a low priority for the program at EPA. This assessment continues to be accurate.

EPA Rarely Inspects Biosolids Applications

Since 2002, EPA staff have observed only one biosolids application in Region 3, and that was in Pennsylvania.

The 2000 EPA OIG report found that the agency performs few biosolids inspections. For example, the report states that in 1998 EPA performed only 167 inspections of POTWs and land applications sites nationwide, two of which were conducted by Region 3 staff. On-site activity does not appear to have increased since then. The EPA Region 3 coordinator indicated to JLARC staff during this review that only one site visit was performed in the region since 2002, to an application site in Pennsylvania.

On-site inspections are important, the EPA OIG report contended, because there are no requirements for land appliers to report any information to EPA. The EPA OIG report stated:

Only through actual inspections of land application sites would EPA gain information about compliance with Part 503 management requirements, such as use of buffer zones, avoidance of wetlands, recognition of harvesting restrictions and grazing restrictions. (*Biosolids Management and Enforcement*, March 2000.)

EPA Continues to Give a Low Priority to Biosolids Oversight

The agency has been criticized for not making biosolids oversight a greater priority. In 2000, the EPA OIG reported that because EPA contends that there is a relatively low risk to human health and the environment as the result of biosolids use, the agency has chosen to allocate its limited resources to higher priority concerns. In 2002, the EPA OIG prepared a follow-up report to its 2000 study of the agency's biosolids program. The EPA OIG indicated that "EPA's position is that the resources allocated to biosolids are appropriate when balanced against competing priorities." As part of EPA's 2003 response to the NRC report, the agency again stated that given the complexity and relative risks of biosolids, the agency had an "appropriate level of resources assigned to biosolids compliance and enforcement activities."

EPA staff interviewed during the summer of 2005 for this review indicated that, in the agency's view, research done in the biosolids area identifies it as a low risk for health or environmental problems. Therefore, the agency still continues to focus its limited resources on other regulatory issues.

EPA Resources for Biosolids Oversight Are Limited

The low priority for the biosolids program at EPA has resulted in limited staffing for the function. The 2000 EPA OIG report indicated that in 1998 there were about 18 FTEs in EPA's ten regional offices assigned to biosolids. However, only seven were responsible for inspections and enforcement. A subsequent follow-up on EPA's program reported that the number of FTEs in the regions had declined to 10 in 2000, four of which were for inspections and enforcement. The NRC report indicated that EPA had roughly nine regional positions assigned to biosolids in 2002. This included staff for inspections and enforcement as well as permitting, technical assistance, and other activities. Currently, the Region 3 biosolids coordinator is the only position allocated to address all biosolids concerns in five states and the District of Columbia.

In September 2001, the national coordinator for state-level biosolids programs wrote to EPA requesting that the agency devote more resources to the biosolids program, and that the agency issue a position statement reaffirming its support of the beneficial use of biosolids. An EPA assistant administrator responded:

The agency has only finite resources to discharge a large number and variety of responsibilities to address risks to the nation's water resources. The challenge, of course, is to use the available resources to reduce risk

to human health and the environment in the most effective ways. EPA also believes that, within its resource constraints, EPA can best contribute to beneficial reuse by maintaining scientific knowledge and risk assessment capabilities; setting, enforcing, and revising standards; and providing tools for decision-making at the watershed level... EPA generally supports beneficial reuse of biosolids, but it is the responsibility of the local government to make local decisions regarding use and disposal options that are consistent with the Part 503 rule.

In an interview conducted for this review, the EPA Region 3 biosolids coordinator told JLARC staff that current staff resource levels for biosolids at EPA are about the same as at the time of the NRC report. Thus, despite the concerns that have been voiced about the adequacy of EPA's program, and although biosolids activity has increased during the last two to three years, EPA resources allocated to the function have remained the same. Thus, EPA contributes relatively little in the way of checks and balances to ensure that land applications actually comply with requirements. While EPA does examine whether the limits for nine chemicals are generally met, and whether approved processes are used for pathogen treatment, it leaves the role of on-site compliance monitoring to states and / or local governments.

State Oversight of Land-Applied Biosolids

In Summary...

In Virginia, the Department of Health (VDH) has primary responsibility for permitting and enforcing the land application of biosolids. However, VDH's oversight of biosolids is currently weak. While VDH does investigate public complaints, few routine inspections are conducted, calling into question VDH's ability to detect irregularities. Enforcement actions are rare. A statutorily-required complaint database has not been proactively maintained, and the agency has not ensured that biosolids fees are consistently collected. Rulemaking activity is slow. VDH regulations lack a method of ensuring public awareness of biosolids site access restrictions, and accountability issues surrounding animal access restrictions need to be addressed. VDH's approach to the regulation of biosolids is overly reliant on the good will of the operators themselves and on citizen complaints to achieve compliance.

Pursuant to the study mandate, this chapter examines the State's role in overseeing land applications of biosolids in Virginia. The chapter particularly focuses on the issue of the oversight of the applications, although other issues are also addressed. The assessment in this chapter of VDH's current oversight performance is used as a basis for suggesting improvements to the oversight of biosolids.

VDH IS RESPONSIBLE FOR OVERSIGHT OF BIOSOLIDS ACTIVITY

VDH is responsible for permitting application activities under the biosolids use regulations when a facility contracts to have its biosolids spread by another entity. Administration of the biosolids program is organized within VDH's Office of Environmental Health Services, through the Division of Wastewater Engineering (DWE). Currently, VDH has three full-time positions assigned to administer the biosolids use regulations. In addition, another full-time position is assigned part of the time to biosolids work, to provide complaint response and field inspections. The three positions dedicated to biosolids, including the DWE director, are located in VDH's central office in Richmond. The position working part-time on biosolids serves from VDH's Lexington office. The DWE director reports to the director of the Office of Environmental Health Services. Another position provides assistance with hearings and regulatory development. However, the position is not organized within the division.

VDH staff are responsible for issuing permits to contractors who have been assigned the responsibility for land-applying biosolids produced at a treatment works by the owner of the facility. Two of the central office positions and the part-time position perform inspections related to permit issuance, biosolids spreading, and complaints. Staff are also responsible for administering a fund to reimburse local governments that carry out their own biosolids monitoring and testing activities. Legislation enacted in 2003 requires VDH to develop and implement a certification program for land appliers and a training program for local monitors. The DWE director is in charge of administering the biosolids use regulations as needed.

The biosolids workload of the division is impacted by the volume of complaints that are received. Complaints are often about biosolids odors, but other issues surface from complaints as well, such as the tracking of biosolids on roads, animals on the fields within 30 days of application, and perceived violations of buffer areas.

In September 2004, a citizen who had brought a regulatory compliance problem to VDH's attention, wrote the following:

My immediate concern is that a violation here indicates that violations are occurring statewide. How do you police biosolids applications to [i]nsure compliance with state ordinances? I would appreciate your insight, and understanding of how the process works.

This question, as well as other issues surrounding VDH's role in regulating and overseeing the land application of biosolids, are addressed by this chapter of the report.

VDH RECEIVES REPORTS FROM APPLIERS ON BIOSOLIDS APPLIED TO FIELDS

Permits are issued to a contractor (a biosolids applier) for an entire county and are written for a five-year period. Permits can be modified to include more acreage or another source of biosolids after initial approval. Contractors must identify any site-specific characteristics of each field in a permit application. For new permits, VDH conducts an on-site inspection to verify the accuracy of the site-specific information, such as slopes, wet areas, and nearby residences. Localities may comment, but only on site-specific issues related to the proposed site(s) will be considered by VDH when determining whether to issue the permit.

Contractors are required to provide VDH with a monthly report identifying, by county, each application that was made in the previous month. The monthly report must include the biosol-

ids' source and an analysis of the material (chemical levels for the nine regulated chemicals, and nitrogen and phosphorus data). The generator provides the chemical concentration analysis information to the contractor based on a rolling twelve-month average. According to VDH staff, the reports are checked quickly to determine the extent to which the recorded pollutant concentrations are approaching the regulated limits. VDH staff indicate that these documents will receive a more detailed review if it is found that the limits are being approached or an unusual concentration has been recorded.

With regard to the pollutants for which data are provided, this monthly report does serve as a second "cross-check" of the EPA DMR reports. However, VDH relies upon the accuracy of the data provided by the applier (who received the information from the generator). There is no independent measurement of any pathogen levels contained in the biosolids by VDH. According to the DWE director, if sampling and testing of biosolids for pathogens are being done independently of the producer and applier, then these activities are being done by local monitors.

MOST LAND APPLICATIONS OCCUR WITHOUT ON-SITE OVERSIGHT BY VDH

VDH performs three main types of inspections with regard to biosolids applications:

- ***Inspections for permit applications*** – These inspections are performed before a permit is issued to a site and are intended to identify any site-specific features that should be accounted for in the permit.
- ***Complaint inspections*** – When complaints from the public are received, VDH may go to the site where biosolids are being or have been applied to determine if any permit violations have occurred. Section 32.1-164.5 (C9) of the *Code of Virginia* requires VDH to develop a procedure for the prompt investigation and disposition of complaints. Complaints are received by phone, e-mail, and letter. According to the DWE director, after a complaint is received, staff first contact the land appliers to identify who was working in the area of the complaint. Staff then go to the site and investigate the operation using a complaint inspection checklist. They will also speak with the person who made the complaint for additional information or to inform that person of the findings from the investigation. Once the investigation is finished, copies of the checklist

are forwarded to the locality in which the complaint originated, the land applier, and the complainant, if requested.

- **Routine inspections** – These are inspections of on-going applications of biosolids that are not in response to complaints. These inspections are done simply to check if permit requirements are being adhered to. VDH has developed a site inspection checklist that staff use when conducting routine inspections. The checklist includes sections devoted to: (1) general information about site location, ownership, and the contractor, (2) field data regarding site and soil conditions, application rates, and biosolids information, and (3) inspector observations and comments concerning compliance with management practices.

VDH’s Focus Has Been on Permits and Complaints

According to VDH staff, their main focus has been on permit applications, complaint response, and regulatory development which are required by statute and regulation. This stated priority is supported by data obtained for this review (see Table 7). While VDH does not systematically track the number of routine inspections that are done, a review of VDH correspondence files, interviews with VDH staff, and a review of data for 2004 and 2005 furnished by VDH, yielded the data for permit issuance, routine, and complaint inspections that are shown in the table.

**Table 7
Number of Inspections Performed by VDH DWE Staff
Related to Biosolids**

Source: JLARC staff analysis of data supplied by VDH.

<u>Year</u>	<u>Permit Issuance</u>	<u>Complaint</u>	<u>Routine</u>
2000	Not indicated	28	12
2002	Not indicated	12	20
2003	Not indicated	58	Not indicated
2004	71	55	19
2005 (Jan. – Aug.)	28	27	10
Average for full years	71	38	17

Note: Routine and complaint inspection numbers for 2000, and the number of complaint inspection in 2003, are figures noted in VDH correspondence files (from prior to the time of the JLARC review). VDH correspondence files did not provide an indication of inspection levels in 2001. The 2002 figures were provided by VDH’s biosolids director in an interview with JLARC staff. The 2004 and 2005 figures are based on a JLARC staff review of information furnished by VDH.

**Relative Lack of Routine Inspections Calls into Question
VDH's Ability to Detect Irregularities**

VDH's ability to detect application irregularities is compromised when complaint inspections are supplemented by only 19 routine inspections for more than 1,100 land applications.

VDH lacks a systematic effort to ensure that biosolids applications are conducted according to the established management practices and site-specific requirements. As shown in the table, VDH staff perform few routine inspections during the course of a year. In 2004, more than 1,100 land applications occurred. However, information from VDH staff indicate that only about 19 routine inspections and 55 complaint inspections were conducted.

Further, according to VDH staff, routine inspections are not scheduled as the result of a plan to address perceived compliance-check needs. Instead, routine inspections occur as a result of VDH staff being in the vicinity of a land application, usually as the result of a permit issuance or a complaint, and having the time to visit an additional site. Furthermore, little oversight is provided following an application to make certain that the public access restrictions are being followed.

In two of JLARC staff's site visits to fields where biosolids had been spread, issues regarding compliance with the department's operational standards were observed.

On a site visit with a major applier to a hay field receiving liquid biosolids, JLARC staff observed that the buffer areas had not been marked using flags as required in the operator's manual. When VDH approves a contractor's operating and management plan, the practices described in it become part of the permit. In this case, failing to mark the buffered part of the field is a technical violation of the permit. (Failure to do so has led to the misapplication of materials inside buffer zones on a number of occasions.) When asked why the flags had not been used, the operator of the spreading equipment said that he had enough experience to know which areas of the field should not be spread. In May of this year, VDH carried out an enforcement action against another land applicator for a similar violation.

* * * * *

On a site visit with a county administrator and monitor, JLARC staff observed that some biosolids had been tracked outside of the buffer area. The monitor called the contractor later that day and asked that the biosolids in the buffer area be removed, which was done.

COMMISSION DRAFT - NOT APPROVED

VDH correspondence reflects the uncertain status of routine inspections at the agency. For example, a VDH staff member responsible on a part-time basis for inspections wrote in 2003:

[Another staff member] suggested I start conducting some routine inspections of biosolids in my region so I am familiar with the personnel and locations. I would be glad to do this if you [and another inspector] think that there is merit to it. We visited a [applier company name] site today and those guys would tighten up their operations if they knew someone was watching. We saw what appeared to be some over-applying and some minor buffer violations. I know that [another company's name] does a decent job but routinely documenting the fact may be useful.

Several factors appear to contribute to an environment in which staff charged with inspection responsibilities ask if doing some routine inspections might have some “merit.”

- An important factor is the limited amount of staff resources available to perform biosolids work. As noted, available staff time is focused on permit issuance and complaint inspections.
- The presence of out-of-state monitors at a number of applications may be a factor. The Blue Plains treatment facility, accounting for about 46 percent of the total dry tonnage of biosolids applied in Virginia, hires the Maryland Environmental Service (MES) to monitor its biosolids applications.
- VDH staff report their ability to perform on-site inspections is limited by their lack of knowledge regarding where the land appliers are working at any specific time. Under the current regulatory framework, contractors are not required to notify the department of the day(s) they plan to work in a county, and weather conditions, generator requests, and malfunctioning equipment can affect where the contractors will operate on a daily basis. (Proposed changes to the biosolids use regulations would require contractors to notify counties at least 15 days in advance of any applications that are scheduled to occur in that jurisdiction. However, under the proposed language, VDH is not notified.)
- To some degree, VDH presumed that the creation of monitor positions would free the department from some of its oversight functions, or at the least augment State resources. For example, as part of the department's

comment on the creation of the biosolids fee fund, the department stated that an advantage of providing fees to support local monitors is that “the credibility of this controversial state permit program will be enhanced.” The department stated that “the use of local monitors will alleviate the need to increase the VDH staff in order to provide for routine surveillance of operations permitted through the regulations.”

These factors, however, are not sufficient to permanently excuse VDH from providing more routine oversight to enforce State-regulated, State-permitted activities. The department can insist upon timely information from contractors about spreading plans. MES inspectors work for one of the generators, not the State; and, to the extent that these inspectors are on-site, they only test the material for pH and odor, and are not required to share their findings with VDH. Also, as will be documented in detail in Chapter 4, many counties permitted for biosolids do not have a monitoring function established, and in other counties where it has been established, lack of expertise has been a concern, and testing of biosolids or soil is rare. Thus, VDH still needs to have the resources necessary to perform a credible oversight role. Additional inspector positions for biosolids oversight could be authorized (and paid for from fee funds with a statutory change, as will be discussed in Chapter 5).

The lack of inspection presence in the field puts VDH in a reactive position concerning any issues that may arise, instead of proactively being able to address such issues. This is problematic from the perspective that, like other fertilizers, once biosolids have been spread onto an agricultural site, it is difficult to recover the material. Where opportunities for nutrient loss are involved, such proactive oversight is especially important. Additionally, an inspection presence, sometimes announced and sometimes unannounced, helps to make it more likely that requirements will be observed. Moreover, the DWE director told JLARC staff that making certain that site-specific requirements are followed is critical to ensuring that the applications are being done correctly.

Recommendation (1). The Virginia Department of Health should allocate two FTE staff positions for the primary purpose of conducting routine inspections of biosolids spreading operations and compliance with site access restrictions. During times of the year when little spreading is taking place, the positions should also be assigned to work on local monitor training issues, and assist with other biosolids oversight functions, such as permitting.

Recommendation (2). The Department of Health should develop a process that requires the cooperation of biosolids appliers in identifying the time periods in each county during which biosolids spreading is expected to occur. The department should use that information to prepare routine inspection plans and a general schedule. Routine inspection plans should provide for a sufficient number and quality of inspections, in different geographic regions and involving various generators and contractors, to: (1) detect and prevent ongoing irregularities in the operations of biosolids applications, (2) systematically assess and document compliance levels across appliers, and (3) confirm on a spot-check basis that access restriction requirements are being observed.

VDH GENERALLY RESPONDS TO COMPLAINTS IN A TIMELY MANNER, BUT SHOULD BETTER MAINTAIN A STATUTORILY-REQUIRED COMPLAINT DATABASE

The *Code of Virginia* requires VDH to have “procedures for the prompt investigation and disposition of complaints” concerning biosolids. While the division has not adopted a formal procedure for complaint response in response to the statute, the division indicates that its policy is to investigate complaints at the land application sites within 24 hours of receiving the complaint. Survey results from the counties indicate that VDH is not consistently meeting this objective, but suggest that VDH staff are responding within one to two days to complaints that are reported by county staff. Among respondents who were aware of VDH’s response time, a majority indicated that VDH responds in 24 hours or less, and 82 percent (14 counties) said that VDH staff responded to complaints in their county within 48 hours of the time the complaint was forwarded to the department (Table 8). The distance from VDH’s central office in Richmond to the county does not appear to affect the amount of time it takes VDH staff to investigate the complaint. Counties as far away from Richmond as Frederick, Clarke, and Westmoreland responded that VDH staff will investigate a complaint in their jurisdictions within 24 hours, on average.

Table 8
County Assessment of the Average Amount of Time That Passes Before VDH Responds With a Complaint Investigation

Source: JLARC staff survey, Summer 2005. Table excludes county respondents who said they did not know VDH’s response time.

Average Time in Which VDH Has Responded	Number of Responses	Percentage of Responses
24 hours or less	9	53%
Greater than 24 hours but within 48 hours	5	29
Greater than 48 hours but within 168 hours (7 days)	3	18
More than a week	0	0
TOTAL	17	100%

In addition, local governments also appear satisfied with VDH's handling and disposition of complaints in their jurisdictions, although some localities did express concerns. Of the 15 respondents who reported attending a complaint investigation with VDH staff, 13 (87 percent) reported that the investigation was mostly or completely thorough. Only one county found the investigation to be not thorough at all.

While VDH staff appear to be responding to complaints in a timely manner, they are not providing information about the complaints to the public in a timely manner, as required by the *Code of Virginia*. Section 32.1-164.5 of the *Code of Virginia* states that VDH shall maintain a database of all complaints received during the calendar and previous year, information about the complaint, and how it was resolved. During the course of this review, the database was not updated between December 2004 and mid-September 2005, although more than 20 complaints were investigated by VDH during that time.

The database could be further enhanced if counties would report all complaint information to VDH. In fact, it would make the database more comprehensive and might also provide the department with vital information about how well field operations are being conducted and the need for greater oversight. For example, county administrators were asked on the survey whether they forward each complaint they receive to VDH. Of the 30 counties that responded, only slightly more than half (53 percent) said that all complaints were forwarded to the department. This is despite the fact that §32.1-164.5 (C9) of the *Code of Virginia* requires localities to notify the department and the permit holder of complaints. The lack of localities forwarding complaints could also explain why a third of respondents indicated that they did not know how often VDH investigates complaints in their county or how long it takes the department to respond to a complaint.

Recommendation (3). The Virginia Department of Health should ensure that its publicly available complaints database is proactively maintained. VDH should ensure that the information is updated at least on a monthly basis.

Recommendation (4). Local governments should notify the Virginia Department of Health of all complaints, as required by the *Code of Virginia*.

VDH HAS TAKEN FEW FORMAL ENFORCEMENT ACTIONS

Since 2001, DWE has issued eight notices of violation and six consent orders for violations of the biosolids use regulations.

Since 2001, VDH has issued eight notices of violation, and six consent orders, with fines totaling \$3,750.

Fines from the six Consent Orders totaled \$3,750, and ranged from \$500 to \$1,000.

It is difficult to determine to what extent these eight violations represent the totality of violations that have occurred on-site, because VDH is not conducting routine inspections on any type of schedule. However, among the cases that VDH has pursued, there are indications that VDH is relatively lax in enforcement, including in dealing with repeat offenses of a similar nature by the same company. The following case examples illustrate this concern.

In January 2004, a biosolids company responded to VDH (which had received a complaint about one of their applications): “the field manager mistakenly spread [a] portion of the field prior to the technical staff completing the flagging of the buffer area... we agreed that if the field had been completely flagged prior to application... biosolids would not have been applied there... [Our company] will [remind] field operations that all fields must be properly flagged before conducting spreading operations.”

In July of that year, a complaint investigation again found that the same company had not flagged fields at an application site, and had applied biosolids 40 feet from a well [current VDH regulations require 100 feet of separation], and on four fields that had been identified in the site plan as drainage ditches. The applicer scraped the biosolids out of the well buffer area. VDH settled for a \$500 fine, and another agreement with the applicer that it would “ensure that all buffer areas are flagged in advance of land application operations.”

* * * * *

In 2000, VDH found through a complaint inspection that a company had applied biosolids such that there were “two locations where biosolids had moved off the field and into drainage ways,” and “may have entered the stream.” The company denied that there were problems. A VDH staff member wrote, “I am concerned that this problem was either ignored, or not considered significant by your firm.” The company was asked to follow VDH recommendations and submit a revised operation plan.

In February 2002, a VDH complaint investigation of a job by the same applicer found that biosolids were being applied to fields directly from a tanker truck, exceeding the permissible rate of application. The project man-

ager stated that the equipment broke down, and he was “trying to keep the biosolids moving.” The VDH inspector noted to the project manager that they had previously discussed that this type of application could not be done. VDH requested that company officials review their procedures, report to the department, and revise its operation plan to ensure that the situation did not recur. When the company responded, VDH found that the company denied exceeding the loading rate, but said that it had instructed field personnel that “they are not to apply biosolids directly from a tanker truck.” VDH wrote to the company that “in so doing, you have addressed the concerns of this Office.”

In July of that year, VDH staff observed that the company had applied biosolids to a field with slopes exceeding 15 percent. The areas were outlined in a soils map as having 15 to 25 percent slopes. In addition, “the biosolids were observed within 25 feet of the stream below a swale [a low, moist tract of land] where biosolids had been applied.” The inspector wrote that “it could not be determined if the biosolids had entered the stream.” The company was asked to review its procedures.

The company reported back that it had rented a different instrument to measure the slope of the area alleged to be greater than 15 percent, and found that “of the several locations that were checked, only two could be found that exceed 15 percent by a few tenths of a percent.” The company indicated that it would try to be more careful not to apply in areas that may drain and lead to runoff in heavy rains. VDH records do not indicate that the department independently verified the company’s claim, but the department decided that no violation was supported. VDH noted in a letter to the company that the operational changes that it was offering to make “were previously offered” by the company to VDH to address “runoff events” in 2000. VDH reminded the company of its responsibilities to maintain an operational plan that protects public health, and (based on the record provided by VDH) concluded the matter.

Then, in October 2002, a VDH complaint investigation found that an application by the same company appeared to be heavy in spots, and found that the biosolids were applied in one pass at a rate exceeding requirements (20,444 gallons per acre, versus 14,000 in the regulations). Once again, however, VDH records do not indicate that any sanction was applied.

Instances such as these appear to be worthy of stronger action by the department. VDH appears to be overly lenient with repeat offenses, sometimes only requiring renewed commitments from the appliers to improve their operations by informing their crews of the need to follow the rules.

To some extent, enforcement can be expected to be rare and relatively weak under current circumstances, with the limited number of inspections that are conducted. However, it also appears that VDH staff could benefit from the availability of guidance materials that reflect agency thinking about handling non-compliant situations, and formalize expectations.

Currently, VDH has not prepared any formal guidance documents to assist staff as they administer the biosolids' program regulations (other than the Fee Guidance Manual, which focuses on assisting local governments in using the reimbursement process). Such guidance documents potentially offer a centralized source for technical information to staff and may provide enhanced consistency in operations. States such as Michigan and Pennsylvania have developed and implemented similar guidance documents.

An enforcement manual could aid VDH staff as they encounter violations and consider potential actions. (The document could also be useful for local governments that have adopted biosolids ordinances.) The manual could describe the various types of violations that may occur, the potential impact to public health and the environment resulting from different violations, the frequency with which specific problems have occurred in the past, as well as outline enforcement actions based on the severity of the violation. For some requirements, such as the 15 percent maximum slope requirement or the flagging of buffer zones, the guidance manual could specify a "no tolerance" policy for any exceedance or violation of requirements. If applied to the slope requirement, for example, a no tolerance policy might help serve to discourage appliers from spreading biosolids on slopes that are measured to be at or near the 15 percent threshold.

Recommendation (5). The Virginia Department of Health should establish a guidance document that addresses enforcement issues, including the general circumstances under which enforcement action will be taken.

VDH IS NOT ENSURING THAT CONTRACTORS CONSISTENTLY PAY THE FEES THEY OWE FOR THE TONNAGE THAT IS APPLIED

As of early September 2005, VDH was unaware that payments from biosolids contractors were \$51,000 less than they should have been for work done in 2004.

For this review, JLARC staff asked VDH questions about the size of the biosolids fee fund balance and the amount of fee payments received in 2004. The amount that VDH reported to JLARC for 2004 was lower than expected with the use of a \$2.50 per ton charge against the quantity of tonnage that was reported annually. An ensuing comparison by VDH staff of the fees collected against the tonnage reported in counties with biosolids ordinances revealed that in 2004, VDH should have collected \$260,254 from appliers. However, \$208,757 was collected, leaving uncollected fees of \$51,497. (In addition, VDH also found that there is \$29,000 in uncollected proceeds for work done in 2005 prior to September.)

Initially, VDH could not account for why this money went uncollected. VDH staff indicated that the department had not been verifying the amounts being paid against the tonnage being applied. VDH was able to produce data on the uncollected amounts by applier. The data revealed that one of the three major appliers had paid slightly more than VDH's tonnage data would suggest. However, the other two major appliers appeared to be \$23,317 short on \$74,040 owed, and \$22,526 short on \$96,643 owed. Additionally, three contractors who performed land applications in 2004 made no payments to VDH during the year.

With the detection of this problem in early September, 2005, VDH has contacted the contractors to assess payment gaps. Of the two major appliers that were short in their payments, it was determined that: (1) VDH had not received payments from one of the contractors for June and July 2004, and the contractor agreed to submit the amount to VDH, and (2) the second contractor agreed with VDH figures on the biosolids tonnage and payment figures, determined that it needed to check with subcontractors to see if they had paid their share, and agreed to work with VDH to change the way they submit checks (the *Code of Virginia* requires that all payments must come from the contractor, and not subcontractors). Two of the contractors who made no payments on relatively small balances have also indicated to VDH that they will send checks for verified tonnage. The third contractor has since gone out of business.

The fact that VDH was unaware of this gap at the time of the review, and had more than \$51,000 in fees from 2004 that had not been collected, indicates that more rigorous oversight of fee payments is needed. In the two weeks that followed the identification of this problem, VDH collected \$15,657 of these funds. Also, VDH staff have indicated that a quarterly audit

procedure of the payments and tonnage applied will be implemented. The agency needs to continue to ensure that the fees that are owed are paid.

VDH SUPPORT OF LOCAL MONITORS COULD BE IMPROVED

As discussed in Chapter 1, localities have the authority under State statute to test and monitor biosolids. Statutory language passed in 2005 will require VDH to offer a training program for local monitors. Survey results from this review indicate that there are several areas in which VDH’s support of local monitors could be improved. These areas include: training, the sharing of information, and the facilitation of information sharing among localities.

Improvements in Training

Legislation approved by the 2005 General Assembly requires VDH to establish a training program for local biosolids monitors. Counties that have enacted a biosolids ordinance are eligible to have someone attend. The training program is to address the provisions of biosolids regulations, sampling and chain of custody control, and complaint response and report preparation, among other areas.

At the time of this review, however, the legislative requirements had only recently been put into place. Results from the JLARC staff survey of counties indicates that operational concerns and State regulations are among the areas that need training focus (Table 9). Operational concerns account for the majority of complaints that localities report receiving, and thus, it is important that monitors have the training to competently

**Table 9
County Opinions on Future Local Monitor Training**

Source: JLARC staff survey, Summer 2005.

<i>What additional training, or greater focus on certain components of the VDH training, would be beneficial to the monitors in performing their functions?</i>	<u>Number of Respondents</u>
Operational concerns (such as biosolids site access, odor control, road tracking and cleanup)	15
General training on State regulations	13
Complaint investigation and resolution	12
Sampling techniques	12
Nutrient management planning	10
Reimbursement process for the biosolids fee fund	10
VDH has provided enough training	1
Other	4

Note: Respondents could choose more than one response. There were 35 responses to this question.

handle issues such as odor complaints or trucks tracking biosolids on the road. Also, 13 respondents expressed a desire for greater clarification from VDH on State regulations and their application at the local level. Of the 35 respondents to this question, only one thought that VDH has provided enough training.

Recommendation (6). The Virginia Department of Health should offer additional training opportunities that address, in an in-depth manner, matters such as: the content of the biosolids regulations, departmental expectations of applicators based on the regulations, effective on-site techniques for monitoring biosolids applications, and department expectations as well as effective techniques for responding to complaint situations. While the training should be offered under the auspices of the department, the department should utilize outside expertise to conduct some of the training as seems appropriate.

Recommendation (7). Materials from training sessions should be used in conjunction with other information to develop a user-friendly guidance manual for local monitors. The manual should address, in lay terms, the questions that local monitors may frequently have in fulfilling a monitoring and testing role. The manual should indicate VDH expectations and best practice ideas for handling different types of challenging situations that have been experienced previously or can reasonably be anticipated.

Improvements in VDH's Sharing of Information With Localities

It appears that some improvements need to be made in the area of information sharing between VDH and local monitors, and across localities. JLARC staff found during this review that many local governments believe that VDH does not share some relevant and needed information about the biosolids program. In addition, it appears that local governments could benefit from sharing more information among themselves.

The data contained in Table 10 indicates the degree to which county administrators believe VDH keeps them informed, including information about any regulatory changes or policy decisions. Among the 37 respondents, 46 percent (17 respondents) claimed that VDH has kept their jurisdiction only "somewhat informed" or "never informed" of program changes. For example, staff in Westmoreland and Orange counties told JLARC staff that their counties do not know what is happening in Richmond and were unaware of potential regulatory and statutory changes. Furthermore, only 16 percent of respon-

dents reported the department has kept their county “completely informed” about changes. The results suggest that many localities may not be aware of changes, potential changes, or other useful information.

**Table 10
Locality View on Extent to Which VDH Has Kept Them Informed
About the Biosolids Program**

Source: JLARC staff survey of county administrators, Summer 2005.

In your opinion, to what degree has VDH kept your county informed about the biosolids program, including any regulatory changes or policy decisions:

	Number Of Respondents	Percent
Completely informed about the program and any changes	6	16%
Mostly informed about the program and any changes	14	38%
Somewhat informed about the program and any changes	10	27%
Never informed about the program and any changes	7	19%
TOTAL	37	100%

Note: There were 37 responses to this question. Percentage does not equal 100 due to rounding.

Without the necessary information from VDH, local officials are finding it difficult to mitigate the concerns of citizens and elected officials. For example, staff in King George County feel that being kept up-to-date is important because local politicians and officials need to be able to respond to constituents’ concerns regarding biosolids applications. Spotsylvania County’s response to the JLARC staff survey indicated that a solution to this situation would be for VDH staff to attend a Board of Supervisors meeting at least once a year to brief and update local officials and citizens.

VDH Could Help Facilitate the Sharing of Information Among Localities

Currently, local governments share a limited amount of information with VDH and each other. As discussed earlier in this chapter, §32.1-164.5 of the *Code of Virginia* requires “localities receiving complaints concerning land application of sewage sludge to notify the Department and the permit holder.” However, fewer than half of the respondents to the JLARC staff survey reported forwarding all of the complaints to VDH that are received by the county.

In addition, counties are not sharing their information concerning the use of biosolids with other jurisdictions. JLARC staff surveyed local governments to help assess the extent of information being shared among counties. Among the 36 responses, 50 percent (18 respondents) do not communicate with other jurisdictions to share relevant biosolids information.

The survey also asked localities what information from other counties would be useful to their county’s biosolids program. Table 11 shows that counties are interested in information from other counties regarding complaints, public hearing issues, and communication from VDH concerning the biosolids use program. Interestingly, localities also responded to this question by again mentioning the need for increased information from VDH.

**Table 11
Locality Assessment of Other County Information
That Would Be Useful to Their Biosolids Program**

Source: JLARC staff survey of county administrators, Summer 2005.

<u>Type of Information</u>	<u>Number of Respondents</u>
Communication from VDH concerning biosolids use program	26
Public hearing issues	25
Complaint information (type of complaint, land applier, etc.)	20
Complaint investigation information	18
Notification about forthcoming applications	15
Inspection information	11
Other	2

Note: Respondents could choose more than one response. There were 36 respondents to this question.

One approach that could be adopted to increase communication and support between VDH and localities is monthly updates from VDH on the latest biosolids information. This communication could be in the form of a monthly email or newsletter sent to county administrators, local monitors, and other officials requesting to be included on the list. Regular updates would assist in ensuring consistency among all permitted jurisdictions. It would also provide county officials with better information that can then be passed on to the boards of supervisors or concerned citizens when biosolids-related issues develop. A Louisa County official told JLARC staff that their citizens are more accepting of biosolids use when the county can demonstrate that it is knowledgeable about the issue.

Limited communication between counties results in jurisdictions missing out on potentially helpful information. Local governments that monitor biosolids activities have access to information about their experiences with land appliers, ideas about monitoring, and information about reimbursement procedures. However, there is currently no system in place for sharing this information across localities. To advance the timely and continuous sharing of knowledge across jurisdictions, VDH should establish a place on its web site that is accessible to county and VDH staff to share information and

identify contacts in each locality. Access to such information may also lead to informal communications between monitors.

Recommendation (8). To better inform localities about the biosolids program, including regulatory changes or policy changes, the Virginia Department of Health should develop and implement a method to distribute information to localities on a monthly or quarterly basis.

Recommendation (9). The Department of Health should create a place on its web site for county staff charged with biosolids oversight to share information.

REPRESENTATION ON BURAC FOR LOCAL GOVERNMENTS AND CONCERNED CITIZENS COULD BE INCREASED

VDH has an advisory committee to assist the department and the State Board of Health in developing regulations. This committee, the Biosolids Use Regulation Advisory Committee (BURAC), is limited to 25 members, of which four are *ex-officio* members representing State agencies. Of those 25, a majority have financial interests, or represent people with financial interests, in the use of biosolids. Seven of the representatives are biosolids producers, and three are biosolids contractors. In addition, there are representatives of the agricultural community, and wastewater treatment associations.

While BURAC is advisory in nature, it helps set the regulatory agenda and helps determine the ideas that go before the Board of Health. Included in the 25 members are only two representatives from county governments, and two citizen members. Ideally, BURAC tries to reach a consensus. However, this does not always happen. When there is disagreement, it is difficult to see how the collective opinion of the group could not favor the position of the regulated community, given the composition of the group.

To increase the credibility of BURAC outside of the biosolids industry, consideration should be given to expanding or reconstituting the membership of BURAC to provide for more representation of local governments, and to include more knowledgeably concerned citizens. Besides providing for more diverse viewpoints and input, an expanded or reconstituted membership that includes more local government representation may also have the desirable benefit of increasing the extent to which county governments are informed of developments in the biosolids program.

Recommendation (10). The Virginia Commissioner of Health should increase or reconstitute the membership of the Biosolids Use Regulation Advisory Committee to provide for more input from local governments in localities where biosolids are applied to land, and for more input from concerned citizens.

SOME CHANGES ARE NEEDED IN THE VDH BIOSOLIDS USE REGULATIONS, AND VDH'S APPROACH TO ENFORCEMENT

VDH is currently working on some changes to its regulations for biosolids. Such changes have been driven by legislative action and input from the biosolids industry and others. Examples of the proposed changes include: more timely notification of local governments prior to spreading, extending the minimum distances between where biosolids can be applied and the residences of persons who may be affected by the odor, and development of regulatory programs to certify land appliers and train local monitors.

While some of the potential changes appear to offer program improvements, VDH's process for developing the regulations has moved very slowly, and the provisions that are currently under consideration are not sufficient to address most of the improvements that are called for in this chapter. Two specific areas of concern include: (1) the slow pace at which VDH has developed regulations implementing statutory requirements for nutrient management plans for biosolids application sites, and (2) methods to achieve the public and animal access restrictions that are provided for in biosolids regulations.

VDH Should Improve the Timeliness of Its Rulemaking Efforts, Such as Rulemaking for Nutrient Management Plan Requirements

Legislation enacted in 2003 requires that nutrient management plans be developed for all sites where land applications of biosolids occur. Nutrient management plans (NMPs) are documents that identify practices for minimizing adverse environmental effects that result from the over-application of nutrients such as nitrogen and phosphorus, while also improving crop production through the efficient use of nutrients. (JLARC staff completed a report in 2004 on Virginia's nutrient management planning program.)

According to VDH staff, the change in statutory language was initiated by the Department of Conservation and Recreation (DCR) as a way to account for the nutrient content of the biosolids. DCR is responsible for administering the State's NMP regulatory program, which already requires NMPs for certain

confined animal and poultry feeding operations. NMPs represent one of the State's efforts to protect and improve water quality in the Chesapeake Bay and other State waters.

Specifically, §32.1-164.5 (C8) of the *Code of Virginia* states that VDH is to adopt regulatory language requiring the development of NMPs for all sites where biosolids are applied. Moreover, the NMPs must be written by DCR-certified nutrient planners. Also, DCR approval is required for plans written for confined animal feeding operations or sites that receive biosolids applications more frequently than once every three years at greater than 50 percent of the annual agronomic rate.

In the two-plus years since enactment of the legislation, VDH has not produced a proposed regulation for public comment. The DWE director told JLARC staff in late August 2005 that the department hopes to present the proposed regulatory amendments at the Board of Health's October 2005 meeting. If adopted at that time, the amendments would then go to the Department of Planning and Budget for review and through the other stages of the regulatory process. It is unclear how much time will pass until final adoption.

The director of DWE reported that the time taken so far to develop the regulatory amendments does not appear to differ substantially from other regulatory changes that have been made to the biosolids use regulations. BURAC has been involved with developing the amended language, but has met infrequently in the past. He added that the changes have been made more difficult because DCR is in the process of amending its regulations with regard to nutrient management planning. Additionally, the department is using this process to make other amendments to the biosolids use regulations that have been required by the General Assembly, including language addressing work-stoppage issues where there is a dispute between a locality and a contractor about the existence of a violation, and language addressing extended buffers to mitigate odor issues.

However, DCR's regulatory amendments to the nutrient management planning program should not have affected VDH's ability to adopt language requiring the development of NMPs for biosolids sites or DCR approval of NMPs written for the specific circumstances described previously. Under the statute, land applications are to occur under the auspices of NMPs, and whether that occurs under DCR's current or future nutrient management planning regulations should not matter. In the future, VDH should be more diligent in developing and implementing rule changes to the biosolids use program that are necessary to accomplish statutory objectives.

VDH Should More Actively Address Site Access Restriction Issues

As noted in Chapter 2, access restrictions were established by EPA to limit the potential for a person or animals to come into contact with biosolids as well as track the material from the site. Restrictions are 30 days for animal grazing and for public access at sites with a low potential for public exposure, and one year for public access at sites with a high potential for public exposure. Almost all sites to which biosolids are applied are considered as having a “low” potential for access under EPA definitions, since “high” potential is deemed to apply to sites such as parks and golf courses where Class B biosolids are rarely used.

VDH staff state that the land applier is responsible for ensuring that public and animal access is restricted. In addition, the landowner signs an agreement that public and animal access to the property will be restricted for the applicable time periods. However, questions arise as to the type of control that should be considered sufficient to achieve the site “restriction” or “control” called for by regulation, and also the exact nature of the landowner versus applier responsibilities in these situations.

Public Access Restrictions to Biosolids Sites. EPA and VDH regulations do not specify any particular minimum measures to achieve site access control. For example, there is no requirement that a sign be posted alerting people to the fact that an application has occurred and that they are prohibited from entering the site for a period of time. There also is no requirement for the construction or use of a restrictive barrier, such as a fence. EPA’s position (and some other states also take this view) is that biosolids are applied to private property, and this fact alone may be construed as adequate to meet the public access restriction requirement. Of course, this attitude assumes that all unsuspecting visitors to the property, as well as all would-be “trespassers” – including community children whose parents may not have been informed about the presence of biosolids in the area – do not merit any notice about the existence of recently-applied biosolids. This attitude on the part of regulators also appears to make the public access restriction unenforceable in most cases. Contractors as well as property owners can argue that: (1) the property upon which they applied biosolids was private property; (2) like EPA and state regulators, they believed that members of the public should have known it was private property and stayed off, and (3) for these reasons, they saw no need to take any action to restrict or discourage public access.

Some states, however, require more specific action by biosolids appliers to address the public access issue. For example,

Some states, such as Ohio, have required a more proactive approach, with the posting of signs for at least 30 days following application.

Ohio requires that at least one sign be in place at each “obvious access point” to a property on which biosolids have been applied. The following describes Ohio’s approach.

Legislation adopted in Ohio in 2000 amended the law to require the posting of signs at sites where Class B sewage sludge is land applied. The state’s environmental protection agency was required to develop minimum standards for this signage requirement. One or more signs must be posted at application sites for at least 30 days (or one year, if the site is a high exposure site).

Biosolids staff in Ohio indicate that the 30-day signage requirement was considered “the best way” to address the public access restrictions. A view seemed to prevail that if public access is to be restricted for 30 days, then some minimum duty exists to inform people throughout that time period that biosolids have been applied at the site.

Initially, there was concern from the regulated community about having a signage rule. Staff indicate that there was a concern about the posting of the signs because applicators “don’t want to draw attention to themselves.” Ohio contacted Pennsylvania, which already had a signage requirement. (In Pennsylvania, signs must be posted for 30 days prior to the application, and leaving signs up for 30 days after application is encouraged). Ohio was informed that the requirement for relatively prolonged sign postings was working well, although petty vandalism of signs was an occasional problem.

The regulation adopted in Ohio required that signs be posted at all sites where Class B bulk sewage sludge is applied. The signs are required to state “NOTICE: CLASS B SEWAGE SLUDGE HAS BEEN APPLIED TO THIS SITE.” The signs include the name of the permittee and the permittee’s telephone number. To help ensure visibility, letters used in the signs are to be of a particular height, and the signs are to be “posted within twenty-five feet of an obvious access point(s) and shall be unobstructed from view.” Any authorized site with road frontage “shall have at least one sign facing the road, within twenty-five feet of the road when possible, and shall be unobstructed from view.” The signs are to be in place for a minimum of 30 days at low public exposure sites, and a minimum of one year at high public exposure sites.

The biosolids staff in Ohio indicate that compliance with the requirement appears to be good. In addition, vandalism of signs has not been a problem.

In Virginia, the initial biosolids use regulations as promulgated in 1994 established a strong policy for restricting public access for Class B, Class III pathogen-treated biosolids. (At that time, State regulations differentiated Class B biosolids into a Class II and a Class III). Under the regulations, when Class III material was applied, access to the site was restricted for at least 18 months. In addition, access was to be “controlled by trespass-resistant fencing in all except those remote sites not accessible to the public.” Signs were also required to be posted “in conspicuous places every 100 feet in wooded or heavily vegetated areas and every 500 feet in open areas.” However, when the Class III designation was eliminated from the regulation, so were any references to the use of any particular mechanisms to ensure public access restrictions to biosolids sites.

Proposed regulatory changes that are underway in Virginia do not address the issue of how to achieve the 30-day access restriction. For other purposes (to increase the amount of notification given in localities), VDH’s proposed regulatory language requires contractors to identify their application sites by posting a sign at least 48 hours prior to commencing operations, and by keeping the sign in place at least 48 hours after the spreading has been completed. Thus, the sign is required to remain on-site for only two rather than 30 days following completion of the application. Also the proposed regulations require only one sign, regardless of the size of the application site or the number of potential access points.

If site access restrictions are to be regarded as one among several components of biosolids regulations providing meaningful “checks and balances” to ensure public protection, then the component should be addressed in a more meaningful way. In addition to current VDH plans to require the posting of a sign at least 48 hours prior to application, signs should also be posted for a 30-day period following application, so that the public is informed of the presence of biosolids throughout the timeframe of the access restriction. VDH should also consider regulatory provisions or permit conditions requiring trespass resistant fencing in areas that are not remote from the public, or where animal access to the property is a concern.

In addition, VDH should consider whether the “low” and “high” public access designations used by EPA are sufficient for Virginia. Applications are being made on sites in Virginia on agricultural land that is adjacent to trailer parks, towns, and villages. To the extent that permits are granted in such areas,

neither a “low” nor “high” public exposure assumption seems appropriate. VDH should consider providing a “medium” designation, with somewhat longer access restrictions than the 30 days required for “low” access sites.

Restricting Animal Access to Biosolids Sites. Under federal and State regulations, access of animals to biosolids sites is to be restricted for a period of 30 days after application. The requirement is a challenge to enforce under the best of circumstances. It is not feasible to have a sufficient inspection presence to determine if animals have accessed biosolids sites at any time during the 30 day period. For this reason, violations of the restriction primarily come to the attention of VDH through the complaints of neighbors who are aware that such a prohibition exists, and photograph the violation.

Records furnished to JLARC staff by VDH indicate some of the situations wherein the animal access restriction issue has come to the attention of the agency. The records also indicate that a lack of specificity in the regulations means that the exact responsibilities for meeting the requirements are not clearly understood. The following case examples illustrate some problems with the current requirements.

In 2003 in Charlotte County, VDH found that cows had access to and may have been grazing on an area less than 30 days after biosolids were applied. The applier of the biosolids agreed to a compliance order stating that the applier would inform landowners of application sites of their responsibility to control access to the sites. The applier also agreed to meet specific conditions that are not already set forth in law. The applier agreed to “ensure that fencing and other such restrictions for access to the land application site(s) are adequate and will be maintained as such, to prevent grazing animals, such as cattle from entering the site(s) to which biosolids have been applied prior to the passing of the required time period.” Further, the applier agreed to “either install, or assist the landowner and/or farmer in repairing fences as necessary to prevent such access.” In addition, the applier agreed to pay a \$750 civil fine.

* * * * *

In April 2004, a complaint investigation in Northumberland County found cattle on fields less than 30 days after biosolids were applied. VDH sent a warning letter to the farmer, indicating that if the agreement were not observed in the future, VDH would withdraw the property from the permit for future applications. As in the

Charlotte County case, a \$750 civil penalty was imposed on the applier, and the applier agreed to help ensure that fencing and other such restrictions for the access of grazing animals would be adequate and maintained.

* * * * *

In Appomattox County in September 2004, VDH found that no fence was present between cattle and an area that had received biosolids less than 30 days before. VDH staff sent a letter to the applier indicating that the applier “has the responsibility for verifying that cattle have been removed from permitted land application sites and ensuring that cattle are adequately restrained from access to the sites following application.”

The applier responded to VDH by stating that “it is not known how the cattle ended up on the site,” but indicated that once discovered, the applier and the farmer responded promptly and took exceptional measures to get the cattle off the field. The applier argued that the companies applying the biosolids do not have any “rights to control or possess the landowner’s property.” Thus, the company asserted, the landowner “is the only one with legal ability to comply with those requirements because he has legal possession and control of the site and of his livestock.” The landowner’s failure to observe access restrictions, the applier argued, “cannot be an occasion of liability for the permit holder.”

Further, the applier stated, “laws imposing penal sanctions must provide reasonable notice of what conduct is required or prohibited, so that persons wishing to avoid sanction will know how to regulate their conduct in accordance with the law.” The applier concluded that “the only clear statement in the regulations... places responsibility on the landowner”, and “nothing in the [Biosolids Use Regulations] or the Virginia Code places a permittee on notice that it will be held in violation of state law for a landowner’s failure to control his livestock.” Unlike the Charlotte County and Northumberland County cases, the records furnished to JLARC staff do not indicate any fine or conditions placed upon the applicant in response to the incident. The case appears to have concluded with a warning letter to the farmer.

In the first two case examples, the consent orders specified conditions for the farms that it appears should instead have

been included directly in VDH's regulations. On farms where animals are grazed, there should be requirements providing that fencing or some physical barrier between grazing animals and the biosolids fields should be in place and consistently maintained.

In addition, in the third case example, the applier raises some legitimate concerns about whether it is reasonable and appropriate to expect the applier to be liable for landowner actions or inactions that allow cattle on the site. VDH needs to examine the animal access restrictions and landowner / applier agreements within its regulations. If appliers are to share in the responsibility for ensuring that animals are kept out of the biosolids over the 30-day period in question, then certain specific minimum expectations should be identified that appliers can realistically achieve.

Recommendation (11). VDH should require that appliers of biosolids post signs about the application for a minimum of 30 days (or one year, for high access sites) following the application. Signs should be posted at known access points and along road frontage.

Recommendation (12). VDH should develop a "medium" public access designation for biosolids sites, providing somewhat longer access restrictions and signage requirements than 30 days. This designation would be used to address sites that do not fit the "high" access designation, but are in areas that are not actually remote from the public, such as sites that are close to trailer parks, neighborhoods, or towns.

Recommendation (13). VDH should examine the animal grazing restrictions of its regulations. VDH should develop language that requires, on farms where animals are grazed, the use of fencing or physical barriers to prevent animal grazing on the biosolids fields. VDH should continue to require that landowners sign agreements to keep animals off the biosolids sites for the required timeframe. In addition, VDH should develop regulatory language that sets forth clear and realistic expectations for the actions that biosolids appliers are to take to help ensure compliance with the animal access restrictions on biosolids sites.

Local Oversight of Land-Applied Biosolids

In Summary...

Local governments may adopt biosolids ordinances, but they cannot enforce more restrictive conditions on the use of biosolids than already exist as part of the State program. Local governments can oversee the land application of biosolids through a local monitoring and testing program.

Although four years have passed since the monitoring and testing authority was established in State law, few counties have an effective monitoring and testing program. Among counties in which there are permits for biosolids, some lack a biosolids ordinance, and a majority do not have a local biosolids monitor. In the counties that do have an ordinance and monitor, almost all monitors go on-site to observe at least some spreading operations. However, their expertise is limited, and on-site testing is rare. Consequently, the local testing and monitoring approach represents a limited addition to biosolids oversight statewide.

State law gives the Virginia Department of Health the responsibility for regulating and issuing permits to contractors to land apply biosolids in the Commonwealth. Consequently, the courts in Virginia have held that local governments may not establish prohibitions or restrictions in local ordinances which circumvent VDH's regulatory and permitting authority. However, each local government has been given the authority, under Section 62.1-44.19:3 of the *Code of Virginia*, to adopt a local ordinance on biosolids that provides for the following:

testing and monitoring of the land application of sewage sludge within [the locality's] political boundaries to ensure compliance with applicable laws and regulations.

The statutory provisions authorizing the local monitoring and testing program were enacted by the Virginia General Assembly in 2001.

This chapter describes the current status of the local testing and monitoring program in Virginia. The chapter provides information on the extent to which local ordinances have been adopted, and monitors put in place, across all localities with biosolids permits. Survey data are then used to consider issues such as: factors causing some counties to reject the use of the testing and monitoring authority; the extent to which

monitors go on-site for land applications; the backgrounds and expertise of the monitors; the activities that monitors perform when on-site, including the prevalency of on-site “testing” by the monitors; and training opportunities for local monitors.

BIOSOLIDS ORDINANCES TO QUALIFY FOR THE TESTING AND MONITORING PROGRAM ARE LACKING IN MANY COUNTIES

Of the 54 counties in which biosolids spreading has been permitted, 36 do not have a biosolids ordinance that is recognized by VDH for participation in the local testing and monitoring program (see Figure 4). Twenty-seven of these counties have no adopted local ordinance, while ten counties have ordinances that have not been approved by VDH.

Thirteen of the 26 counties with no local ordinance at all responded to the JLARC staff survey of county administrators. Several reasons were given by survey respondents for the lack of an ordinance. Six county administrators expressed the opinion that their county has not adopted an ordinance because the county still sees biosolids oversight as a State responsibility (Table 12).

Table 12
Reasons Some Local Governments Are Not Adopting Biosolids Ordinances

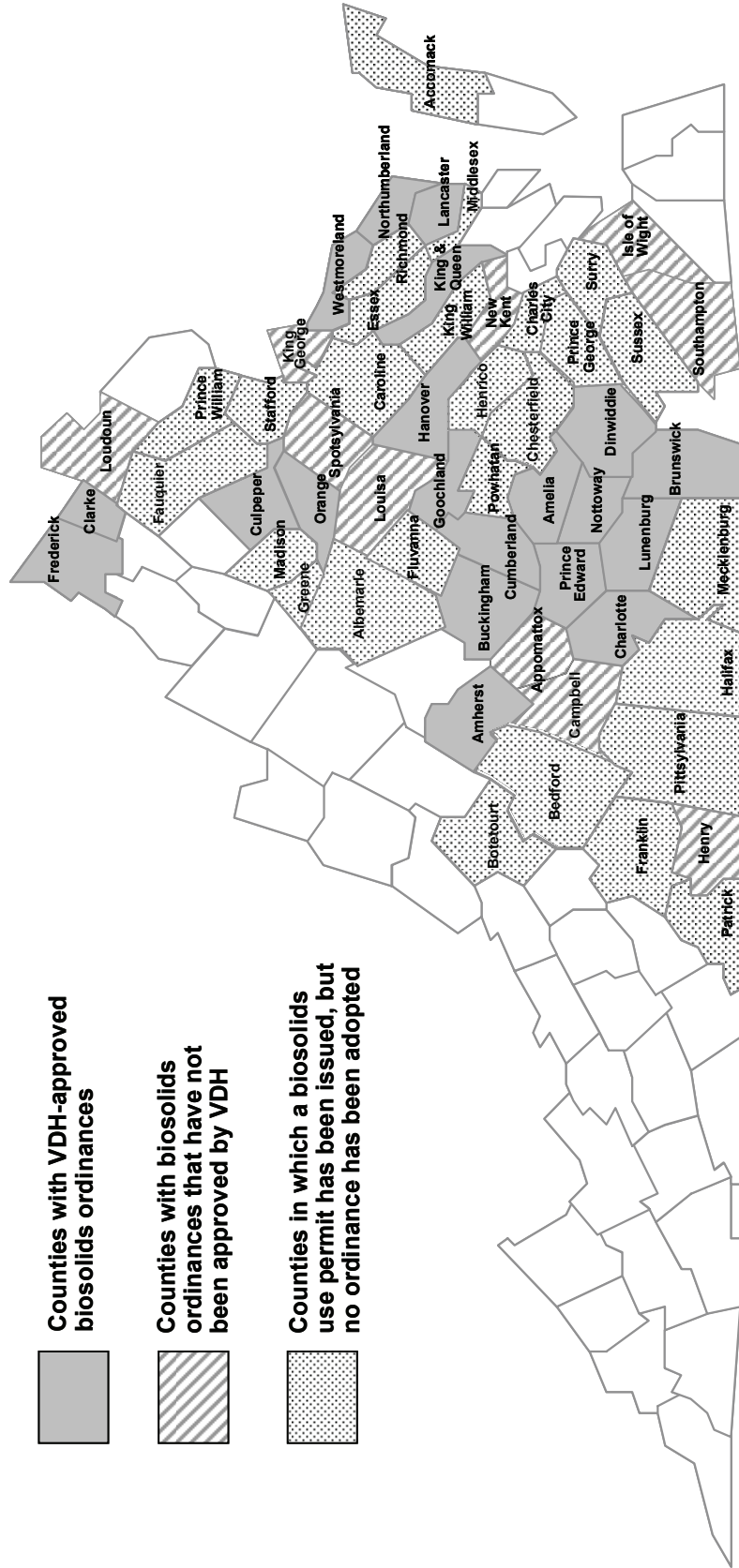
Source: JLARC staff survey, Summer 2005.

Reason Given on the Survey	Number of Respondents
The State should be responsible for regulating and enforcing the use of biosolids in Virginia	7
An ordinance has limited usefulness since it only allows the locality to monitor applications and test the material, as opposed to regulate its use within the jurisdiction	6
The county believes that an ordinance may lead to a lawsuit from the land appliers operation here	2
The county does not have the time, funding, or expertise to create and enforce an ordinance	2
The county does not receive enough biosolids material to warrant an ordinance	2
Other	5

Note: Respondent could choose more than one response. There were 15 responses to this question.

**Figure 4
Local Ordinance Status Among Counties Receiving Biosolids**

Source: Information provided by VDH, and JLARC staff analysis.



Note: VDH is currently reviewing biosolids use permit applications for sites in Amherst and Isle of Wight counties. VDH has approved an ordinance passed by Amherst County. Isle of Wight County has adopted a local ordinance, which has not been approved by VDH.

The following comment reflects the reasoning behind such a decision:

The County has not enacted an ordinance providing for local testing and monitoring because the County sees that as merely a shifting of the responsibility that [has been] mandated to VDH. Localities cannot enact ordinances addressing the land application of biosolids that are more stringent than the VDH regulations, but localities are expected to hire monitors to do VDH's work if we want testing and monitoring done with a promise of reimbursement, maybe. Even with the testing and monitoring programs, our elected officials aren't convinced that the program will bring about any useful benefit to the locality nor that citizen concerns will be addressed in a favorable manner.

Similarly, another five localities suggested an ordinance has limited usefulness since it only allows the locality to monitor applications and test the material, as opposed to regulate its use within the jurisdiction.

MOST COUNTIES WITH BIOSOLIDS ORDINANCES FOR MONITORING AND TESTING PURPOSES INDICATE THERE ARE SOME BENEFITS

Of the 28 counties with biosolids permits that have local ordinances (19 approved by VDH, and 9 unapproved), 21 responded to the JLARC staff biosolids survey. (Amherst County has adopted a VDH-approved ordinance and Isle of Wight County has adopted an ordinance that has not been approved by VDH, but no permits have been issued for the counties.) Of the 21 respondents, 17 (approximately 81 percent) indicated that the ordinance has been beneficial. For example, one county identified several benefits to their jurisdiction.

The ordinance allows a local contact to be involved in the land application of biosolids process. The process of developing an ordinance allows the public to have some input, and also allows the local monitor to be proactively involved. The ordinance overall provides the legal backing to force land appliers to comply with the County. The public outcry and opposition has settled some since the adoption of the ordinance due mainly to the fact that the County is aware of what is taking place and can speak knowledgeably.

Staff in Cumberland County stated they met with a land applier to draft an ordinance and, as a result of the meeting, the land applier agreed to abide by certain additional rules even though they were not required. Other counties described the benefit

as having more input with State officials and the land appliers throughout the permitting process. For example, Prince Edward staff said that having an ordinance on the books makes the appliers of biosolids take the locality more seriously. Some ordinances have benefited counties by addressing a common county and citizen concern, the impact to the environment. Specifically, Clarke County staff reported that their ordinance allows on-site review by local officials to address local concerns such as the potential for biosolids to contaminate groundwater in karst terrain.

In addition, the *Code of Virginia* provides that localities with an adopted ordinance have the authority to halt an application. Monitors have reportedly shut down applications for reasons such as bad weather or noxious odors. However, a monitor does not have the authority to impose fines for violations.

IN MOST LOCALITIES WITH BIOSOLIDS ORDINANCES AND MONITORS, SOME ON-SITE OVERSIGHT IS PROVIDED, BUT THE SCOPE IS LIMITED

Of the 28 counties in which land is permitted and that have biosolids ordinances, 21 responded to the JLARC survey. Among the 21 responding counties, 16 reported having local monitors, while five (Appomattox, Cumberland, Hanover, King George, and Spotsylvania) reported having ordinances but no person assigned to perform local monitoring.

The local monitor is the locality’s point person for biosolids oversight, potentially fulfilling the testing and monitoring function that is authorized in State statute. A positive finding from this review is that of the 16 counties reporting on the survey that they have a local monitor, all but one indicate that their monitor goes on-site during biosolids spreading some or most of the time (Table 13). Thus, there are at least 15 counties in which the local monitor function is providing some frequency of routine on-site oversight.

**Table 13
Counties With Local Monitors Report That Monitors Are On-Site Most or Some of the Time for Land Applications**

Source: JLARC staff survey, Summer 2005.

Response	Number of Respondents	Percentage of Respondents
All of the time	0	0 %
Most of the time	9	56
Some of the time	6	38
None of the time	1	6
Total	16	100 %

A problem, however, is that most of the local monitors have limited expertise, the role they play on-site is limited, and few counties are participating in training intended to increase the capabilities of the local monitors. These concerns are discussed in the remainder of the chapter.

Individuals Assigned Biosolids Monitoring Duties Take on the Workload In Addition to a Regular Workload

Various types of personnel in counties have been designated to fulfill biosolids monitoring duties. In most instances, these individuals take on the monitoring duties in addition to a regular workload. Most frequently, the regular workload and the expertise of the individuals assigned to also address biosolids is not focused on environmental or health issues. According to a JLARC staff survey, many of the local monitors are responsible for building code enforcement (Table 14). Individuals assigned monitoring duties include county administrators, planning directors, environmental management officers, and directors of public works.

Table 14
Responsibilities of Local Monitors Besides Biosolids

Source: JLARC staff survey, Summer 2005.

Please identify the other responsibilities, if any, that are assigned to the individual or individuals who perform local biosolids monitoring duties in your county:

Type of Responsibility	Number of Monitors
Building code enforcement	12
Planning	8
Administration	7
Secretarial	4
Erosion control	3
Landfill oversight	3
Animal control	1
None	1
Other	4

Note: Respondents could choose more than one responsibility. There were 16 respondents to this question.

In most localities, the need for biosolids monitoring work constitutes a relatively small proportion of the available work hours during a calendar year. Nonetheless, the times that monitoring work could be done does not necessarily correspond with the times that local monitors feel they can afford to give biosolids a priority. Among counties with monitors responding to the JLARC staff survey, 81 percent reported that the local monitors believe their other responsibilities have at least some impact, if not a major impact, on their ability to monitor biosolids applications. An example of reported limitations in the moni-

toring role due to time conflicts is the monitoring program in Buckingham County.

Buckingham County has received more dry tons of biosolids than any county in the Commonwealth since 2002. However, the planning and zoning administrator to whom biosolids oversight responsibilities are assigned said that his other responsibilities have a priority over biosolids-related activities, and the county mainly responds to complaints. He said that he has been re-writing county ordinances, and this has taken a lot of his time that might have been directed towards biosolids activities. No on-site routine monitoring of applications has been done. In fact, the monitor noted that last winter, time constraints related to other assigned duties prevented him from investigating a potential application to frozen ground, which is prohibited under State regulations.

When On-Site, Most Monitors Check for Obvious Permit Violations and Odor Problems, But Testing Activity Is Rare

Counties with monitors present during at least some land applications were asked to identify the functions that these staff perform when on-site. Of the 15 administrators who reported that staff were on-site at least some of the time, 13 (81 percent) reported that staff were there to assess odor and smell issues (see Table 15). Twelve respondents (80 percent) reported that staff were there to look for obvious problems with the application, such as tracking and odors.

Only four counties reported that they take samples or perform any tests on the biosolids. Amelia and Louisa reported that the county had tested for pH levels. Amelia and Westmoreland counties reported testing for the nine chemical pollutants, and both Westmoreland and Clarke reported testing for pathogen levels. Other monitors, however, believe that biosolids testing is not important, arguing that the composition of the material is unlikely to change from the time that it leaves the plant, and some monitors state that it is too costly.

The lack of sampling and testing by monitors means, however, that the monitors do not provide an independent verification of the chemical content of the biosolids, and there is no measurement of pathogen levels. Further, the cost of the testing does not need to be borne by localities, as a biosolids fee fund has been set up in part for the purpose of paying the costs of sampling or tests at sites where biosolids are applied.

Table 15
Functions Performed by Local Monitors
When On-Site During an Application
 (Among Those Who Go to Sites)

Source: JLARC staff survey, Summer 2005.

Intended Purpose	Number of Respondents	Percentage of Respondents
To assess the extent of odors and/or smells	13	81 %
To be present at the site to look for obvious problems such as tracking	12	80
To measure minimum distances for setback requirements	12	80
To check application rates	8	53
To discourage improper applications by being present	7	47
To test biosolids for pH levels	2	13
To take samples or testing biosolids for pathogen levels	2	13
To take samples or testing biosolids for chemical concentrations of the nine regulated trace elements	2	13
To take samples or testing biosolids for airborne constituents or aerosols	0	0
To take samples or testing biosolids for chemical constituents other than the nine regulated trace elements	0	0

Note: Respondents could choose more than one item. There were 15 respondents to this question.

Another option available to local governments is the testing of well water or soils before and after biosolids applications are made. Again, however, only two respondents to the JLARC staff survey indicated that their county performs this type of testing (Amelia and Brunswick).

RELATIVELY FEW TRAINING SESSIONS FOR LOCAL MONITORS HAVE BEEN HELD, AND ATTENDANCE HAS BEEN LIMITED

Despite the limited expertise of local monitors, relatively few training sessions for the monitors have been held by the Virginia Department of Health. Since May 2003, VDH has offered only four training sessions (Table 16). While sixteen counties were represented at a 2004 session, attendance at training sessions in 2005 has been weak (ten and eight counties represented at the two sessions, respectively).

Two problems that appear to have some impact upon the level of attendance of local monitors at recent training sessions are that (1) attending the sessions does not appear to be a priority, and (2) the training itself has received mixed reviews. The following examples illustrate the problem of training attendance, as indicated by attendance at the last session that was held in June 2005.

Table 16
VDH Training Sessions for Local Monitoring

Source: JLARC staff analysis of data supplied by VDH.

<u>Date of Training</u>	<u>Topic</u>	<u>Number of Counties Represented</u>
May 21, 2003	Land application fee and reimbursement process	9
June 24, 2004	Update on regulations, inspections/enforcement, operation concerns	16
January 25, 2005	Update on regulations, sampling and testing, and enforcement	10
June 30, 2005	On-site sampling and testing	8

Note: Nineteen counties had ordinances approved by VDH at the time of the training sessions.

During this review, a local monitor told JLARC staff that he hoped to attend VDH training in June 2005 that was to focus on testing and sampling, but time constraints might prevent him from doing so. The monitor indicated a desire to perform sampling but lacked the expertise. The monitor did not attend the June training.

* * * * *

Also during the course of this review, staff in another county indicated that the local monitor was not qualified to test and sample biosolids. County staff stated that if the county had someone with the training and background, they might start testing. However, when VDH offered a recent training course in sampling, the monitor did not attend.

* * * * *

The announced purpose of the June VDH training session for local monitors was to provide guidance about on-site sampling and testing of biosolids. Only eight counties were represented at the meeting. Attendance was low despite the fact that VDH had based the date and time on input from the localities. In fact, there were more representatives from the Maryland Environmental Services, who VDH had asked to assist in the demonstrations, than local monitors.

The varying level of training among local monitors is a concern. Training sessions can not only provide monitors with the necessary skills to effectively carry out their responsibilities, but can also lead to a level of consistency in how these responsibilities are performed. A greater chance for inconsistency exists among local monitors when they receive information on the biosolids use program from different sources. Land appliers are concerned that this inconsistency might result in a

monitor halting an application because they do not understand the program.

The effectiveness of the training sessions has been mixed, according to respondents to the JLARC survey. Among the 15 counties that had someone attend at least one training session, 64 percent believed the sessions were “mostly” to “highly” effective at providing useful information and technical guidance for implementation of their county’s biosolids activities. However, 36 percent of respondents found the sessions to be only “somewhat effective” or “not effective.” For instance, the monitor in Louisa County reported that after attending all the sessions, he was still uncomfortable with determining the rates at which biosolids should be applied and identifying at what rate an application was occurring.

Some local monitors have used other means to receive some basic training for their biosolids role. Several counties reported that someone on staff has attended DCR’s training on nutrient management. A local monitor in another locality reported that she calls another county for help with biosolids-related questions. One local monitor, who has attended two of the four VDH training sessions, stated that without the biosolids company (the applier), she would have been “lost” in her job. She said that it was a land applier who took her around to “show her the ropes.” The monitor said that she still is not familiar with the details of VDH regulations, such as slope restrictions, and she does not see how the monitoring she does “will assuage citizens”, given the limited nature of what she checks on site.

TO DATE, AVAILABILITY OF THE FEE FUND HAS NOT INDUCED MANY LOCALITIES TO BE PROACTIVE IN TESTING AND MONITORING BIOSOLIDS

In addition to authorizing local governments to establish local testing and monitoring programs, State statutes also provide a source of funding for the testing and monitoring activity. The biosolids fee fund was established by the General Assembly in 2001 to cover the costs localities incur as a result of testing and monitoring biosolids applications. Localities must enact an ordinance to be eligible to receive reimbursement for certain biosolids related activities. Under the language establishing the fund, land appliers are to collect a fee from the generators of the material based on each dry ton of sewage sludge that is applied in a locality and remit that amount to VDH on a monthly basis.

Counties Can Be Reimbursed for their Testing and Monitoring Activities

The fee amount was determined in 2002 by a 19-member ad hoc committee established by VDH. Regulations promulgated pursuant to the legislation established the fee generators must pay \$2.50 per dry ton applied, to be adjusted annually based on the federal consumer price index. Local jurisdictions are reimbursed at \$16 per hour for the monitor’s time, and VDH also provides separate reimbursements for any costs related to sampling and testing, as well as travel.

Since 2003, localities with adopted ordinances have been able to seek reimbursement from VDH for costs associated with the testing and monitoring of the land application of biosolids. The majority of fee funds to date have been distributed for training costs, complaint investigation, and travel expenses. VDH staff state that a local reimbursement has never been denied.

Counties Have Made Very Limited Use of the Fee Fund

Although 12 of 19 eligible counties have sought reimbursement, from May 2003 to June 2005, only about \$60,000 in reimbursement has been requested (Table 17). Three counties, Amelia, Charlotte, and Nottoway account for almost 70 percent of the reimbursements that have been made. Six eligible counties have not sought reimbursement. These counties are: Brunswick, Goochland, Hanover, Lancaster, Southampton, and Spotsylvania. The Hanover County director of public

Table 17
Biosolids Fee Fund Reimbursements Since May 2003

Source: JLARC staff analysis of data provided by VDH.

County	Total Amount of Reimbursement	Number of Reimbursements
Amelia	\$23,123	9
Nottoway	9,023	9
Charlotte	8,543	6
Westmoreland	3,529	4
King and Queen	2,984	3
Buckingham	1,746	4
Dinwiddie	1,561	2
Orange	1,521	7
Northumberland	1,520	1
Clarke	1,475	1
Culpeper	1,207	6
Frederick	1,002	2
Total	\$57,234	54

Note: Reimbursements are made on a quarterly basis. The total amount of reimbursement and the number of reimbursements columns do not include two joint payments totaling \$2,0670 made to Amelia and Charlotte counties for activities performed between May and September of 2003.

works said that as a policy her county would not seek reimbursement because the county believes that there are strong regulatory controls dictating what material is allowed to enter a wastewater treatment plant and what that plant is allowed to produce. It is not clear whether the other counties are not performing any reimbursable activities, or whether they have not sought reimbursement for other reasons.

One of the reasons that the fee fund is not being utilized to a substantial extent is the limited amount of testing and monitoring activity that is taking place.

In addition, some local governments are not seeking reimbursements for the expenses that they do incur. Local governments reported a variety of reasons for not seeking reimbursement on the JLARC staff survey, but the main reason appears to be that local staff do not see the time required to seek reimbursement to be worth the size of the reimbursement that would be made. As discussed previously, many local monitors have other responsibilities that impact the amount of time they can spend on biosolids. Also, six counties indicated on the JLARC staff survey that they were unaware of what activities are reimbursable. Some counties might be unaware of the reimbursement process because they recently passed a biosolids ordinance which is required for a county to be eligible for the reimbursement program.

To this point, local involvement in biosolids monitoring has not been effective in many localities. As documented in this chapter, some localities where biosolids are permitted have not yet adopted ordinances establishing a monitoring and testing program. In other localities, a local monitor has not been designated. Where monitors have been established, the monitors report that they go on-site at least some of the time, but testing is rare. Little in the way of cost reimbursements have been requested for biosolids monitoring by the localities.

The likelihood of more proactive locality testing and monitoring in the future is unclear. Future activity levels appear to depend on the degree to which localities wish to supplement VDH's efforts, and the local-level support that exists for giving the function sufficient priority for it to be effective. The State already has a cost reimbursement program in place, yet few localities have found this to be sufficient incentive to have active programs. Thus, major improvements upon local monitoring only appear likely if local citizens are sufficiently concerned to insist upon it, and if local governing body members make it a priority.

USE OF REGIONAL MONITORS IS AN OPTION FOR IMPROVING OVERSIGHT IN SOME LOCALITIES

In any given locality, there is not enough workload entailed in biosolids oversight to justify the need for a full-time, year-round monitor. Based on JLARC interviews conducted with county officials, an individual assigned to biosolids oversight may spend as little as two percent or up to 30 percent of their time on biosolids-related activities. Moreover, the amount of time spent may vary in the same locality from year to year. Staff in Louisa County, for example, report that 30 percent of the monitor's time was spent doing biosolids-related activities in the first year of monitoring, but much less time was required in the second and third years. In the third year, the monitor only performed 12 hours of biosolids-related work.

Localities that conduct biosolids monitoring have mostly chosen to cope with the sporadic nature of this workload by assigning the task to a locality staff person who has several other duties. As noted in Chapter 4, however, it is not unusual for such staff to give biosolids oversight a low priority relative to their more regular duties. Moreover, it is difficult for these staff to see the need for extensive training in an area that constitutes such a small proportion of their workload.

These facts suggest that several localities coming together to employ a regional biosolids inspector might constitute a more effective arrangement in many cases. Despite the potential benefits of this approach, however, there are only two regional monitoring arrangements at this time, although these arrangements do include six localities. One part-time monitor is shared by Orange and Culpeper counties. Also, as this report was being developed, in August 2005, the counties of Buckingham, Charlotte, Lunenburg, and Prince Edward collectively hired a regional monitor to oversee biosolids applications and respond to complaints. The position will be organized within the Prince Edward County health department, but will allocate time based on the extent to which applications are occurring in each county. The counties decided to adopt a regional approach because they wanted the applications more closely watched, and they did not have the need or resources to each create a separate position.

There appears to be some more potential for regional monitor arrangements to be used. In the JLARC survey of localities, several localities not included in such arrangements indicated that they thought this arrangement could be useful. But in addition, about one-third of respondents did not think that this approach would be useful. Some localities believe that their own staff, though having divided attentions, are most in tune with the needs and the people of the community. They do not

wish to see a situation arise in which there are multiple complaints in multiple localities at one time, and their locality fails to receive the attention it needs. Thus, to the extent that these localities are able to develop an effective arrangement for testing and monitoring in their locality, there is reason to respect the approach they have chosen.

Some of the localities potentially interested in sharing a regional monitor suggested that they might give it greater consideration if VDH was involved in the process. For example, they would like to see VDH contribute to the cost of advertising for the position in the localities, assist with scheduling for the position to ensure equitable coverage among the participating counties, and address the county boards of supervisors about the usefulness of the position. Previous attempts by counties to work together to create a joint monitor suggest that there can be a need for one locality or agency to “step up” and lead the effort. Louisa, Orange, Greene, and Albemarle, for example, were all interested at one time in developing a regional monitor position to serve their counties. However, this idea never moved forward from early discussions because it lacked a driving force to develop the position.

In addition to VDH coordination in setting up regional arrangements, some localities might be more receptive to a regional monitoring approach if a funding incentive were provided for their participation. Since the biosolids fee program already provides localities with an opportunity to have most or all of their actual costs for biosolids oversight reimbursed by the fund, an incentive program would need to offer localities benefits that exceed cost reimbursement. Each locality with a biosolids ordinance that participates in a regional arrangement could receive a set minimum payment above the base reimbursement level that it could be allowed to use for any environmentally-related purposes in the locality. The size of the added reimbursement could be increased somewhat for localities with particularly high biosolids workloads that are handled by a regional monitor.

**CONCLUSION: A MAJORITY OF COUNTIES LACK LOCAL MONITORS,
AND LITTLE TESTING IS DONE**

Most of the localities that receive biosolids are relatively rural counties with limited local government staffs and environmental or health expertise. Some of these counties believe that the entire responsibility for the oversight of State biosolids regulations and permit conditions should reside with the State. Consequently, local testing and monitoring of biosolids has not received a high priority in most counties.

Table 18 summarizes the results from the JLARC survey of counties with biosolids application permits. Over half of the counties have not established a local monitor position, and about nine of ten counties do not conduct tests at biosolids sites. The county monitoring and testing function appears to be hampered by a lack of expertise and training for a task which, in any given county, represents a small and somewhat irregular part of the local government staff workload.

**Table 18
Summary of Survey Results on Local Monitoring
and Testing Activity in Counties**

Source: JLARC staff survey, Summer 2005.

<u>Extent of Monitoring and Testing Activity</u>	<u>Number of Respondents</u>	<u>Percent</u>
No Local Monitor Position Established	20	54 %
Monitoring Assigned, But No On-Site Testing	13	35
Monitoring, With Some On-Site Testing (Testing of Biosolids, Soils, or Nearby Wells)	4	11
Total Counties Responding to the Survey	37	100 %

Note: Appendix G shows county-level information on local ordinances and monitor activity among counties responding to the JLARC staff survey.

Improving Oversight with the Use of the Biosolids Fee Fund

In Summary...

State statutes authorize collection of a fee from contractors applying biosolids. The fee fund was originally established to provide a source of funding for a locality monitoring and testing function, which was authorized by State statute in 2001 to be implemented by January 1, 2003. It was hoped that the local monitoring and testing function would provide a useful supplement to oversight by VDH. However, findings for this report indicate that the local testing and monitoring function is limited in scope or non-existent in most localities. Meanwhile, State regulators have limited resources and conduct little routine oversight, yet have suggested to the public that effective regulatory checks and balances are in place. In light of the current situation, the General Assembly may wish to authorize the use of the biosolids fee fund to pay costs associated with increasing VDH's oversight capacity, particularly its conduct of routine inspections. An increased State oversight capacity could give the biosolids oversight program more credibility.

Previous chapters of this report have described the role of the federal, State, and local governments in Virginia in providing biosolids oversight. As indicated, at each level there are important limitations in the oversight that is provided. A recapitulation of these limitations is provided at the beginning of this chapter, to indicate the need for improvements in the program if it is to be made more credible.

The chapter then discusses steps that could be taken to improve oversight by using the biosolids fee fund to improve oversight statewide. The biosolids fee fund is currently underutilized, a reflection of the fact that testing and monitoring are not done in many counties, and limited in scope in others. Particularly in light of the limited locality use of the fee fund, State statutes could be amended to also allow the use of the fee fund to increase VDH's capacity to perform routine inspections. These actions could help bring greater credibility to biosolids oversight, an objective that citizen complainants as well as the biosolids industry support.

IMPROVEMENTS IN THE BIOSOLIDS OVERSIGHT PROGRAM ARE NEEDED TO PROVIDE A MORE CREDIBLE PROGRAM

The mandate for this review, House Joint Resolution 643, states that "strict compliance with regulatory requirements ap-

plicable to [the] use of biosolids, prompt response to complaints, and consistent enforcement of laws are essential to securing the goals of protecting public health and safety and the quality of the Commonwealth’s environment, while maintaining the benefits of Virginia’s biosolids program.” State regulators have said that there are numerous checks and balances in the biosolids regulatory system that ensure compliance with the provisions of the regulations. The review for this report, however, finds that there are limits to the safeguards that regulators point to as protective of the public and the environment (Exhibit 3).

Exhibit 3
Limitations in the Known Effectiveness of Biosolids Regulations

Source: JLARC staff analysis of VDH correspondence, the NRC report, and Virginia-specific data collected for this review.

<u>Checks and Balances Cited by VDH</u>	<u>Limitations in These Items</u>
Wastewater treatment plants must use approved processes to reduce pathogens.	Pathogens are still present in Class B biosolids. Inspections of plants by EPA are rare. Tests are rarely done to determine actual pathogen levels in biosolids batches at the time of application.
Biosolids are tested for trace metals.	Only nine metals are currently regulated. The NRC report indicates a need for a new risk assessment, with a reassessment of the limits for the nine regulated chemicals, and the use of updated data to assess more chemicals that may be now prevalent in biosolids.
Biosolids are applied at a rate that does not exceed crop nutrient needs.	Biosolids actually have been applied at a rate based on nitrogen needs, which may exceed crop needs for phosphorus. Moreover, violations of application rates are not readily detected, although there have been a few cases found in Virginia.
Set back distances must be maintained.	Setback distances in Virginia do go further than federal regulations. However, VDH reports indicate that VDH complaint inspections sometimes find buffer distances that have been violated. There appears to be some problems convincing applier crews of the necessity to flag off buffer areas before application.
Inspections by local monitors and VDH staff can detect irregularities either in the application process or on farm sites after application.	<p>As indicated in Chapter 3, VDH routine inspections are rare. VDH is very dependent upon an active and informed public who are in sight distance of fields and can spot violations, or upon making incidental discoveries while investigating an odor complaint.</p> <p>Local monitors, as documented in Chapter 4, are not assigned in most localities due to lack of an accepted local ordinance, and where available, typically need more training and expertise to be effective. VDH staff and local monitors rarely conduct any verification tests of the biosolids applied, the soil, or wells on adjacent property.</p>

There are some measures that could be taken, however, to use biosolids fee fund proceeds to improve on the credibility of the oversight program. The remainder of this chapter addresses the biosolids fee fund, and recommendations for its use to improve biosolids oversight in Virginia.

RESOURCES FOR OVERSIGHT IMPROVEMENTS ARE AVAILABLE THROUGH THE BIOSOLIDS FEE FUND

The assumptions used by VDH to set the biosolids fee amount anticipated a greater level of oversight for applications than is in place today.

The assumptions used by VDH to set the biosolids fee amount anticipated a far greater level of oversight for applications than is in place today. The model that was used appears to be suggestive of what a more effective oversight program would entail. For example, the fee estimation model assumed that at each biosolids application site, three inspections would be done (before, during, and after spreading operations). In addition to a one-hour drive time per visit, the model assumed two hours of inspection time per inspection, plus 0.5 hours for post-inspection paperwork. In counties receiving biosolids in a given year, it was anticipated that costs might include a standard metals and nutrient sample and a fecal coliform sample for each source of biosolids applied in the county, and that two “sampling events” might be needed, on average, for complaint investigations by the local monitor.

Consequently, fees that are available from the reimbursement fund provide a level of funding that could support all or most of the costs that a substantial improvement in monitoring might entail. At present, there is a \$300,000 balance in the fee fund that can be used to make improvements. Moreover, annual proceeds to the fund are outstripping reimbursements by more than \$200,000 per year (moreover fee collections are lower than they could be, since the \$2.50 per dry ton charge has not been increased for inflation, and the fee is not currently collected in localities without biosolids ordinances). The fund, then, could be used to pay for a more ambitious program of oversight than is currently being provided.

STATE STATUTES COULD BE CHANGED TO ALLOW THE USE OF FEE FUNDS TO PAY FOR THE ADDITION OF TWO BIOSOLIDS POSITIONS AT VDH

The State’s current hybrid program of State and local monitoring of biosolids applications provides for a level of oversight that is better than no oversight at all. However, as indicated in chapters 3 and 4 of this report, the oversight achieved by State and local monitors, at least in most localities, is sporadic and weak. The program appears to be overly dependent upon the

good faith of appliers, or, if that fails, upon proactive citizen complainants.

While localities that wish to have an active local monitoring program should be allowed and encouraged to perform that role, there are several reasons that argue for placing a greater focus upon the State level for making overall improvements in biosolids oversight. These reasons include the State's regulatory and permitting responsibility for biosolids, the lack of a commitment by many counties to the testing and monitoring function, the relative ease of obtaining the necessary expertise for inspections, an increased likelihood of achieving consistency in the application of State rules and regulations, and the opportunity to provide for a systematic plan and strategy that takes into account the source of the biosolids, the applier, and the location of the applications.

VDH staffing for the biosolids program is limited. VDH has chosen to use its limited staff resources to focus on permit issuance and complaint response. However, the agency is struggling in performing its oversight role with existing staff. As noted, VDH is performing an average of about 17 routine inspections per year, while more than 1,100 applications are being made. Even the routine inspections that are made are not done as the result of a strategy or plan for oversight, but rather are based on whether a staff member is in the area of a permitted site for other reasons, and decides to stop by. Consequently, a recommendation was made in Chapter 3 that two inspector positions for biosolids should be added at VDH to help monitor and enforce the agency's regulations.

It is interesting to note that with regard to the State's biosolids program, the regulated community itself has been maintaining that the staffing of the State agency regulating it should be increased. One of the major biosolids-applying companies interviewed for this study stated that "VDH staffing levels seem to be the problem with the program." The company indicated that they would like to see improvements at VDH because they would like there to be more public confidence in the biosolids program. Another major applier interviewed for the review stated that VDH staff need to go out to the application sites more often, and that more resources for VDH would help the agency accomplish this. This company also noted a desire for the biosolids program to have more credibility.

With a change in statute, the fee fund paid by biosolids generators could be used to finance some improvements in VDH's capacity to perform inspections. For example, the *Code of Virginia* could be amended to allow for the use of fee funds to pay for the costs associated with adding two VDH inspector positions, as recommended in Chapter 3. Currently, VDH inspec-

tor costs average \$77,000 per FTE position, including the cost of fringe benefits. Given that unused fee funds appear likely to average about \$200,000 per year under current locality practices (and with a \$300,000 fee fund balance providing a cushion), fee funds could be utilized to pay compensation costs associated with two FTE inspector positions at VDH. These inspector positions could have the planning and conduct of unannounced, routine inspections of biosolids applications as their main work priority. Secondly, these staff could assist in the VDH permitting process and in preparing training and manuals to help local monitors perform proficient inspections, in those localities still wishing to have a local testing and monitoring role.

If this change is made to make the fund available to help fund statewide oversight, then it also would be appropriate for VDH to provide in its regulations for the collection of the biosolids fee in all counties with permits. This change would result in the collection of substantial additional fee funds. The availability of these funds would present several opportunities for the biosolids program, including: (1) additional funds to pay for more testing or other improvements in the program at the State level, (2) additional funds to pay for more testing and monitoring at the local level, if localities are interested in doing so, or (3) a downward revision in the minimum per-ton charge contained in VDH regulations, if the fee fund revenues substantially exceed the need for biosolids program resources.

Recommendation (14). The General Assembly may wish to consider amending the *Code of Virginia* to permit the use of biosolids fee funds to pay costs incurred by the Virginia Department of Health for the oversight of biosolids applications. Fee funds could be used to pay the compensation costs of two FTE positions at VDH. The positions could be required to give highest priority to planning and performing routine on-site inspections for sites where biosolids are spread. In addition to these compensation costs, VDH use of fee funds could be authorized for other oversight purposes, such as the costs of biosolids, soil, or well tests that VDH finds are needed to adequately perform inspections and respond to citizen concerns.

Recommendation (15). If the General Assembly provides for the use of biosolids fee funds to pay for increased VDH oversight, then the General Assembly may also wish to require that fee funds be collected for all applications of biosolids, irrespective of the ordinance and program status of the locality in which the biosolids are applied.

A

Study Mandate

HOUSE JOINT RESOLUTION NO. 643

Directing the Joint Legislative Audit and Review Commission to study the land application of biosolids. Report.

Agreed to by the House of Delegates, February 26, 2005

Agreed to by the Senate, February 26, 2005

WHEREAS, the General Assembly has enacted legislation requiring the State Board of Health to establish and administer, through the State Department of Health, a comprehensive program to regulate the management, treatment, and beneficial use of sewage sludge or biosolids, in order to protect public health, safety, and the environment of the Commonwealth while realizing the benefits of a properly managed program for the recycling of nutrients contained in sewage sludge; and

WHEREAS, the State Board of Health has adopted the Virginia Biosolids Use Regulations, which establish a uniform, statewide program governing the use of biosolids as a fertilizer and soil amendment on lands in the Commonwealth; and

WHEREAS, the General Assembly has authorized localities to adopt ordinances for inspection and monitoring of land application, to hire local monitors, to abate violations of state laws and regulations, and to receive reimbursement for those activities from fees imposed on the land application of biosolids; and

WHEREAS, biosolids are beneficially used on agricultural and forest land on more than 50 counties in Virginia, amounting in 2003 to approximately 225,000 dry tons per year; and

WHEREAS, production of biosolids is expected to increase due to wastewater treatment infrastructure expansion and improved treatment technology necessary to serve population growth and to achieve goals for water quality improvement and Chesapeake Bay cleanup; and

WHEREAS, strict compliance with regulatory requirements applicable to use of biosolids, prompt response to complaints, and consistent enforcement of laws are essential to securing the goals of protecting public health and safety and the quality of the Commonwealth's environment, while maintaining the benefits of Virginia's biosolids program; and

WHEREAS, more effective use of the authority granted to local governments to inspect and monitor the land application of biosolids will augment state resources, improve oversight of land application, improve communication with the public, allow quick and effective response to complaints, and ensure rapid abatement of violations; and

WHEREAS, the General Assembly acknowledges the responsibility of the Commonwealth and its agencies to assist local governments with adequate training and technical knowledge, accurate information, and clear and consistent regulations and policies; and

WHEREAS, the Joint Legislative Audit and Review Commission has experience in reviewing the effectiveness of state agency regulatory programs such as the Virginia biosolids program; now, therefore, be it

RESOLVED by the House of Delegates, the Senate concurring, That the Joint Legislative Audit and Review Commission be directed to study the land application of biosolids.

In conducting its study, the Commission shall include, among other things, an evaluation of (i) the current level of funding, staffing and resources available to the State Department of Health for oversight and enforcement of the Virginia biosolids program; (ii) resources available to assist local governments with implementation of their biosolids inspection and monitoring authority; (iii) programs to ensure the proper training and support of local biosolids monitors; (iv) incentives to encourage sharing of information and resources among local governments, including the use of regional or multi-jurisdictional monitors; and (v) measures to encourage and assist coordination and communication between the State Department of Health and local governments so as to ensure consistency and efficiency in complaint response and enforcement.

Technical assistance shall be provided to the Commission by the State Department of Health and the Department of Environmental Quality, including making available all records and information necessary for the completion of this study. The Commission shall consult with, at a minimum, a representative sampling of the local governments currently participating in the land application program, including those generating and those receiving biosolids. All agencies of the Commonwealth shall provide assistance to the Commission for this study, upon request.

The Commission shall complete its meetings by November 30, 2005, and the chairman shall submit to the Division of Legislative Automated Systems an executive summary of its findings and recommendations no later than the first day of the 2006 Regular Session of the General Assembly. The executive summary shall state whether the Commission intends to submit to the General Assembly and the Governor a report of its findings and recommendations for publication as a House document. The executive summary and report shall be submitted as provided in the procedures of the Division of Legislative Automated Systems for the processing of legislative documents and reports and shall be posted on the General Assembly's website.

B

Permits Held and Permitted Acreage by Applier

There are 114 active Biosolids Use Regulations (BUR) permits that are currently active in Virginia. These are the permits that are issued by the Virginia Department of Health (VDH). Of these permits, 89 were issued or reissued between October 2000 and October 2004. About 80 percent of the 114 active permits belong to three companies: Synagro, Recyc, and Nutri-Blend. The table below shows the number of permits held by each contractor and the total number of acres under permit as of August 2005. The remaining permits are held by 13 other contractors, including the town of Leesburg, a hauling company, and other assorted companies.

Virginia Department of Health (BUR) Permits Held, and Permitted Acreage, by Land Applier / Contractor

Source: JLARC staff analysis of data supplied by the Virginia Department of Health.

<u>Land Applier / Contractor</u>	<u>Number of Permits Held</u>	<u>Permitted Acreage</u>
Synagro	39	183,134
Recyc	28	108,000
Nutri-Blend	25	64,600
Others	22	38,639
TOTAL	114	394,373

Note: Figures are as of August 2005. VDH has also issued nine permits for distribution and marketing of pelletized material on a statewide basis and three permits for routine storage facilities.

Pathogens of Concern in Sewage

List of Some Principal Pathogens of Concern Found in Domestic Sewage and Sewage Sludge

Source: U.S. EPA, *Environmental Regulation and Technology: Control of Pathogens and Vector Attraction in Sewage Sludge*.

Organism	Disease / Symptoms
Protozoa <i>Entamoeba histolytica</i> <i>Balantidium coli</i> <i>Cryptosporidium</i> <i>Giardia lamblia</i> <i>Toxoplasma gondii</i>	Acute enteritis Diarrhea and dysentery Gastroenteritis Giardiasis (including diarrhea, abdominal cramps, weight loss) Toxoplasmosis
Bacteria <i>Salmonella sp.</i> <i>Shigella sp.</i> <i>Yersinia sp.</i> <i>Vibrio cholerae</i> <i>Escherichia coli</i> <i>Campylobacter jejuni</i>	Salmonella (food poisoning), typhoid fever Bacillary dysentery Acute gastroenteritis (including diarrhea, abdominal pain) Cholera Gastroenteritis Gastroenteritis
Enteric Viruses <i>Hepatitis A virus</i> <i>Norwalk and Norwalk-like viruses</i> <i>Rotaviruses</i> <i>Enteroviruses</i> <i>Polioviruses</i> <i>Coxsackieviruses</i> <i>Echoviruses</i> <i>Reovirus</i> <i>Astroviruses</i> <i>Caliciviruses</i>	Infectious hepatitis Epidemic gastroenteritis with severe diarrhea Acute gastroenteritis with severe diarrhea Poliomyelitis Meningitis, pneumonia, hepatitis, fever, cold-like symptoms, etc. Meningitis, paralysis, encephalitis, fever, cold-like symptoms, diarrhea, etc. Respiratory infections, gastroenteritis Epidemic gastroenteritis Epidemic gastroenteritis
Helminth (parasites) <i>Ascaris lumbricoides (roundworm)</i> <i>Ascaris suum</i> <i>Trichuris trichiura (whipworm)</i> <i>Toxocara canis</i> <i>Taenia saginata (tapeworm)</i> <i>Taenia solium</i> <i>Necator americanus</i> <i>Hymenolepis nana</i>	Digestive and nutritional disturbances May produce symptoms such as coughing, chest pain, and fever Abdominal pain, anemia, diarrhea, weight loss etc. Fever, abdominal discomfort, muscle aches, neurological symptoms Nervousness, insomnia, anorexia, abdominal pain, digestive disturbances Nervousness, insomnia, anorexia, abdominal pain, digestive disturbances Hookworm disease Taeniasis

D

Dry Tons of Biosolids by County, 2002 to 2004

Table D - 1
Total Dry Tons Applied By County in which VDH Has Issued a Biosolids Permit, 2002 to 2004

Source: Virginia Department of Health.

Counties	2002 Total Dry Tons¹	2003 Total Dry Tons	2004 Total Dry Tons	Average Tons
Accomack	0	40	70	37
Albemarle	0	1,497	2,736	1,411
Amelia	2,426	1,842	12,632	5,633
Appomattox	7,493	8,367	6,964	7,608
Bedford	416	4,505	6,220	3,714
Botetourt	0	0	0	0
Brunswick	0	1,691	2,280	1,324
Buckingham	28,122	22,477	10,718	20,439
Caroline	15,104	14,598	6,538	12,080
Charles City	3,894	4,779	1,739	3,471
Charlotte	0	8,210	9,201	5,804
Clarke	4,837	3,192	1,547	3,192
Culpeper	10,487	7,335	12,955	10,259
Cumberland	5,645	10,641	4,652	6,979
Dinwiddie	12,512	15,060	17,167	14,913
Essex	9,940	6,195	1,181	5,772
Fauquier	3,385	7,143	10,014	6,847
Fluvanna	0	5,796	0	1,932
Franklin	0	1,395	4,851	2,082
Frederick	13,800	1,527	9,368	8,232
Goochland	4,713	3,885	2,587	3,728
Greene	0	2,782	3,594	2,125
Halifax	0	760	0	253
Hanover	4,463	307	3,085	2,618
Henrico	1,001	929	1,227	1,052
Henry	0	24	1,037	354
King and Queen	8,178	2,474	8,299	6,317
King George	856	4,410	4,711	3,326
King William	4,298	3,998	3,344	3,880
Lancaster	0	0	0	0
Loudoun	1,664	7,572	3,478	4,238
Louisa	4,657	8,488	7,938	7,028
Lunenburg	0	1,064	154	406

Table D – 1 (continued)				
Counties	2002 Total Dry Tons¹	2003 Total Dry Tons	2004 Total Dry Tons	Average Tons
Madison	6,851	11,788	5,076	7,905
Middlesex	0	4,720	5,098	3,273
New Kent	758	248	0	335
Northumberland	0	0	489	163
Nottoway	8,202	17,348	6,528	10,693
Orange	14,461	6,589	8,829	9,960
Patrick	0	0	265	88
Pittsylvania	0	1,963	3,239	1,734
Powhatan	3,085	3,739	8,713	5,179
Prince Edward	2,653	722	8,434	3,936
Prince George	6,112	4,658	3,863	4,878
Prince William	0	0	0	0
Richmond County	1,407	2,276	2,314	1,999
Southampton	0	125	671	265
Spotsylvania	0	0	2,004	668
Stafford	11,002	3,423	2,364	5,596
Surry	0	107	1,335	481
Sussex	0	4,463	1,976	2,146
Westmoreland	2,619	7,709	10,770	7,033
TOTAL	205,039	232,861	232,255	223,385

Note: ¹Total dry tons for 2002 are based on land applications by Nutri-Blend, Recyc, Synagro, and Wright Trucking only. A Biosolids Use Regulation permit was issued for Campbell County in August 2005. Permit applications are currently being considered by VDH for Amherst and Isle of Wight counties.

Table D - 2
Total Dry Tons Applied and Percent of Total Tons for
Ten Counties Receiving the Most Biosolids, 2003 - 2004

Source: Virginia Department of Health.

Counties	2003 Total Dry Tons	2004 Total Dry Tons	Percent of Total Dry Tons Applied
Buckingham	22,477	10,718	7.1
Caroline	14,598	6,538	4.5
Charlotte	8,210	9,201	3.7
Culpeper	7,335	12,955	4.4
Dinwiddie	15,060	17,167	6.9
Fauquier	7,143	10,014	3.7
Louisa	8,488	7,938	3.5
Madison	11,788	5,076	3.6
Nottoway	17,348	6,528	5.1
Westmoreland	7,709	10,770	4.0
SUBTOTAL	120,156	96,905	46.7
TOTAL	232,861	232,255	100.0

Research Activities

A number of research activities were undertaken as part of this study to address the issues in House Joint Resolution 643. These activities included: structured interviews and site visits, surveys, document reviews, and a review of other states' programs.

Structured Interviews and Site Visits

JLARC staff conducted structured interviews with staff at VDH, local governments, other state agencies, land appliers, farmers, and individuals with an interest in the topic. Visits to agricultural sites to observe land applications were also conducted.

JLARC staff interviewed VDH staff charged with overseeing and enforcing Virginia's biosolids use regulations, including the director of the division of wastewater engineering and a biosolids specialist. Interviews with other State agencies included staff with the Department of Environmental Quality and the Department of Conservation and Recreation (DCR).

In addition, JLARC staff interviewed county administrators, local monitors, and other officials in counties currently permitted to receive land applied biosolids. Staff from the following localities in which land application of biosolids has been permitted by VDH were interviewed: Amelia, Appomattox, Buckingham, Charlotte, Fauquier, Frederick, Hanover, King and Queen, Loudoun, Louisa, Orange, Prince Edward, and Westmoreland. JLARC staff also interviewed representatives of three land appliers operating in Virginia, concerned citizens, staff at a wastewater treatment plant, staff at EPA, and a researcher at Cornell University.

JLARC staff also spoke with biosolids program coordinators in Maryland, Michigan, North Carolina, Pennsylvania, and Wisconsin about their programs. JLARC staff also interviewed staff with the Maryland Environmental Service, who perform on-site inspections of biosolids that are produced at the Blue Plains facility and land applied in Virginia. Additionally, staff for this review interviewed two farmers who use biosolids. Six site visits were conducted to observe actual applications.

Surveys

One web-based and one mail survey were conducted as part of this review. JLARC staff conducted an internet survey of 54 counties in which land has been permitted for biosolids applications; and another two counties in which State permits are pending for a total of 56. JLARC staff received 37 responses to this survey for an overall response rate of 66 percent. Localities responding to the survey receive about two-thirds of the biosolids applications that are made in Virginia. (A Virginia map at the end of this appendix shows the localities which were surveyed, and which localities did and did not respond.) The survey addressed each county's level of involvement with land applied biosolids, the level of State resources available to local governments, the effectiveness of State training programs for local monitors, and the level of cooperation between local governments in sharing information and resources related to biosolids activities.

In order to obtain information on the biosolids disposal methods used by wastewater treatment facilities, JLARC staff conducted a mail survey of 88 wastewater treatment plants licensed in Virginia and permitted as major-municipal facilities by the State Water Control Board and one facility in the District of Columbia. The response rate for this survey was 88 percent, with 78 wastewater facilities returning surveys. The survey sought information from treatment plant operators regarding sludge disposal options and the cost of land application compared to land filling and incineration.

Document Reviews

A wide array of documents were reviewed as part of this evaluation. JLARC staff examined Department of Health files on permitted applications of biosolids to evaluate the effectiveness and timeliness of the State permitting process. Staff also reviewed complaint investigation materials in order to determine how Department of Health officials are responding to complaints. In addition, JLARC staff reviewed the findings and recommendations from a 2002 study done by the National Research Council of the National Academy of Sciences that focused on the technical standards used by EPA to develop the Part 503 rule. JLARC staff also reviewed EPA's 2003 response to the NRC report, as well as EPA technical documents on Part 503 development. Staff also examined two reviews of EPA's biosolids program conducted by the EPA Office of Inspector General. Local ordinances passed by localities in Virginia were also reviewed.

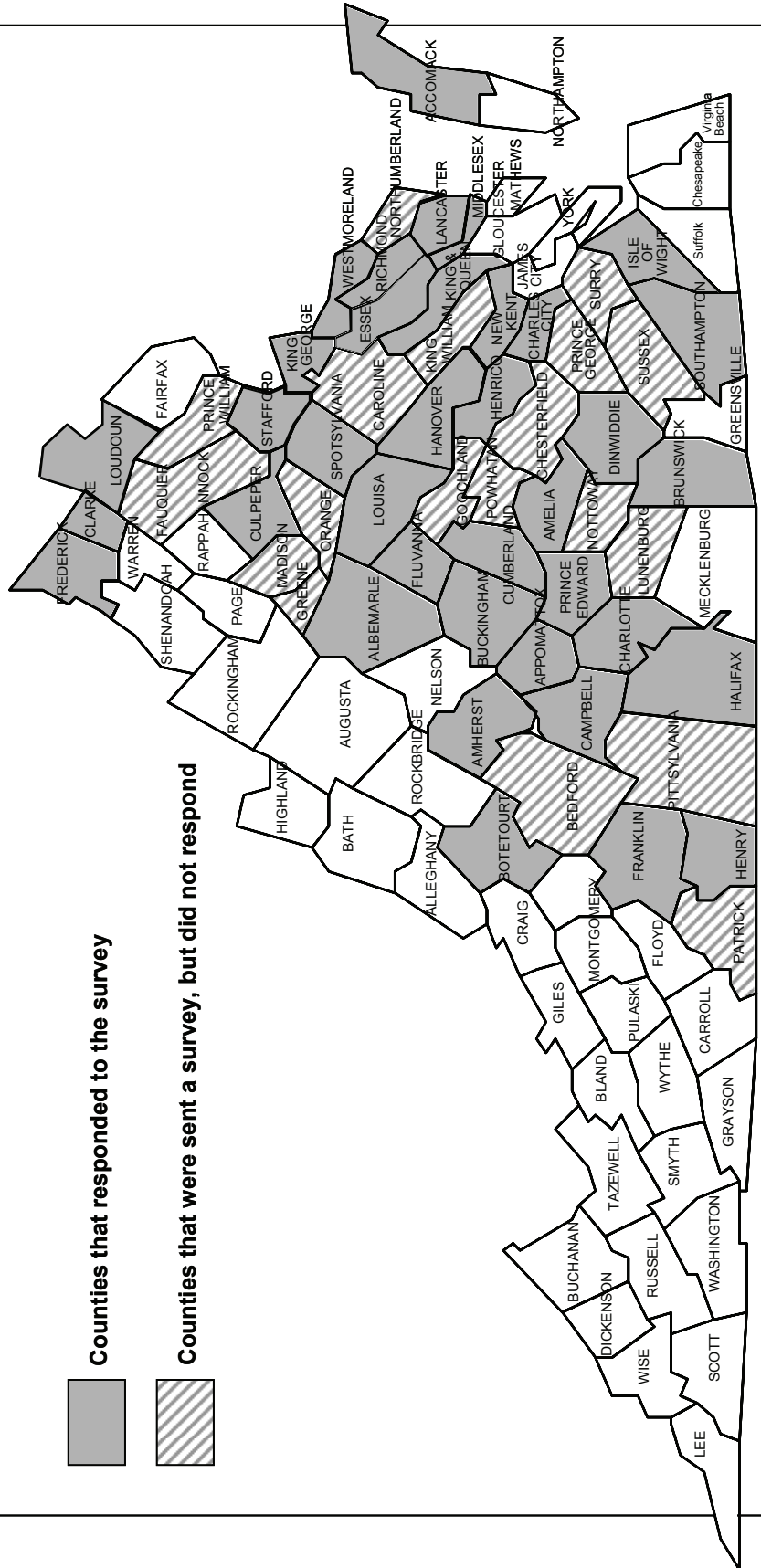
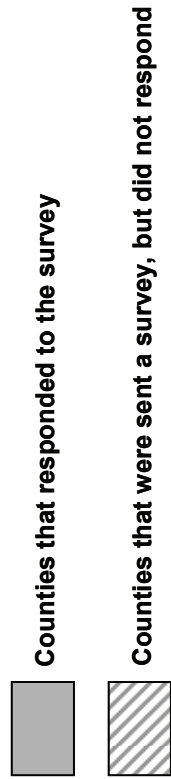
JLARC staff also reviewed the pollutant concentrations reported by the VDH-approved sources of land applicable Class

B biosolids. EPA Region 3 supplied JLARC staff with reports indicating the DMR data and limits for sludge for 2004 as reported by all POTWs in the region. Concentrations for each regulated pollutant were measured against the established ceiling limit.

Attendance of Meetings and Local Monitor Training Sessions

JLARC staff attended two meetings of the Biosolids Use Regulations Advisory Committee (BURAC), a panel created under the *Virginia Administrative Code* to advise the Health Commissioner on the implementation and administration of the biosolids use regulations. In addition, staff attended one training session for local biosolids monitors in order to assess the quality of instruction being offered.

Responses to the JLARC Staff Survey of County Administrators in Counties in Which VDH Has Issued a Permit for the Land Application of Biosolids



Appendix **F**

Glossary of Terms and Acronyms

Agronomic rate	The annual whole sludge application rate (dry weight basis) designed to (1) provide the amount of nitrogen needed by the food crop, feed crop, fiber crop, silviculture crop, cover crop, horticultural crop or vegetation grown on the land and (2) minimize the amount of nitrogen in the sewage sludge that passes below the root zone of the crop or vegetation grown on the land to the groundwater
Biosolids	The soil-like residue of materials removed from sewage during the treatment process. During treatment, bacteria and other tiny organisms break sewage down into simpler, harmless organic matter. The organic matter combined with bacterial cell masses, settles out to form biosolids.
Class A Biosolids	Pathogens in these biosolids are reduced to below detectable levels. Within Class A, Exceptional Quality (EQ) biosolids meet the most stringent metal limits. No restrictions are placed on the land application of EQ biosolids, but restrictions are placed on Class A biosolids that do not meet the stringent metal limits
Class B Biosolids	Pathogens must be significantly reduced but not below detectable levels for Class B biosolids and site restrictions and farm management practices must be used when applying such biosolids
BUR	Biosolids Use Regulations
BURAC	Biosolids Use Regulations Advisory Committee
CWA	Clean Water Act
DCR	Department of Conservation and Recreation
DC WASA	District of Columbia Washington Area Sanitation Authority
DEQ	Department of Environmental Quality
DMR	Discharge Monitoring Reports
DPB	Department of Planning and Budget
DWE	Division of Wastewater Engineering, organized within VDH's Office of Environmental Health Services
EPA	Environmental Protection Agency
EPA OIG	Environmental Protection Agency's Office of Inspector General
EPA Region 3	Federal monitoring of biosolids activities in District of Columbia, Delaware, Maryland, Pennsylvania, Virginia and West Virginia
FTE	Full-time employee
MES	Maryland Environmental Service
NMP	Nutrient Management Plan
NPS	Nonpoint source pollution
NRC	National Research Council of the National Academy of Sciences

Appendix F, continued	
PADEP	Pennsylvania Department of Environment
Part 503	Also known as “Standards for the Use or Disposal of Sewage Sludge”, defines how sewage sludge is to be disposed of, the treatment processes that sewage sludge must go through to become biosolids, and the management practices for applying the material to agricultural and non-agricultural sites. EPA is responsible for administering and enforcing the regulations of the Part 503.
Pathogens	An organism capable of causing a susceptible host to develop a disease or infection.
POTW	Publicly-owned treatment works, same as WWTP
SCWWA	South Central Wastewater Authority
Sewage	Domestic, municipal, or industrial liquid waste products
Sewage sludge	A solid, semi-solid or liquid residue generated during the treatment of domestic sewage in a treatment works.
USDA	The United States Department of Agriculture
VDH	Virginia Department of Health
Vector attraction	The characteristic of sewage sludge that attracts rodents, flies, mosquitoes or other organisms capable of transporting infectious agents.
VPDES	Virginia Pollutant Discharge Elimination System
WWTP	Wastewater treatment plants

G

Local Monitoring Programs by County

The table below shows summary information on local monitoring programs in counties in which there are biosolids permits and which responded to the JLARC staff survey.

County	Ordinance Adopted	Monitor	Number of Training Sessions Attended	On-site During Spreading (of the time)	Fee Fund Dollars	Average Acreage Applied, 2002-04
Local Monitors On-Site Most of the Time During Spreading						
Amelia	✓	✓	4	Most	\$23,123	1,050
Brunswick	✓	✓	1	Most	0	286
Charlotte	✓	✓	2	Most	8,543	649
Clarke	✓	✓	0	Most	1,475	808
Culpeper	✓	✓	4	Most	1,207	2,279
Dinwiddie	✓	✓	2	Most	1,561	2,217
Frederick	✓	✓	3	Most	1,002	1,400
Henry	✓	✓	0	Most	0	71
Lancaster	✓	✓	0	Most	0	78
Local Monitors On-Site Some of the Time During Spreading						
King and Queen	✓	✓	2	Some	2,983	1,338
Loudoun	✓	✓	1	Some	0	1,043
Louisa	✓	✓	2	Some	0	1,408
Prince Edward	✓	✓	2	Some	0	680
Southampton	✓	✓	0	Some	0	56
Westmoreland	✓	✓	2	Some	3,529	1,742
Local Monitor Is Not Present During Spreading						
Buckingham	✓	✓	2	None	1,745	2,879
No Local Monitor Is Assigned						
Accomack			0	None	0	1
Albemarle			0	None	0	327
Appomattox	✓		0	Some	0	1,226
Botetourt			0	None	0	88
Charles City			0	Some	0	575
Cumberland	✓		1	None	0	1,957
Essex			0	None	0	2,326
Fluvanna			0	None	0	255
Franklin			0	None	0	951
Hanover	✓		0	None	0	973
Halifax			0	None	0	512
Henrico			1	None	0	237
King George	✓		0	None	0	1,157
Middlesex			0	None	0	504
New Kent			0	None	0	101
Richmond			0	None	0	519
Spotsylvania	✓		0	None	0	328

Note: Amherst, Campbell, and Isle of Wight counties also responded to the JLARC survey, but were not included in this table. Permit applications are pending before VDH for proposed sites in Amherst and Isle of Wight counties. A permit was issued for sites in Campbell county in the summer of 2005.



OCT 04 2005

COMMONWEALTH of VIRGINIA

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October 4, 2005

Mr. Philip A. Leone, Director
Joint Legislative Audit and Review Commission
Suite 1100, General Assembly Building
Capitol Square
Richmond, Virginia 23219

RE: Review of Land Application of Biosolids in Virginia

Dear Mr. Leone:

Thank you for the opportunity to review the Joint Legislative Audit and Review Commission's (JLARC) report on the Land Application of Biosolids in Virginia. The Commission staff did an excellent job getting their arms around the rather difficult subject matter involved in this review. I also appreciate the Commission staff's cooperation and advice throughout their evaluation of the program oversight, enforcement of the *Biosolids Use Regulations*, and adequacy of resources.

The Virginia Department of Health (VDH) is in substantial agreement with the Commission's recommendations. VDH believes the implementation of these recommendations will strengthen and improve the biosolids program. I will brief the Board of Health at its October 21st meeting on the recommendations (Recommendations 10, 11, 12, and 13) which require their action in order to amend the *Biosolids Use Regulations*. Based on our past experience, some of the proposed regulatory changes reflected in the JLARC recommendations may encounter some resistance from various entities. However, we believe the Commission's review will be valuable to the Board of Health in addressing public comment adverse to such changes. For those recommendations (Recommendations 2, 3, 5, 6, 7, 8, and 9) that can be implemented administratively, I have directed the Director of the Office of Environmental Health to develop an implementation plan.

For those recommendations that will require legislative approval in order to implement (Recommendations 1, 14, and 15), I will work with both the Administration

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and the General Assembly in order to request the necessary legal authority and financial resources that would improve the oversight of the land application of biosolids.

VDH staff will be in attendance at the October 11, 2005, meeting to address questions the Commission may have about the program. However we do not need to be placed on the Commission's agenda for a separate presentation. Please let me know if I can provide you with any further assistance.

Sincerely,

A handwritten signature in black ink, appearing to read "Robert B. Stroube". The signature is written in a cursive style with a large initial "R" and "S".

Robert B. Stroube, M.D., M.P.H.
State Health Commissioner

cc: The Honorable Jane H. Woods
Secretary of Health and Human Resources

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