REPORT OF THE
JOINT LEGISLATIVE AUDIT AND REVIEW COMMISSION

SOLID WASTE FACILITY MANAGEMENT IN VIRGINIA: IMPACT ON MINORITY COMMUNITIES

TO THE GOVERNOR AND
THE GENERAL ASSEMBLY OF VIRGINIA

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Preface

Local governments and private companies currently operate more than 240 non-hazardous solid waste facilities in Virginia. In recent years, there has been an increase in the number of private regional landfills in the Commonwealth. Most of these facilities import waste from outside of Virginia as a regular part of their operations. All solid waste facilities in the Commonwealth are regulated by the Department of Environmental Quality (DEQ).

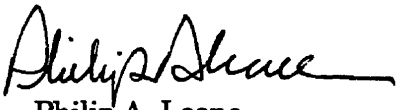
House Joint Resolution 529 directed JLARC to study the practices related to the siting, monitoring, and cleanup of solid waste facilities with a special focus on the impact of these activities on minority communities. This study mandate was passed in response to charges that minority neighborhoods were being targeted as host communities for solid waste facilities, in particular large regional landfills.

The findings of the study were mixed. There are some racial inequities associated with the local siting of the private regional landfills, and in approximately 35 percent of the communities in which facilities have been sited since the State adopted a comprehensive set of regulations, minorities do live in disproportionately high numbers. However, approximately 72 percent of the persons who live around recently permitted solid waste facilities are white. While localities generally did a poor job of involving the community in the process for siting these facilities, there is no reliable evidence to indicate that there has been any intent to discriminate in the local site selection process.

The report also found significant gaps in DEQ's central office oversight program, as well as problems in the solid waste inspection program that is implemented by regional office staff. With regard to the inspection process, the report found that solid waste sites in minority communities received fewer inspections and had especially long periods of non-compliance compared to those facilities in white communities. These problems appear to be at least partly the result of chronic staff shortages among inspectors, a lack of guidance from the DEQ's central office, and an inefficient and weak enforcement process.

The report includes recommendations intended to improve community involvement in the siting process, DEQ's central office oversight program, and the agency's inspection and enforcement activities. DEQ's implementation of these recommendations is necessary to ensure compliance with Virginia's solid waste management regulations as well as to ensure protection of the environment and minimize any negative impact on minorities or other citizens of the Commonwealth who live near solid waste facilities.

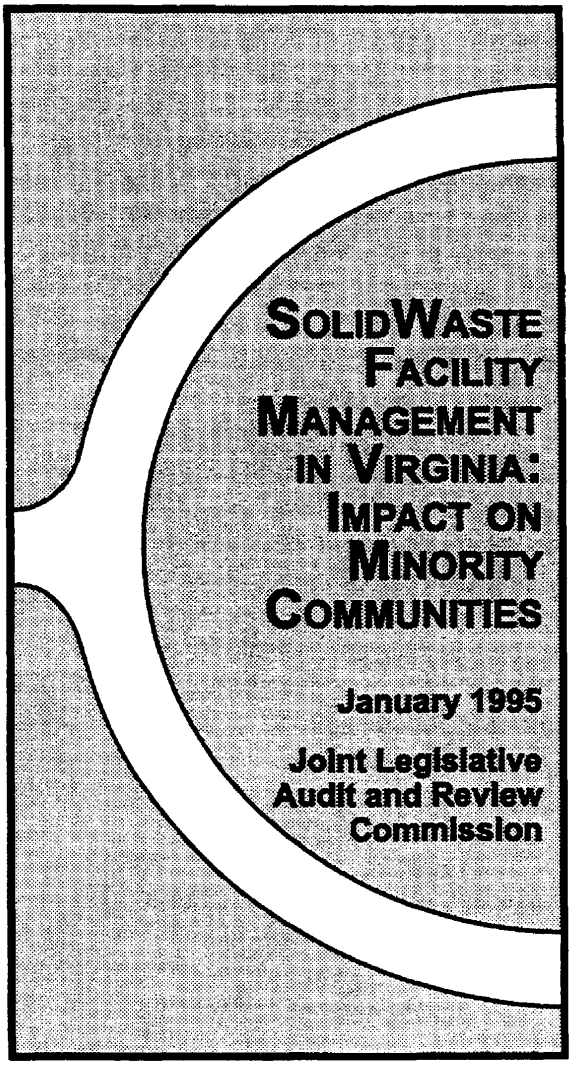
On behalf of JLARC staff, I would like to express our appreciation for the cooperation and assistance provided by staff at the Department of Environmental Quality, the local officials and facility operators around the State who met with us or provided information through surveys, and representatives of the private solid waste companies and the community action groups that we interviewed.



Philip A. Leone
Director

January 19, 1995

JLARC Report Summary



In 1993, the Virginia General Assembly passed House Joint Resolution 529 directing JLARC to study practices related to the siting, monitoring, and clean-up of both hazardous and non-hazardous solid waste facilities, specifically focusing on the impact of these activities on minority communities. While there are no hazardous waste disposal facilities in Virginia, local governments and private companies operate more than 240 non-hazardous solid waste facilities across the State.

The majority of these facilities in the State are sanitary, industrial, and demolition debris landfills which are used to dispose of various types of solid waste by burying the refuse in the ground. The State agency responsible for ensuring that regulations governing the management and disposal of solid waste are properly implemented is the Department of Environmental Quality (DEQ). In 1988, the responsibilities of this agency increased significantly with the adoption of a sweeping set of solid waste regulations that were designed to protect the environment from possible contamination related to the disposal of solid waste.

The key issue raised in this mandate is whether a pattern of racial discrimination has developed in the process for siting and monitoring solid waste management facilities which disproportionately exposes minorities to certain health risks. While the study found no evidence of an intent to discriminate against minorities, the analysis revealed that in some cases, siting and monitoring practices have had a disproportionate impact on minority communities. Significant findings of the report include:

- Only 17 percent of the solid waste facilities sited since 1988 are located in communities which have a minority population rate that exceeds 50 percent. This calls into question the view that minority communities are routinely targeted to host solid waste facilities in Virginia.

- However, almost four out of every ten solid waste facilities that have been sited in the State since 1988 are located in disproportionately minority communities. In nearly half of these

communities, the difference between the community and locality-wide minority population rate is substantial.

- While there is no evidence of an intent to discriminate by local governing bodies that approve site locations, local governments generally do a poor job of proactively involving the community in the siting process.

- Critical gaps exist in DEQ's solid waste regulatory oversight program. Management within DEQ have not implemented systems to monitor the compliance status of solid waste facilities with respect to groundwater monitoring and landfill closure activities. Nor is attention given to whether the agency's major compliance programs — monitoring and enforcement — are consistently implemented.

- Due to staffing problems, the performance of the agency's inspectors has been inconsistent, and data for a sample of waste facilities indicates less inspection activity for facilities in minority neighborhoods. DEQ has not adequately enforced the closure requirements for landfills that are no longer receiving waste and does not routinely monitor these facilities to ensure that they are not creating problems for the environment.

- There has been some growth in the number of private regional landfills in Central Virginia. This has created geographic and racial equity issues as a disproportionate amount of solid waste is disposed of in Central Virginia which has a large proportion of minorities.

Minorities Are Disproportionately Impacted by 35 Percent of SWMF Sitings

To determine the impact on minorities of recently sited SWMFs, JLARC staff conducted an analysis of the racial composition of the communities surrounding the recently sited SWMFs. Analysis of the communities around these facilities reveal that approximately seven out of every ten residents who live within communities around new newly permitted SWMFs are white. In addition, only seven out of 41 communities (17 percent) around these sites have a minority population that exceeds 50 percent (see Figure, opposite page).

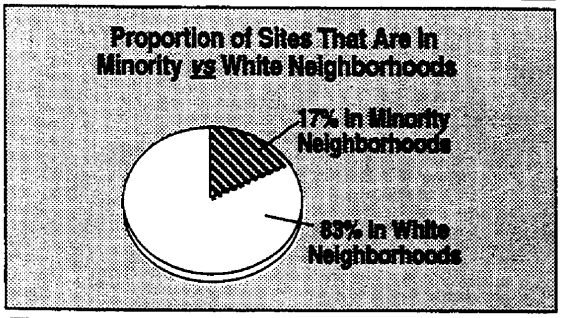
Nonetheless, legitimate questions can be raised about facility sitings patterns which show that minorities live near SWMFs at rates which are higher than should be expected based on their numbers in the overall population of the locality. This type of disproportionate representation suggests that minorities are, either coincidentally or as a matter of public policy, being forced to bear a disproportionate share of any burdens or risks which may be associated with living in close proximity to a SWMF.

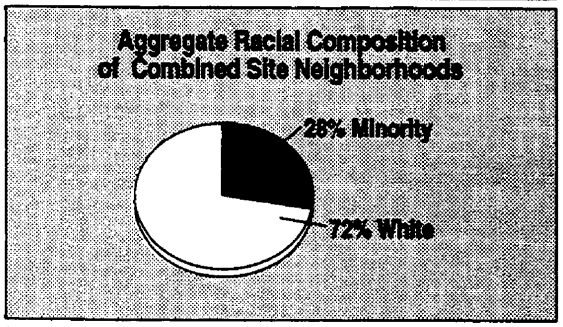
The study findings suggest that minorities are disproportionately impacted by 35 percent of the SWMF sitings (see Figure, page IV). Fourteen of the 40 (35 percent) planned or established facilities since 1988 are in communities that are disproportionately minority. In seven of these 14 facility sitings that are considered to have a disproportionate impact, the differences between the community and the locality-wide minority rate are greater than 20 percentage points..

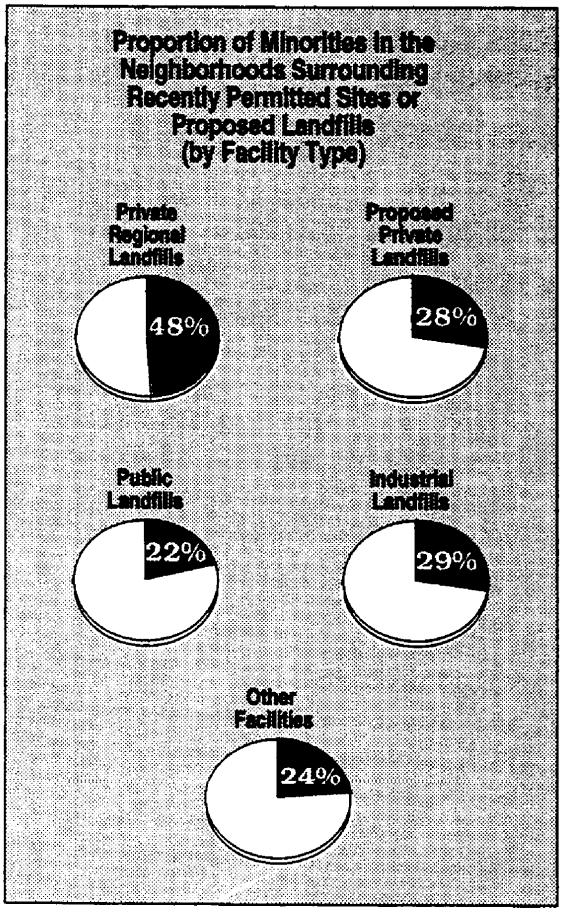
No Evidence of Intent to Target Minority Communities

Despite the disproportionate impact on minorities, there is no evidence of an intent to discriminate against these communities. A review of the local decisionmaking pro-

Racial Characteristics of Neighborhoods with Solid Waste Sites





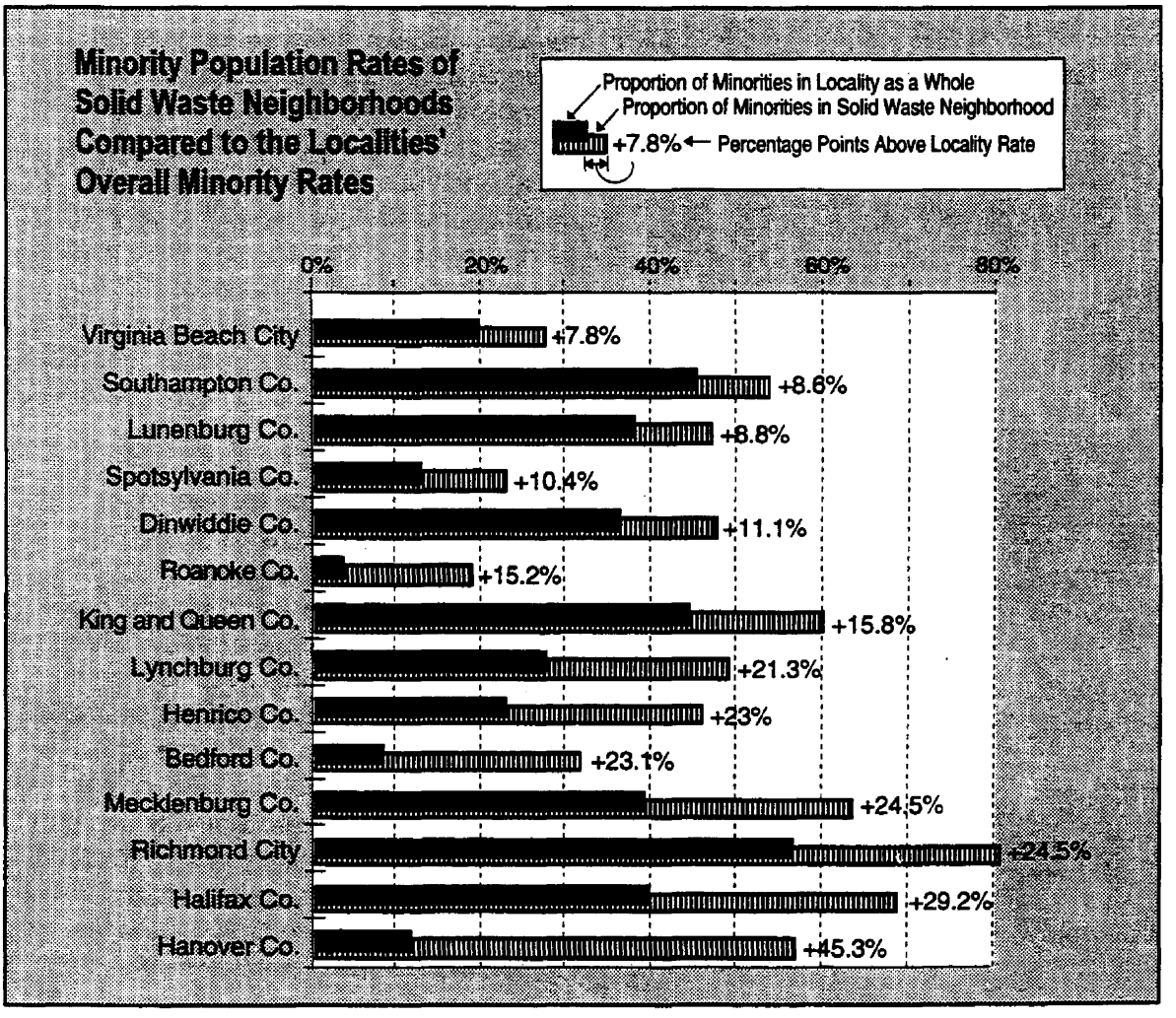


cess in these and other communities did not reveal significant differences between the siting process for sites in disproportionately minority communities and sites that are not in disproportionately minority communities. Localities that approved solid waste sites in minority communities were just as likely to have conducted formal independent siting studies and objectively evaluated alternative sites, and were almost as likely to have had minority representatives on the local governing board who supported the siting decision.

Public Participation in the Process Needs to Be Improved

One aspect of the siting process that needs to be improved is public participation. In a number of localities visited by JLARC, it was apparent that there was a lack of public involvement during the early stages of the siting process. In some of the more urban localities, much of the planning for the site was handled by professional staff and consultants. In some of the more rural localities, county administrators and members of the board of supervisors worked closely on the project without much outside involvement.

A survey of residents in communities with SWMFs that have been permitted under the 1988 regulations indicates that public participation in the siting process generally has not been cultivated. Only 15 percent of those responding to the survey had any knowledge of how the facility came to be located in their community, and 77 percent indicated that they had no knowledge about the siting of the facility in their community. The number of minority residents with any knowledge of the siting process was even lower — only eight percent. In minority communities, failure to involve the public in a meaningful way during the siting early stages of the process may give rise to suspicion and resentment that the site is being "dumped" in the community because of the racial composition of the residents.



In order to minimize the problems with future SWMF sitings, the State should develop some guidelines which outline strategies that may be used to ensure community involvement in the siting process. Local governments need to be certain that members of the communities in which SWMFs may be established are involved in the planning, siting, and development of operational guidelines for these facilities. The Department of Environmental Quality, in consultation with the Virginia Association of Counties and the Virginia Municipal League, should develop a technical assistance guide for local governments on the process for siting solid waste management facilities. In addition, the Secretary of Natural Resources should require DEQ to develop a geographical mapping database to help identify the racial characteristics of residents surrounding all sites in which SWMFs are proposed. If the communities are predominantly or disproportionately minority, the permit applicant should be required to demonstrate that representatives from the affected community were given the opportunity to participate in the process for siting the facility.

Critical Gaps Exist in DEQ's Oversight Program

In response to the 1988 Solid Waste Management Regulations, DEQ has established a program of oversight to enforce the regulatory requirements. However, this oversight program has some significant problems which appear to be at least partly the

result of several reorganizations that the solid waste program has undergone in recent years. Some staff are not clear on their responsibilities for oversight, and very little attention is given to supervising and coordinating the work of the field staff who are responsible for conducting facility inspections. While it appears that DEQ has established a system to enforce many of the major new regulatory requirements, the agency has given only minimal attention to key regulatory requirements regarding groundwater monitoring and landfill closure. In the area of groundwater monitoring, DEQ's lack of enforcement may have allowed higher rates of noncompliance for landfills in minority communities to go undetected.

The department needs to substantially improve its oversight program in these areas. This can be accomplished by clearly defining the oversight responsibilities for all central office staff and developing a reporting system that requires regional staff to report quarterly on compliance rates for both active and closed facilities.

DEQ's Inspection Process Is Inconsistent and Varies by Race

Examination of DEQ's inspection process over the last 23 years revealed significant problems with the process which are at least partly the result of chronic staff shortages among inspectors and a lack of guidance from the department's central office. The analysis revealed that inspectors are not able to consistently conduct inspections of SWMFs in their region. Further, the length of time between inspections is considerable and especially long for sites in minority neighborhoods. Also, the length of time that sites remain out of compliance with solid waste regulations has increased over time, and the periods of non-compliance have been especially lengthy for sites in minority communities.

Solid waste operators that do not resolve violations are referred to the agency's enforcement unit. Data analyzed for this study indicate that the process is underutilized, protracted, and weak. Since 1980, only 148 cases have been officially referred to the unit. Most of these cases are still pending after an average of three years since the initial referral. Because DEQ does not have the authority to levy administrative penalties without the consent of the operator, some cases are referred to the Attorney General's office for legal action. These cases remain unresolved after an average of six years.

DEQ needs to institute several reforms to improve the agency's inspection process. The agency needs to conduct a workload analysis for each region and determine the number of inspectors that will be required to enhance the integrity of the inspection process. In addition, the agency should implement a notice of violation point system like the one used in the water division to bring greater consistency to the inspection process. DEQ should also develop an automated data management system which will allow inspectors to more efficiently track the compliance status of all SWMFs in the State and enable central office staff to provide better oversight of the inspection process. Finally, the enforcement process could be strengthened if the *Code of Virginia* were amended to give an administrative law judge the authority to impose civil penalties on recalcitrant solid waste operators who are in violation of the State's regulations.

DEQ Needs to Improve Enforcement of the Closure Requirements

Because landfills pose a risk to the environment even after they have stopped receiving waste, it is important that inactive facilities be closed properly. Although DEQ is required by the regulations to regularly inspect inactive and closed landfills to ensure that the closure standards are implemented, the agency has provided only minimal oversight in this area. Almost half of the

landfills that have stopped receiving waste have never been inspected by DEQ. Additionally, the majority of inactive landfills that are required to close under the regulations have not been forced to do so, and less than 30 percent of these sites were being reviewed by enforcement at the time of this study. Managers of the enforcement and compliance units within DEQ should develop a plan to identify all inactive landfills which are out of compliance with State closure regulations so that these sites can be officially closed and routinely monitored.

Landfill Capacity Does Not Need to Be Regulated

With the construction of several large regional landfills in the State over the last several years, there has been a substantial increase in the amount of waste being imported to the State. In 1993, imported waste accounted for about 14 percent of the solid waste disposed of in the Commonwealth and by 1995 it will account for nearly 18 percent.

The trend in private regional landfills has generated both geographical and racial equity issues. Most of the regional landfills are located in Central Virginia which, as a result, receives a disproportionate share (42 percent) of all the solid waste that is buried in the State. In addition, most of the counties which host these regional facilities and the neighborhoods in which the sites are located have minority populations that are substantially larger than can be observed statewide.

Despite this trend, local governments still control most of the State's landfill capacity, if remaining capacity is measured in terms of the number of years that a facility can continue to receive waste. Specifically, local governments control 92 percent of the remaining landfill capacity which is fairly evenly distributed across the State. Based on these findings and potential legal barriers, there is not a compelling reason to support State regulation of the construction of new private landfills.

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I. Introduction

In 1993, the Virginia General Assembly passed House Joint Resolution 529 directing JLARC to study practices related to the siting, monitoring, and clean-up of both hazardous and non-hazardous solid waste facilities, specifically focusing on the impact of these activities on minority communities. While there are no hazardous waste disposal facilities in Virginia, local governments and private companies operate more than 240 non-hazardous solid waste facilities across the State.

The majority of these facilities in the State are sanitary, industrial, and demolition debris landfills which are used to dispose of various types of solid waste by burying the refuse in the ground. Other types of waste facilities include incinerators which are designed to burn trash, and materials recovery plants which capture the energy stored in waste for sale to power plants. Some of the landfills and incinerators across the State also have recycling operations as a part of the integrated trash management programs implemented by some localities and private companies.

In 1992, the active solid waste facilities in the Commonwealth received and disposed of approximately nine million tons of waste. This was four percent of the total amount of solid waste disposed nationwide. It is estimated that approximately 16 percent of the waste disposed in the Commonwealth — 1.5 million tons — is imported from outside of Virginia.

The key issue raised in this mandate is whether a pattern of racial discrimination has developed in the process for siting and monitoring solid waste management facilities which disproportionately exposes minorities to certain health risks. The concerns expressed in this study mandate mirror those articulated nationwide by a growing number of community action groups. Convinced that minorities face greater exposure to environmental pollutants, these groups are beginning to pressure federal, state, and local officials to reform a siting process which they contend deliberately targets minority communities as potential sites for solid waste management facilities.

Despite this national movement for "environmental justice," many local public officials in Virginia and members of the solid waste industry contend that race plays no role in the location decisions for waste disposal facilities. These decisions, they state, are driven mostly by geologic factors (availability of land that is suitable for the construction and operation of the solid waste facility) and economics (the location of the most affordable land). They also contend that the risk associated with these facilities, location notwithstanding, has been greatly reduced by improved technology and more stringent federal and state regulations.

This report presents an analysis of the practices used at the State and local level to site, monitor, and clean up solid waste sites in Virginia. Consistent with the requirements of the mandate, this study examined these practices with an emphasis on how they have impacted minority communities. Also, included in this review is an

examination of the changes in Virginia's capacity for waste disposal which have resulted, in part, from the growth in regional landfills.

This chapter provides an overview of solid waste disposal activities in Virginia and presents information on the various types of solid waste facilities which have been granted permits to operate in the State. In addition, this chapter summarizes some of the key changes that have occurred in the regulatory environment for solid waste, discusses the oversight role for the Department of Environmental Quality, and describes the approach used to conduct this study.

ORIGINS OF THE ENVIRONMENTAL JUSTICE MOVEMENT

The issue of whether race is a key factor in the siting of solid waste management facilities had its roots more than 10 years ago when a landfill was constructed in a predominantly black North Carolina County. This landfill was built specifically to receive the highly toxic chemical PCB. Following a nationally publicized protest of this siting, several studies were conducted which concluded that hazardous waste facilities were more likely to be located in areas with high proportions of minority residents.

In response to the growing pressure from members of what is now referred to as the "environmental justice movement," the Environmental Protection Agency (EPA) formed a task force in 1993 to examine the issue. Later in 1994, President Clinton signed an Executive Order directing the relevant federal agencies to take immediate action regarding the issue of environmental justice.

To date, there have been no systematic studies of this issue in Virginia. However, the controversy which recently accompanied proposals to site several landfills and a medical waste incinerator in localities with large minority populations provided the impetus for the study mandate of this report.

Warren County Protest Sparks Environmental Justice Movement

In 1978, more than 30,000 gallons of the chemical polychlorinated biphenyl (PCB) was illegally dumped along 210 miles of roadway in the state of North Carolina. Four years later, the Governor of North Carolina decided that the 32,000 cubic yards of contaminated soil should be removed and disposed in a community known as Afton, which is located in Warren County.

Shortly after the decision was made to site the landfill in Afton, the black community in Warren County initiated a protest of this action which they labeled as "environmental racism." At the time of the proposed siting, Warren County had the largest minority population in the state. Moreover, the community where the site would be located was 84 percent black.

Among the organizers and supporters of the protest where the Southern Christian Leadership Conference and the United Church of Christ's Commission for Racial Justice. The protest, which included more than 500 demonstrators (most of whom were jailed), was unsuccessful. In 1982, over 6,000 truckloads of the contaminated soil were dumped into the landfill.

Siting Studies Led to National Focus on Environmental Justice

While the Warren County demonstration was unsuccessful, it spawned a host of studies which focused on whether race played a role in the siting of hazardous and solid waste facilities. The results of most of the early studies suggested that hazardous waste facilities are more likely to be located in areas that have a high proportion of minorities. For example, the United States General Accounting Office (GAO) was directed to conduct a study of siting practices of four hazardous waste facilities in the South Atlantic Region of the United States in 1983. This study found that the minority populations in three of the four communities ranged from 52 to 90 percent.

Four years later, the United Church of Christ commissioned a study of the same phenomenon. The findings of this study suggested that race was the most important factor in explaining the location of hazardous waste facilities. A different study of the characteristics of the residents who lived near a hazardous waste facility in Detroit resulted in similar findings.

Recently, however, a study conducted by professors at the University of Massachusetts at Amherst generated findings that were not consistent with the earlier studies. The authors of this study concluded that while a great deal of additional research is needed, they could find no consistent, statistically significant pattern of racial or ethnic discrimination when examining the distribution of hazardous waste treatment and disposal facilities in the country.

Based largely on the early studies, some have concluded that the decision to establish these types of facilities in minority communities was a deliberate attempt to distribute any potential environmental hazards to non-white communities. However, others viewed the decision process as more political than racist. According to this view, minority communities have been targeted because they lack the political power to block the sites. In other words, the goal of both local governments and private operators is to seek the path of least resistance.

In response to the pressure created by these studies, the EPA announced that ensuring environmental justice in hazardous waste sitings would be a top priority. Subsequently, a task force was formed to examine the procedures used for siting hazardous waste facilities and to make recommendations to address any siting practices that were discriminatory. In 1994, President Clinton signed an Executive Order focusing additional attention on this issue. This order directed federal agencies to take immediate action to ensure that minority communities would not be disproportionately exposed to

pollutants from waste management facilities. Some of the specific requirements for the relevant federal agencies are as follows:

- make environmental justice a part of the agency mission by identifying disproportionately high health and environmental effects on minority or low-income populations;
- promote enforcement of health and environmental statutes in minority and low-income communities; and
- improve research and data collection relating to the health and environment of minority and low-income populations.

Charges of Environmental Racism Have Been Raised in Virginia

In August of 1990, the Board of Supervisors of King and Queen County passed a resolution which allowed Browning-Ferris Industries to construct a regional landfill in the county. Shortly after the resolution was passed, a biracial community group known as the Residents Involved In Saving The Environment (RISE) filed a suit challenging the siting on the grounds that it was racially discriminatory. Though not entirely based on race, similar controversies developed with landfill sitings and proposals for the construction of medical incinerators in the counties of Amelia and Sussex, and the cities of Petersburg and Richmond.

To date, there have been no systematic studies of this issue in Virginia. However, the controversy which recently accompanied the aforementioned proposals to site new landfills in counties with large minority populations provided the impetus for House Joint Resolution 529. Since that time, additional, mostly anecdotal evidence has illustrated that some counties with newly proposed (in some cases regional) landfills have larger proportions of minorities than can be observed statewide (Figure 1).

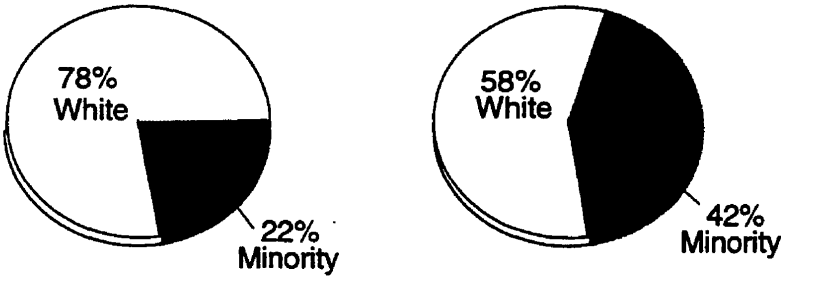
Members of the environmental justice movement contend that although the patterns observed in Virginia have not been rigorously examined, they are consistent with national data which clearly indicate that race has been injected in the decision making process for the siting of solid waste facilities. Based largely on this anecdotal evidence, some members of this movement state that the process for siting facilities in the Commonwealth should be reformed.

SOLID WASTE DISPOSAL IN VIRGINIA

As the population of the United States continues to grow, public concern has begun to emerge about the amount of waste generated nationwide. Presently in Virginia, no facilities have been granted permits to legally dispose of hazardous solid waste. Consequently, most materials that are considered hazardous must be transported to

Figure 1

Proportion of Minorities in Virginia Compared to Counties with Proposed Landfills



Virginia Total
Average Income $20,082

Eight Counties with Proposed Landfills
Average Income $15,205

Source: Conservation Council of Virginia Special Report: *The Environmental Justice Movement.*

other jurisdictions for permanent disposal. As for non-hazardous solid waste, however, it is estimated that at least nine million tons are deposited in Virginia annually, ranking the Commonwealth eighth nationally in tons disposed.

The solid waste industry in Virginia, like those in other states, has undergone considerable change during the last twenty years. Perhaps the most significant change occurring in this industry since 1971 has been the use of improved methods for handling the growing amounts of refuse and other forms of solid waste. In previous years, virtually all of the solid waste in Virginia was dumped into unregulated and in many cases environmentally unsafe landfills. However, as concerns about the safety of landfills have grown and additional regulations have been adopted, waste management operators have been forced to make significant technological changes to these facilities.

At the same time, some local governments across the State are beginning to implement recycling and trash incineration programs to offset the use of landfills. Still, despite the efforts of some localities to diversify their methods of waste disposal, landfills remain the most popular mechanism for disposing of solid waste. Most of these facilities in Virginia are considered sanitary landfills which primarily receive household and commercial garbage. Separate landfills have been established for industrial waste materials, construction or demolition debris, and compost materials.

Nationally, Virginia Ranks High in Solid Waste Disposal

In 1988, pursuant to the Virginia Waste Management Act, the Virginia Waste Management Board promulgated a comprehensive set of regulations governing the disposal of solid waste in Virginia. A key part of the regulations focused on identifying the types of materials that would be considered solid waste. Subsequently, solid waste was broadly defined in Virginia to cover any discarded material not exempt from regulation based on other State or federal statutes.

Since the hazardous waste regulations were passed, there has been only one proposal for a hazardous waste facility in Virginia. According to staff at the Department of Environmental Quality, this proposal was vehemently opposed by the residents of the area suggested for the site and was rejected. There are no other such facilities in the State. The State has, however, granted permits to 562 facilities for the management and disposal of non-hazardous solid waste, of which approximately 43 percent are currently active.

In 1992, staff at *BioCycle* — an environmental publication — conducted a survey of solid waste officials in each state in the country regarding waste disposal activities. While cross-state differences in the definition of solid waste limit the usefulness of these data, some relevant findings do emerge from this survey. The study found that the annual amount of refuse classified as non-hazardous solid waste in the United States — 250 million tons — was approximately 25 percent higher than all previous estimates. Additionally, as Table 1 indicates, Virginia ranks eighth among states for waste disposal by processing an estimated nine million tons of trash each year. Not surprisingly, most of the states that disposed of the greatest quantities of waste in 1992 were those with the largest populations, such as California, Florida, Texas, Pennsylvania, Michigan, Illinois, and Ohio.

However, population does not completely explain the cross-state differences in total amounts of waste disposed. For example, New York, which has the second largest population in the United States, ranks 29th in tons of waste disposed within state boundaries. Further, when the waste disposal figures for all states are adjusted to account for population, Virginia's national ranking moved from eighth to third despite the fact that it is only the 12th largest State in the country (Table 2). Virginia's high ranking for tons of waste disposed per capita is likely related to the large amount of solid waste that is imported from other states. According to a 1992 solid waste survey by *BioCycle* magazine, 16 percent of the 9 million tons of waste disposed in Virginia — 1.5 million tons — was imported from other states. Virginia's landfill operators report that much of this waste was imported from several Northeastern states.

Table 2 shows that three of the most populated Northern states — New Jersey, Pennsylvania, and New York — rank below the national median for total amount of waste disposed per capita. This indicates that a substantial portion of the solid waste generated in these states is being transported to other jurisdictions for permanent disposal. As will be discussed later in this report, because of differences in the rates (tipping fees) charged by landfill operators in various states, it has proven less expensive for some solid waste companies to transport their refuse to the Commonwealth and other Southeastern states for disposal than to use the landfills in their jurisdictions.

Southern Portion of Virginia Has a Relatively High Number of SWMFs

Since 1971, 562 solid waste management facilities (SWMFs) have been permitted in Virginia. In total, the 562 SWMFs in the state occupy more than 23,000 acres of land. To examine the specific geographic location of these facilities since State regulation

Table 1

Tons of Waste Disposal and Ranking by State

State	Waste Disposed (In Tons)	National Ranking
California	45,000,000	1
Florida	18,700,000	2
Texas	18,000,000	3
Ohio	15,700,000	4
Illinois	14,600,000	5
Michigan	11,700,000	6
Pennsylvania	9,500,000	7
Virginia	9,000,000	8
Missouri	7,500,000	9
New Jersey	7,100,000	10
Massachusetts	6,800,000	11
North Carolina	6,000,000	12
Washington	5,100,000	13
Tennessee	5,000,000	14
Alabama	4,500,000	15
Georgia	4,400,000	16
Minnesota	4,400,000	17
South Carolina	4,000,000	18
Kentucky	3,500,000	19
Louisiana	3,500,000	20
Wisconsin	3,400,000	21
Oregon	3,300,000	22
Oklahoma	3,000,000	23
Arizona	2,900,000	24
Connecticut	2,900,000	25
Colorado MEDIAN =	2,400,000	26
Kansas	2,400,000	27
Iowa	2,300,000	28
New York	2,200,000	29
Arkansas	2,000,000	30
West Virginia	1,700,000	31
New Mexico	1,500,000	32
Mississippi	1,400,000	33
Hawaii	1,300,000	34
Nebraska	1,300,000	35
Rhode Island	1,200,000	36
Utah	1,200,000	37
New Hampshire	1,100,000	38
Nevada	1,000,000	39
Maine	950,000	40
Idaho	850,000	41
Washington DC.	815,000	42
South Dakota	800,000	43
Delaware	750,000	44
Montana	600,000	45
Indiana	570,000	46
Maryland	510,000	47
Alaska	500,000	48
North Dakota	400,000	49
Vermont	390,000	50
Wyoming	320,000	51

Notes: Data have been rounded and are therefore not precise estimates of solid waste.
Source: JLARC staff analysis of data from a *BioCycle* magazine 1992 survey of solid waste officials.

Table 2

Per Capita Waste Disposal and Ranking by State

State	Tons of Waste Disposed Per Capita	National Ranking
California	1.50	1
Missouri	1.46	2
Virginia	**1.45**	**3**
Ohio	1.44	4
Florida	1.44	5
Washington DC	1.33	6
Illinois	1.27	7
Michigan	1.25	8
Rhode Island	1.19	9
Hawaii	1.17	10
Oregon	1.16	11
South Dakota	1.14	12
South Carolina	1.14	13
Massachusetts	1.13	14
Delaware	1.22	15
Alabama	1.08	16
Texas	1.06	17
Washington	1.04	18
Tennessee	1.02	19
Minnesota	1.00	20
New Hampshire	1.00	21
New Mexico	0.99	22
Kansas	0.97	23
Oklahoma	0.95	24
Kentucky	0.95	25
West Virginia	**MEDIAN = 0.95**	**26**
New Jersey	0.92	27
Alaska	0.91	28
North Carolina	0.90	29
Connecticut	0.88	30
Arkansas	0.85	31
Idaho	0.84	32
Nevada	0.83	33
Louisiana	0.83	34
Iowa	0.83	35
Nebraska	0.82	36
Pennsylvania	0.79	37
Arizona	0.79	38
Maine	0.77	39
Montana	0.75	40
Colorado	0.72	41
Wyoming	0.70	42
Utah	0.70	43
Wisconsin	0.69	44
Vermont	0.69	45
Georgia	0.68	46
North Dakota	0.62	47
Mississippi	0.54	48
New York	0.12	49
Maryland	0.11	50
Indiana	0.10	51

Notes: Data have been rounded and are therefore not precise estimates of solid waste.

Source: JLARC staff analysis of data from a *BioCycle* magazine 1992 survey of solid waste officials. Population data collected from the *Book of the States, 1990-91.*

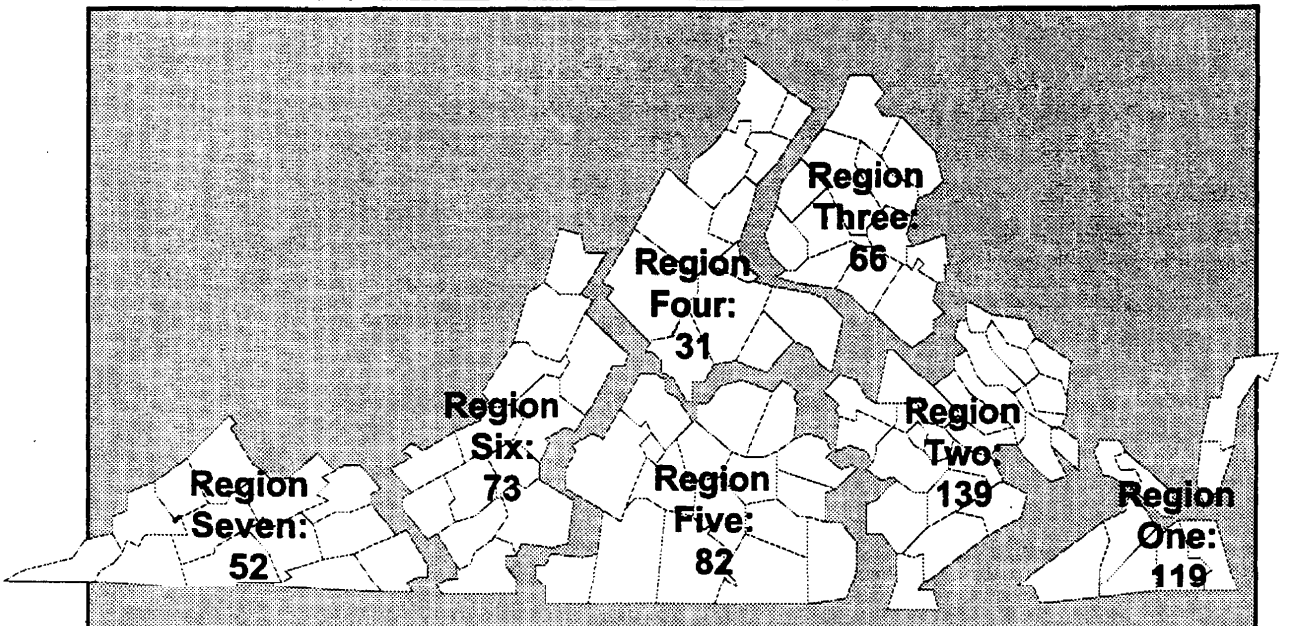
of this activity began, JLARC staff grouped the various counties and cities across Virginia into the seven management regions used by the Department of Environmental Quality (DEQ), and identified the number of SWMFs which have been established in these areas.

Several patterns surface when the location of Virginia's SWMFs is examined by DEQ region. On an absolute basis, since 1971, more SWMFs have been placed in those management regions which are primarily defined as Southeastern and Central Virginia (see Figure 2). For example, in the region located in Southeastern Virginia (Region One), 119 SWMFs — 21 percent of all facilities — have been granted waste management permits since 1971. In the region referred to by DEQ staff as Central Virginia (Region Two), 139 SWMFs were approved for operating permits. Together, these two regions account for 46 percent of all SWMFs permitted by the State since this regulatory function was created.

However, because the seven management regions are not equal in size as measured by population, some variation in the number of SWMFs across these geographic areas is to be expected. Higher population areas generate more refuse and may therefore require greater numbers of SWMFs. To determine if certain areas of the State have a relatively larger number of SWMFs per capita, the population in each region was divided by the number of SWMFs in the region. Figure 3 presents the results of this analysis.

Figure 2

Regional Location of Solid Waste Facilities Permitted Since 1971

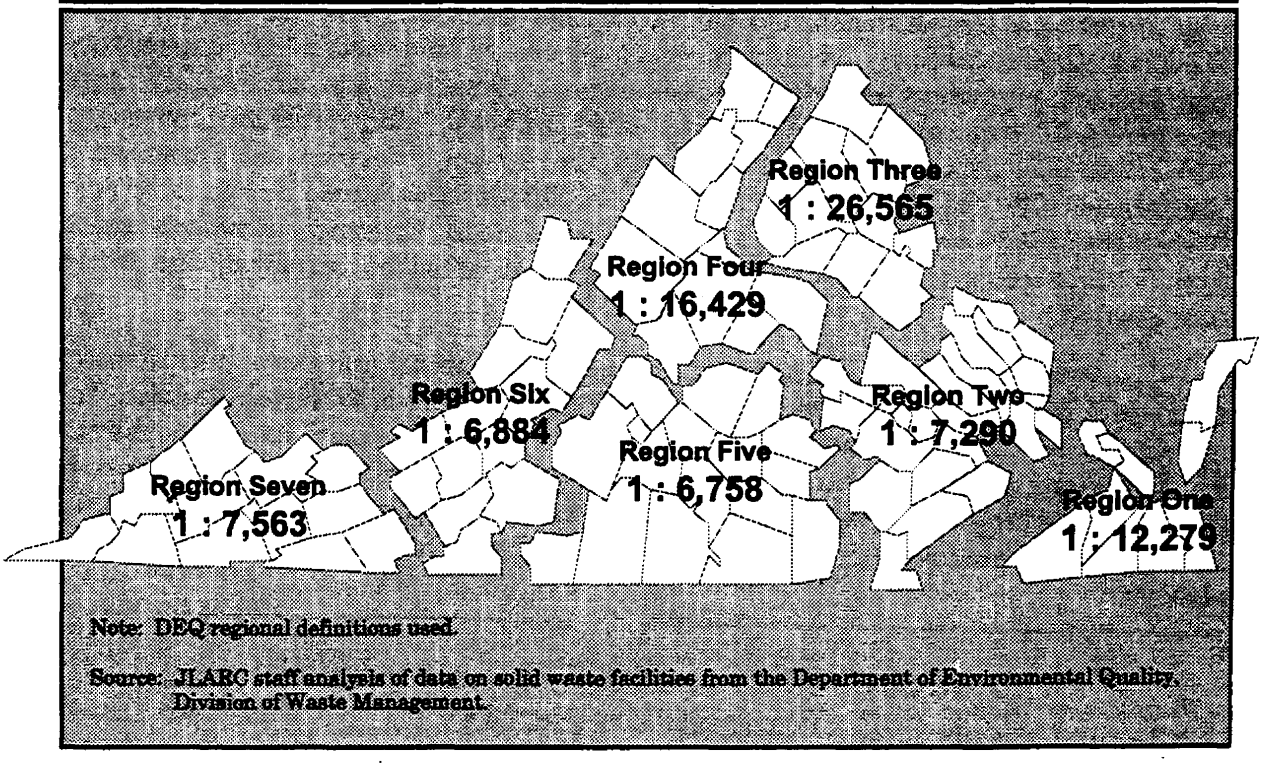


Note: DEQ regional definitions used.

Source: JLARC staff analysis of data on solid waste facilities from the Department of Environmental Quality, Division of Waste Management.

Figure 3

Ratio of Solid Waste Management Facilities to the Population of DEQ's Management Regions



Note: DEQ regional definitions used.

Source: JLARC staff analysis of data on solid waste facilities from the Department of Environmental Quality, Division of Waste Management.

As shown, the areas defined by Southside (Region Five) and a portion of Southwest Virginia (Region Six) have the smallest number of residents per SWMF of any areas in Virginia. In Region Five, one SWMF has been permitted for every 6,758 residents. In Region Six, the ratio is one for every 6,884 residents. Conversely, the regions defined by the Northern and Northwestern portions of the State have the greatest number of residents for each SWMF. In the Northern portion of the State (Region Three), permits have been granted to one SWMF for every 26,565 residents. In Region Four — Northwest Virginia — the ratio is one for every 16,429 residents.

These patterns are consistent with a number of theories regarding facility siting in Virginia. Some local officials suggest that large amounts of undeveloped, remotely located, and inexpensive land in the Southern part of the State have facilitated the development of more government-operated landfills. In other cases, it has been suggested that minimal zoning restrictions in this region of the State have served as an attractive incentive for prospective owners of private SWMFs.

Alternatively, the high land values, a limited number of remote, large undeveloped tracts of land, and the intense controversy that would likely surround any attempt to build large public or private landfills, militate against the siting of SWMFs in the Northern area of the State. Still others suggest that localities in the Northern part of the

State are no more resistant to siting SWMFs than those in other areas. They contend that highly populated areas such as Northern Virginia both need and can afford to build larger facilities, thereby generating an economy of scale in waste management which reduces the number of facilities required in the region.

Landfills Are Most Prevalent Method of Waste Disposal in Virginia

As noted earlier, although there are several methods for disposing of solid waste, the most widely used method remains landfills. Since the regulatory process was initiated in 1971, 55 percent of the SWMFs which have been issued permits to operate in Virginia are considered sanitary landfills (Figure 4). State regulations define a sanitary landfill as any "land burial facility engineered for disposal of household waste which is so located, designed, constructed and operated to contain and isolate the waste so that it does not pose a substantial present or potential hazard to human health or the environment."

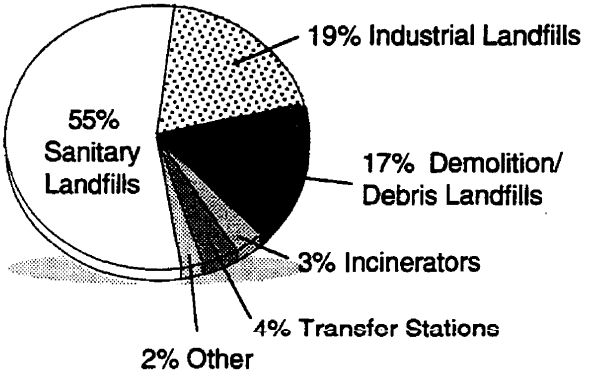
Although not obvious from this definition, the regulations do permit sanitary landfills to receive other types of non-household solid waste (for example, commercial sludge or non-hazardous industrial waste). Further, as noted earlier, under limited circumstances, these facilities can receive certain types of small quantity hazardous waste.

Before the State adopted laws and regulations which more tightly regulated this industry, constructing a landfill could simply involve digging a hole in the ground. Localities usually required that the landfill be built in an area where the soil was naturally compacted so that it could serve as a filter for rainwater and any other liquid

Figure 4

Types of Solid Waste Management Facilities in Virginia

Total Facilities Permitted Since 1971 = 562



Source: JLARC staff analysis of automated data from the Department of Environmental Quality, Division of Waste Management.

that could leak through the waste and possibly contaminate the groundwater. However, no other requirements were uniformly imposed.

Since 1971, a series of State and federal regulations designed to enhance the safety of landfills have been promulgated. These regulations, in effect, are designed to convert landfills into "dry tombs" which permanently separate the solid waste from the groundwater that runs beneath most of these facilities and the rainwater that runs over the facilities. Under the new regulations, most landfills must now have the following safety features before its owner can receive a permit to operate:

- *A Composite Liner System.* This is a liner system placed at the bottom of the landfill for the purpose of minimizing the amount of rainwater or "garbage juice" that can seep through the waste and contaminate the underlying groundwater. This liner system must include a synthetic plastic membrane and two feet of compacted clay soil beneath the liners. Alternative liner systems can be approved by the state.

- *A Leachate Collection System.* This is a system designed to capture and remove solid waste liquids known as leachate that generate over time in the fill area. The purpose of this system is to reduce and limit the amount of liquids that are permitted to collect on the liner system. Once captured, the leachate is pumped through a series of pipes imbedded in the fill area into a storage tank or pond and eventually transported or directly discharged to a waste water treatment plant.

- *Groundwater Monitoring System.* This system is a series of wells placed around the active fill area to provide operators with the means for early detection of potential groundwater problems. Through the wells, which are long sections of pipe, samples of groundwater beneath the landfill are taken and tested regularly for possible contaminants.

- *Final Cover.* After the fill area has reached capacity, a final cover must be installed. For most landfills, this cover is required to contain at least 18 inches of compacted clay. Because the clay cover has a low permeability rate, the solid waste is protected from rain. This reduces the amount of leachate in the fill area and the potential for groundwater contamination.

- *The Erosion and Sedimentation Control System.* To further prevent storm or rain water run-off from entering the landfill, the regulation requires owners to construct a series of channels or other structures. These structures are often designed to channel run-off into a pond adjacent to the landfill.

- *A Gas Management System.* One of the potential dangers of landfills is the explosive methane gas that is naturally produced from the decomposition of certain solid waste. To prevent this gas from traveling underground and coming into contact with substances that can ignite it, some landfills must have systems which prevent the buildup of methane gas.

While these new requirements have undoubtedly improved the ability of State government to reduce the environmental risks associated with the operation of landfills, the regulations impose significant costs on the local operators. It is estimated by engineers at Virginia Polytechnic Institute and State University that these environmental protection features increase the cost of opening a landfill to anywhere from $500,000 to as much as $800,000 per acre.

Industrial Solid Waste Landfills. Approximately 19 percent of the landfills permitted in the State since 1971 have been industrial waste facilities. According to the Solid Waste Management Regulations, industrial waste is any solid waste generated by a manufacturing or industrial process that is not a regulated hazardous waste. Some types of industrial waste specifically mentioned by the regulations include waste from the production of electricity, agricultural chemicals, leather and leather products, resins, and textiles.

While sanitary landfills can and in some cases do accept industrial waste, non-industrial or household waste cannot be disposed of at industrial waste landfills. These landfills also have a separate set of regulations governing the siting criteria, design and construction, and operation. Nonetheless, in most cases, these requirements are not substantially different from those governing the siting, design and construction, and operation of sanitary landfills.

Construction and Demolition Debris. Landfills designed to receive construction and demolition debris are the next largest category of solid waste management facilities in the State, representing 17 percent of all facilities which have been issued a permit since 1971. Construction waste is defined as any non-hazardous solid waste generated during construction, remodeling, or repair of pavement, houses, commercial buildings or other structures. Debris is the waste that results from land clearing operations. These facilities can only receive waste that meets these definitions.

Incinerators as an Alternative to Landfills in Virginia. As noted earlier, one method for disposing of solid waste is to incinerate the materials. It has been reported that burning solid waste "reduces its volume by as much as 90 percent," while at the same time creating opportunities to capture the energy stored in certain types of waste for sale to power plants. In Virginia, only three percent of all solid waste facilities permitted since 1971 have been designed to burn trash. This is true, despite emerging evidence that the other alternative to landfilling — recycling — carries significantly higher costs.

One reason that there are few incinerators in Virginia is likely the local opposition that typically accompanies any attempt to establish an incinerator in most communities. Incinerators have been criticized by environmentalists on the grounds that such facilities may emit life-threatening waste and produce ash which contains cancer-causing agents.

EVOLUTION OF SOLID WASTE REGULATION IN VIRGINIA

Some of the most significant changes that have occurred in the solid waste industry in Virginia have been in the regulatory area. State regulation of waste disposal has advanced from being completely unregulated prior to 1971, to a comprehensive set of requirements that govern landfill design and construction, monitoring of groundwater and gas, and the siting, operation, and closure of solid and hazardous waste facilities.

As the environmental movement gained momentum during the 1970s, the Commonwealth began addressing the problem of unregulated waste disposal through the site permitting process. However, inadequate enforcement staff, vague standards, and a narrow interpretation of the regulations greatly minimized the impact of these initial requirements.

This regulatory program was enhanced during the 1980s, first with State mandates, then through both State and federal legislation and regulations that established a comprehensive program for the regulation of solid waste. During this period, more resources were directed to environmental management, and a separate waste management agency was created which was merged with other environmental agencies to form the Department of Environmental Quality in 1993. One significant result of the changes over the last two decades has been a sharp reduction in the number of solid waste management facilities which are currently open and actively receiving waste in Virginia.

First Solid Waste Regulations Passed In 1971

Prior to 1971, the State did not play an active role in the regulation of solid waste in Virginia. Private operators and local governments involved in solid waste management were subject only to ordinances which were adopted by city councils and county boards of supervisors, and health regulations implemented by local health departments.

Due in part to the absence of regulations, solid waste managers (including local governments) were essentially free to use any number of methods to dispose of waste. Some operators constructed large landfills that received all types of solid waste without any safety features to contain the potentially hazardous "garbage juice." Some landfill operators would collect and burn some of the refuse on-site without attention to air quality issues. In many cases, solid waste managers would operate what would now be classified as open dumps.

These SWMFs could and usually did escape any sanctions as long as they were not operated in a manner that posed an obvious threat to public health in violation of local health regulations. As long as landfill operators implemented measures that would control obvious indicators of potential problems, such as rodents, seagulls, and foul odor, they would not be shut down by health department inspectors.

The 1971 Regulations. In 1971, the State promulgated solid waste regulations which were implemented by the Department of Health. The regulations established certain basic requirements for the operation of SWMFs. They required that all solid waste disposal facilities have a permit to operate. The regulations also expressly prohibited open dumping of solid waste and set forth certain requirements for the operation of solid waste disposal facilities. These operating regulations included requirements for cover, access to the facility, control of paper and dust, pest and animal control, and fire prevention control. The regulations also prohibited scavenging and salvaging and the disposal of hazardous waste.

At the outset, enforcement of the 1971 regulations was minimal. According to present DEQ staff, the regulatory program in the 1970s and 1980s was underfunded and understaffed. In addition, the permit staff at the time lacked sufficient expertise to effectively regulate the operation of SWMFs. Regulatory enforcement also was made difficult because the regulations did not contain many specific standards to enforce.

Instead of enforcement, most resources were apparently directed toward educating the owners of SWMFs about the permit process and persuading them to comply with regulatory requirements. Operating permits were often granted through a process of negotiation between the applicant and the permit writer. In addition, inspection and enforcement activity during this period has been described by DEQ staff as a matter of "cajoling, threatening, and jawboning the parties" toward minimum standards of compliance.

DEQ staff also suggest that the 1971 regulations were flawed because they permitted open dumps in existence prior to the effective date of the regulations to continue operating with a "non-conforming permit." As a result, solid waste disposal remained only minimally regulated during the 1970s.

General Assembly Establishes Permit Deadline

Based on a concern that there were still many open dumps operating in the State, the General Assembly passed a law in 1979 requiring all facilities that were not permitted to obtain a permit or shut down. The statute allowed for the continued operation of existing open dumps until June 1983. After that date, they were required to have a permit or shut down. The mandate ultimately was effective in obtaining the closure of many additional facilities.

In enforcing this mandate, the Virginia Department of Health (VDH) compliance staff reportedly began to impose specific conditions on solid waste facilities seeking permits. For old landfills, existing problems with leachate seepage, inadequate cover, or landfill runoff had to be remediated before a permit was granted. For new landfills, some staff required operators to install base liners and groundwater monitoring systems. In addition, some operators were required to agree to use a more extensive final cover when the landfill ultimately closed.

Federal Government and State Pass More Comprehensive Regulations

As noted earlier, during the 1970s, solid waste was regulated solely by a small division of the Department of Health, in conjunction with the Solid Waste Commission. However, as concern for environmental protection increased during the 1980s, the State focused additional resources on waste management and in 1986, the General Assembly enacted the Virginia Waste Management Act which established a separate Waste Management Board as well as the Department of Waste Management (DWM).

State's Role Expanded. The DWM's role in solid waste management expanded considerably with the adoption of the 1988 Solid Waste Management Regulations. These sweeping regulations established comprehensive criteria governing the siting, design and construction, operation, and closure of solid waste management facilities. According to DEQ staff, these regulations were adopted in anticipation of new federal criteria for sanitary landfills that the EPA was in the process of drafting at the time.

Through a grandfather clause in the regulations, SWMFs that were operating at the time the 1988 regulations became effective were allowed to continue to operate until July 1, 1992. However, after many localities complained that they could not meet this deadline, the General Assembly extended the deadline for compliance for government-owned landfills to 1995.

EPA Adopts Federal Solid Waste Regulations. In 1991, three years after Virginia's Solid Waste Management Regulations became effective, EPA adopted regulations establishing criteria for sanitary landfills that were similar to the 1988 Virginia solid waste management regulations. However, one of the major differences was the requirement in the federal regulations that all landfills be in compliance with the new operating requirements by October 1993 or shut down. This requirement was in conflict with the extension that the General Assembly had previously granted to public landfills to continue operating until 1995.

To resolve this conflict and to provide relief to localities, the General Assembly enacted legislation allowing local government landfills that were in existence when the 1988 regulations became effective to continue operating after October of 1993 if the facility was permitted before March 15, 1993 and had received solid waste prior to October 9, 1993. To obtain permission to continue operating, a locality was required to submit a signed statement acknowledging that: (1) the owner or operator was familiar with state and federal laws and regulations pertaining to solid waste management, (2) the facility was not an open dump, (3) the facility did not pose a substantial threat or hazard to the environment, and (4) leachate from the facility did not pose a threat of contamination or pollution to the environment.

Any authorization granted to localities to operate their landfills beyond October 1993 has certain restrictions. Specifically, the exemption from the regulations only applied to unused capacity that was approved for use prior to March 15, 1993. Moreover,

landfills that received this exemption were still required to install groundwater monitoring systems and monitor groundwater in accordance with the State and federal regulations. In addition, all landfills that continued to operate after October 1993 are required to comply with the closure and post-closure requirements in the new regulations. Finally, all operators — whether public or private — that wish to laterally expand are required to comply with all of the requirements for new landfills.

Other differences between Virginia's solid waste management regulations and the federal regulations were resolved through amendments to the State Solid Waste Management Regulations in 1993. DEQ amended Virginia's solid waste management regulations to conform them to the federal regulations.

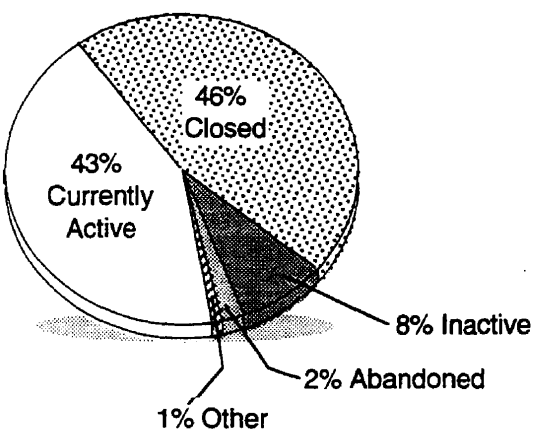
One apparent impact of these new regulatory requirements has been a reduction in the number of landfills. Rather than face the cost of installing a groundwater system or expanding under the new regulations, many of the owners of the older landfills which were reaching capacity decided to close down. Others closed because they were experiencing structural problems that could not be repaired without significant expenditures.

As shown in Figure 5, of the 562 facilities that have operated in Virginia since 1971, only 43 percent are still active. Almost half of these facilities have closed (46 percent). Approximately eight percent are not officially closed but are no longer taking waste. The remaining owners either had their permit revoked, abandoned the landfill, or failed to properly close the facility.

Figure 5

Current Status of Solid Waste Management Facilities Which Have Been Granted Permits to Operate Since 1971

Total Number of Facilities= 562



Source: JLARC staff analysis of automated data from the Department of Environmental Quality, Division of Waste Management.

State Law Now Requires Localities to Certify Proposed Solid Waste Sites

The last major State law passed in the area of solid waste management was in 1989. The General Assembly changed the permit process by requiring localities to certify that the proposed site for a solid waste management facility, as well as the planned operations of the prospective facility, are consistent with all applicable local ordinances. Prior to 1989, DWM notified the local government of a facility's location upon receipt of an application. The locality then informed DWM as to whether the proposed facility was consistent with all local ordinances. Failure to object within 30 days constituted local approval of the site.

The new process requires the applicant to obtain certification from the local governing body prior to submitting a permit application. Therefore, this amendment relieved the State of the difficult position of approving a site location without the consent of the locality in which the facility would be sited. Under current law, Virginia localities may now enact ordinances regulating the siting of facilities within their boundaries which must be complied with before a State permit will be granted.

THE OVERSIGHT ROLE OF THE DEPARTMENT OF ENVIRONMENTAL QUALITY

During the 1993 session, the General Assembly passed a series of laws creating the Department of Environmental Quality (DEQ) by merging three formerly separate regulatory agencies — the Department of Air Pollution Control, the Department of Waste Management, and the State Water Control Board — and one advisory agency, the Council on the Environment. The *Code of Virginia* established DEQ's broad array of duties by stating that "it shall be the policy of the Department of Environmental Quality to protect the environment of Virginia in order to promote the health and well-being of the Commonwealth's citizens."

The duties of this new and expanded agency are numerous. They include the following:

- administration of state and federal programs for safeguarding the air, water, and land resources;
- the issuance and enforcement of environmental permits and regulations;
- the coordination of environmental planning and policy development with other state agencies; and
- the provision of public outreach and education opportunities on environmental matters.

Rationale for Merger. The merger of these agencies and their programs was prompted by a concern about the efficiency and effectiveness of the State's environmental regulatory operations. Specifically, officials with DEQ cite economies of scale, better coordination and expediency in the permitting process, and an increased, consistent regional presence throughout the state as the main reasons for the creation of a comprehensive environmental agency.

Prior to the merger, individuals may have been required to visit as many as three different agencies to acquire permits if their business was subject to regulations of the Department of Air Pollution Control (APC), the Department of Waste Management (DWM), and the State Water Control Board (SWCB). Since the agencies have been merged, the process for obtaining a permit is reportedly more streamlined.

Another concern of the General Assembly was the uneven level of service that each agency provided in different regions of the State. For example, APC had seven regional offices. The SWCB had six regional offices which overlapped some of APC's regions. DWM did not have a significant regional presence because for practical purposes, the solid waste industry was largely unregulated until the 1980s. Now that the merger is complete, officials at DEQ have initiated a plan to coordinate the activities of its major functions — air, water, and solid waste management — in the same seven regional areas of the State.

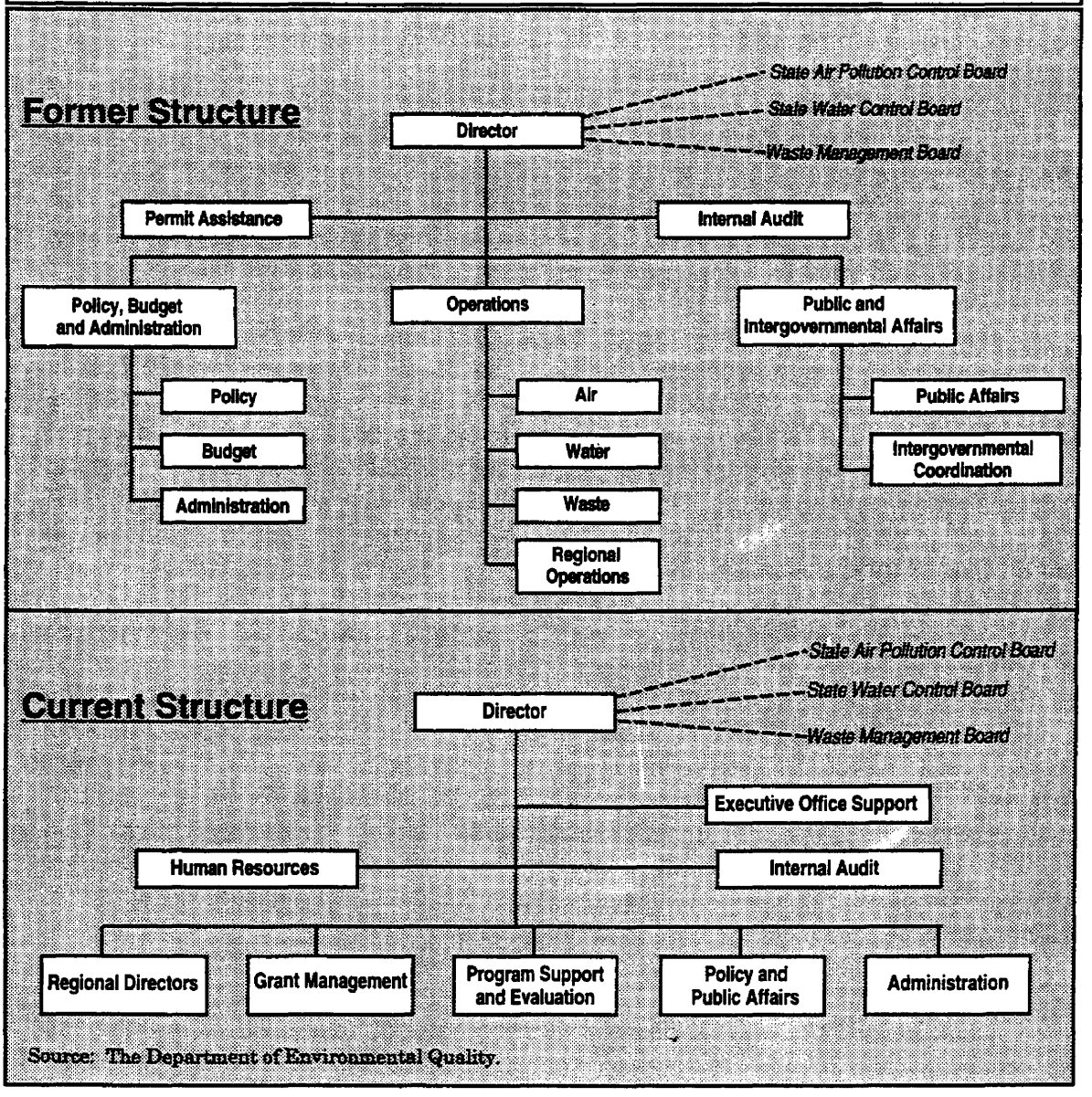
Role of Regulatory Boards. *The Code of Virginia* establishes three citizen regulatory boards which are responsible for promulgating Virginia's environmental regulations. The three boards are: (1) the Waste Management Board, (2) the Air Pollution Control Board, and (3) the State Water Control Board. Like the boards of other state regulatory agencies, DEQ's citizen boards are appointed by the governor. These boards have statutory authority to promulgate regulations and to approve certain permits. In developing regulations, these boards consider comments and recommendations of the public, regulated entities, and advisory committees. Moreover, it is within the jurisdiction of the boards to impose administrative sanctions and initiate legal action when environmental statutes, regulations, or permits are violated.

Internal Organization of DEQ. Currently, DEQ is undergoing a reorganization by the recently appointed director. This reorganization has focused on both the executive structure of the agency and its seven regional offices. Figure 6 illustrates the changes which have been made to DEQ's executive structure. As a part of the reorganization, the Director has eliminated three central office units — Policy, Budget and Administration; Operations; and Public and Intergovernmental Affairs — and assigned the duties of most of these units to the regional level.

For solid waste operations, the most significant of these changes appears to be the elimination of the Operations Unit. Under the old structure, some staff in this unit had supervisory responsibility for the Office of Waste Resource Management (OWRM). It is through OWRM that a significant amount of oversight is conducted for solid waste. Staff in this office have the responsibility for approving the applications submitted by local governments and private companies for solid waste permits. This involves

Figure 6

The Organization of the Department of Environmental Quality



Source: The Department of Environmental Quality.

evaluating site plans to ensure that they are technically sound. Consequently, OWRM staff include a geologist, environmental engineers, and a chemist. Also, much of the inspection activity for the central region of the State is in the OWRM.

Without the added layer of administration that existed in the Operations Unit, each regional director will report directly to DEQ's executive director. According to the director, this is part of a larger strategy to "empower" the regional offices and create a

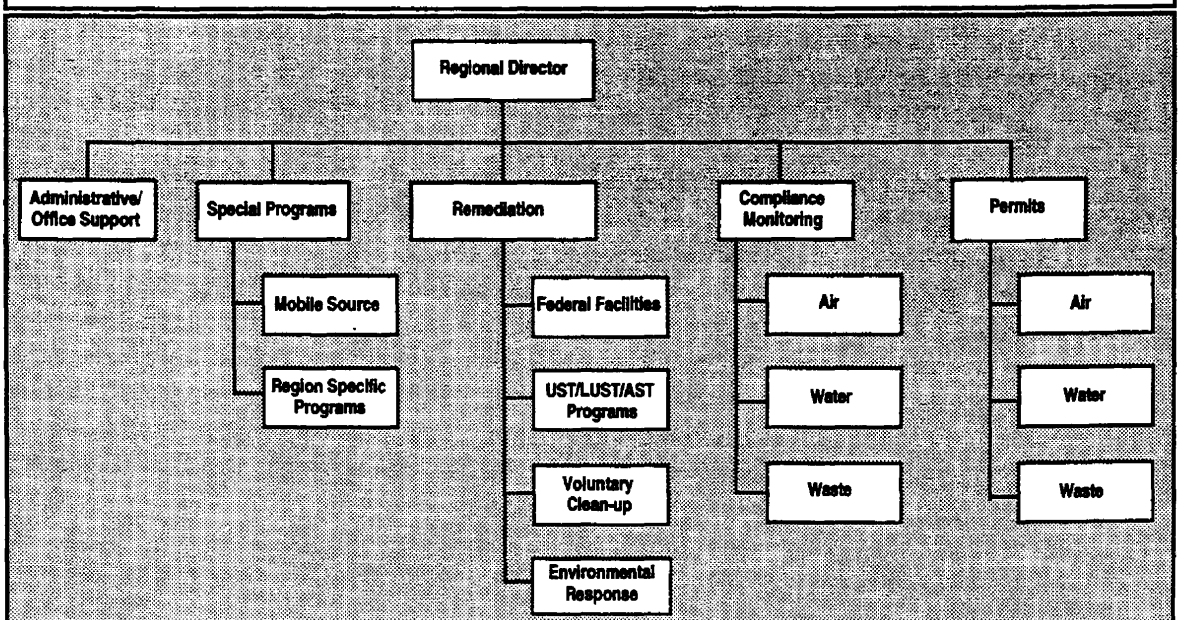
more efficient delivery of services. In effect, this reorganization has moved the functions of the three central office units to the regional level. Although some responsibilities such as program support, policy development, and administration will remain centralized as a part of the DEQ executive structure, the regional offices will be given the authority and resources to implement a range of activities previously carried out by central office and OWRM staff.

Figure 7 illustrates the internal organization of each regional office under this new structure. Each of the seven regional offices will have separate units responsible for the key functions that define the oversight role for solid waste. Specifically, compliance monitoring will continue to be the major responsibility of the inspectors in the regional office. However, the inspectors will receive supervision and general direction from the director of the region, who no longer has to work through a central office operations unit.

In addition to the day-to-day inspection activities, all permit writing for solid waste facilities, site remediation and clean-up activities will also be directly implemented by the seven regional offices. Solid waste permit writing will be conducted in close coordination with staff in the regional offices who have expertise in air and water issues. This is to ensure coordination of the regulations for these three different environmental areas.

Figure 7

Structure of the Regional Offices in the Department of Environmental Quality



Source: JLARC graphic based on data from the Department of Environmental Quality.

STUDY MANDATE

As a result of the controversy and publicity surrounding several local siting decisions for SWMFs in Virginia, questions have been raised as to whether race was a factor in the decision making process. In response to this concern, the General Assembly passed House Joint Resolution 529 directing JLARC to examine the past and present practices of both the State and localities concerning the siting of hazardous and non-hazardous solid waste facilities.

In addition, the mandate also directs JLARC to review and assess the adequacy of the State oversight activities for this industry, specifically focusing on facility inspections and the clean-up of existing sites. In light of the absence of hazardous waste disposal facilities in Virginia, this study will focus on the policies and practices associated with the siting, monitoring, and clean-up of non-hazardous solid waste management facilities.

STUDY APPROACH

The approach used in this study was designed to directly assess whether locality siting practices for solid waste management facilities may be racially-based, thereby imposing a disproportionate share of the potential environmental hazards associated with the operation of these facilities on minority communities. The study mandate recognizes that if minorities are more likely to live in close proximity to SWMFs, any inadequacies in the procedures used to inspect and monitor these facilities could increase their risk of exposure to environmental pollutants should problems develop at the sites.

As a result, the framework developed by JLARC staff for this review was designed to examine how the practices related to solid waste facility siting, monitoring, and clean-up are conducted, and whether there is evidence to indicate that minorities are likely to bear a disproportionate burden of any problems associated with the oversight and management of these facilities. Using this framework, the study focuses on three key areas of solid waste management in Virginia: (1) an analysis of the policies and practices used by the State and local governments to site SWMFs; (2) an assessment of the adequacy with which DEQ has carried out its oversight and compliance roles for all facilities; and (3) an analysis of landfill capacity in the Commonwealth. The following issues were addressed within each of these key areas:

- What is the nature of the siting process for SWMFs at both the State and local level?

- Does race play a role in the local decision making process used to determine the location of solid waste facilities in Virginia?

- Are DEQ's monitoring, inspection, and enforcement practices adequate and implemented without regard to the racial composition of the community surrounding the landfill?

- Has DEQ properly monitored those landfills which are no longer receiving waste to ensure that they have been closed according to existing regulations?

- Given Virginia's landfill capacity, are policies needed to regulate the construction of future landfills?

JLARC staff conducted a number of research activities to address these research issues. This section of the chapter provides a brief discussion of some of the research methods for this study. Greater detail regarding the particular methods used for each issue is provided in the remaining chapters.

Examining State and Local Siting Policies and Practices

The central question of the study mandate is whether minority communities are being targeted when decisions are made concerning where SWMFs will be located. To address this issue, JLARC staff conducted two major activities: (1) identifying the racial composition of the communities in which SWMFs have been sited since the passage of the solid waste regulations in 1988; and (2) conducting structured interviews with officials at both the State and local level who were involved in the siting process.

Determining the Community's Racial Composition. In order to complete the siting analysis, JLARC staff had to determine what constituted a "solid waste community" and identify the racial composition of this community. To accomplish this, it was decided based on previous studies and interviews with State and local officials that the area that includes census blocks within a two mile radius surrounding the SWMF would be defined as the community.

Next, using data on the longitude and latitude of all facilities that have been granted permits to operate since 1988, JLARC staff pinpointed these sites on a 1990 Census database and used a geographical mapping system to draw a two mile radius around each site as a means of defining the "solid waste community." The 1990 Census database organizes information on Virginia's population at the block, block group, and census tract levels. The block is the smallest unit of analysis in the census data and for confidentiality reasons contains less information than the larger block groups and census tracts. Block groups are predetermined clusters of the individual blocks, while the census tracts represent an aggregation of the block groups at the county and city level.

With the mapping software, JLARC staff were able to work with the smallest unit of analysis and identify those blocks whose geographical midpoint fell within the two mile radius used to define the landfill community. Using data on the race of the residents

from these blocks, the proportion of minorities in the communities was calculated and compared to the racial composition for the locality in which the community was located.

Conducting Structured Interviews. The benefit of the statistical analysis is that it indicates whether the communities in which solid waste facilities are sited are in predominantly minority neighborhoods or whether these areas have a disproportionate number of minorities. The limitation is that it does not explain the cause of this outcome. In other words, it does not indicate whether this impact reflects an intentional bias in the siting process, or is due to other factors which appear to be related to the racial composition of the communities in which facilities are sited.

To examine this question, JLARC staff conducted structured interviews with local community groups, the county or city administrators, members of the local boards of supervisors and city councils, and the facility managers in the localities in which the SWMFs were sited. In these interviews, these key actors were asked to recreate the siting process and provide documentation which supported their descriptions. This allowed the team to determine if key differences existed in the siting process for localities according to the racial composition of the "solid waste communities."

Community Knowledge of the Siting Process

Another focus of this study was to determine how much the residents knew about the siting process. Since 1988, more than 30 SWMFs have been granted permits to receive solid waste. The data used by JLARC staff in this assessment was collected using a telephone survey of a sample of residents from each solid waste community established since 1988. Through a contract with the Virginia Commonwealth University (VCU) Survey Research Laboratory, JLARC staff were able to determine whether residents living near SWMFs had any knowledge about the siting process. To conduct the survey, VCU identified a random sample of households in each solid waste "community" established since 1988 and conducted a telephone survey in which the residents were asked a series of questions about the SWMF in their area.

Assessment of DEQ Monitoring and Enforcement Practices

When the State strengthened the solid waste regulations in 1988, the oversight responsibilities of DEQ increased substantially. These oversight responsibilities included required regular inspections of solid waste facilities, the implementation of enforcement actions against non-compliant facilities, and the inspection of facilities that stopped receiving waste to determine if they were properly closed. To evaluate the adequacy of DEQ's oversight efforts, JLARC staff reviewed the agency's records detailing their inspection, enforcement, and closed site monitoring activities.

For each oversight function, JLARC staff analyzed whether the agency's activities were implemented without regard to the race of the community surrounding

the SWMFs. As with the analysis of siting, JLARC staff used 1990 census block data with the mapping software package to identify the racial composition of the communities surrounding the sites which were included in the analysis. Structured interviews were also conducted with DEQ inspectors and enforcement staff to supplement the analysis of the files.

An Evaluation of Landfill Capacity in Virginia

A key portion of the study focused on an assessment of the existing landfill capacity for the disposal of household or commercial waste. The general purpose of this analysis was to determine the magnitude of available landfill capacity in the State and whether comprehensive policies are needed to regulate the construction of future SWMFs. The research activities conducted for this issue were a survey of the landfill managers and a review of court cases involving the regulation of landfills.

Survey of Landfill Managers. To develop a measure of landfill capacity in Virginia, JLARC staff mailed surveys to each landfill manager in the State. These individuals were asked to report on, among other things, the total number of acres on the site that are used to dispose of waste, the total amount of waste received by the facility annually, the amount of landfill space already at capacity, and the date that the facility expects to reach capacity.

Review of Court Cases. As a part of evaluating the State's options for addressing the issue of excess landfill capacity, JLARC staff reviewed court cases that related to the regulation of this industry. Recent decisions by the United States Supreme Court have held unconstitutional laws enacted by states which restrict the importation of waste from other states. Less clear is whether these decisions prohibit states from regulating the construction of additional landfills. The court cases were reviewed to examine this issue.

REPORT ORGANIZATION

The remaining chapters in this report present the results of JLARC's review of solid waste management and oversight issues in Virginia. Chapter II provides a review of the siting process, and assesses the impact of race on location decisions for SWMFs. Chapter III describes how DEQ has organized its oversight program for solid waste at the state level. Chapter IV presents the results from an evaluation of several of DEQ's oversight activities. Chapter V examines the condition of closed landfills and evaluates the State's clean-up program. The last chapter in this report examines the methods of waste disposal for localities across the Commonwealth and determines the amount of landfill capacity that exists in the State.

II. Race and Solid Waste Facility Siting in Virginia

The principle issue raised by HJR 529 is whether minorities are adversely affected by State and local policies which determine where solid waste facilities will be located. Over the last 15 years, the State's role in regulating the operation of solid waste facilities has been greatly increased with the adoption of a comprehensive set of solid waste management regulations. However, these regulations do not govern the actual site selection process for waste management facilities that are proposed in various localities. Historically, this has been and remains a local issue. Accordingly, any attempt to determine whether solid waste sites are selected in a racially discriminatory manner must focus on the land use policies and practices of local governments and the specific outcomes of this process.

In terms of outcomes, when the racial composition of the neighborhoods in which recently permitted solid waste sites was examined in this study, the findings were mixed. On average, the majority of persons who live in communities surrounding the 34 solid waste sites which have been permitted since 1988 are white. This calls into question the view that minority communities are routinely targeted to bear the social costs of hosting solid waste facilities. However, almost four out of every ten of these facilities have been sited in communities where minorities live in substantially higher proportions than can be observed for the locality as a whole. This suggests that minorities are, to some degree, disproportionately impacted by the location of solid waste facilities.

Concerning the siting process, there is no reliable evidence to indicate the race of the communities was explicitly considered as a part of local decision making. Localities that approved solid waste sites in minority communities were just as likely to have conducted formal independent siting studies, objectively evaluated alternative sites, and were more likely to have had minority representatives on the local governing board who supported the siting decision. Nonetheless, while local governing bodies do carry out the statutory requirements for establishing solid waste facilities, some have generally done a poor job of incorporating the community into the decision making process. In some cases, this has created special problems when sites were located in minority communities.

This chapter presents the results of JLARC's analysis of the solid waste siting process in Virginia. Also included are the results of a survey of residents who live in the neighborhoods in which recently permitted sites are located.

VIRGINIA'S PROCESS FOR SITING SOLID WASTE FACILITIES

While there have been modifications to the process for siting solid waste management facilities (SWMFs) in Virginia, decisions concerning where SWMFs will be

located are primarily carried out at the local level. Prior to the enactment of the Virginia Waste Management Act in 1986, the siting process was entirely local and was based on the land use policies that were applicable in the jurisdiction where a SWMF was proposed to be sited.

With the passage of the Waste Management Act in 1986 and the promulgation of the Solid Waste Management Regulations in 1988, the State was given a limited role in the siting process. More importantly, this new role for the State does not include the selection of local sites for proposed SWMFs. This has been and remains a local issue. Therefore, any analysis of whether race plays a role in the siting of SWMFs must focus on the local land use policies and practices in the jurisdictions in which these facilities have been sited.

State's Role in Facility Siting Does Not Include Site Selection

Prior to 1986, the siting process for SWMFs was entirely a local one. The Virginia statutes and regulations governing solid waste management did not give the State any role in the siting process and did not impose any requirements on the siting of SWMFs. As a result, the siting process consisted of the local land use policies that were in place in the locality where a solid waste management facility was proposed.

Local Siting Process Prior to 1986. The local siting requirements for solid waste management facilities varied significantly across jurisdictions prior to 1986. Some localities had ordinances which expressly required anyone proposing to build and operate a SWMF to obtain a special or conditional use permit, regardless of the zoning in place at the proposed location. After conducting the hearings required by State statute, the governing body would vote on whether to approve the special or conditional use permit required to operate a solid waste facility on the site.

In some localities, the zoning laws dictated whether a permit was required for the construction and operation of a SWMF. If a facility was proposed in an area that was not zoned accordingly, the developer of the facility was required to obtain a special or conditional use permit through the local governing body. However, if the area was already zoned for a solid waste facility, no local approval was required.

Other localities did not have zoning during this period and thus did not impose any local siting requirements on the development of landfills or other solid waste disposal facilities in their jurisdictions. In contrast, some localities expressly prohibited the siting of solid waste management facilities in their jurisdiction.

State Certification Responsibility. With the enactment of the Virginia Waste Management Act in 1986, the State was given a limited role in the siting process. To ensure that the State did not grant a permit to an applicant who had not complied with the applicable local siting process, the General Assembly established a requirement that the State receive certification from the locality that any proposed landfill or other solid waste facility was in compliance with all applicable local land use ordinances before a

permit could be issued. Subsequent amendments to the certification statute shifted responsibility to the permit applicant to provide the local certification. Under current law, an application for a solid waste management facility will not be considered complete unless the applicant has provided proof of certification from the relevant governing body that the site's location and operation are consistent with all local ordinances.

Current State Role. With the adoption of the 1988 Solid Waste Management Regulations, the State was given additional responsibility in the siting process. The regulations established specific siting criteria for all proposed SWMFs. Moreover, the regulations gave the State responsibility to ensure that those criteria have been met before a permit for operation is issued.

Even with these new responsibilities, the State's role does not include the selection of suitable sites for proposed facilities. Rather, the State's sole responsibility is to verify compliance with local land use laws and the technical siting requirements established by the regulations. Neither the solid waste statutes nor the solid waste regulations give the State authority or responsibility to actively participate in the selection of potential SWMF sites.

Nor can the State reject proposed sites on any basis other than failure to comply with local ordinances or the technical siting criteria. This means that even if it were determined that a proposed landfill or other type of SWMF would adversely impact a minority neighborhood, DEQ does not have the legal authority to reject a site application on such grounds.

SITING OUTCOMES: ARE SITES LOCATED IN AREAS WITH DISPROPORTIONATE MINORITY POPULATIONS?

Prior to the passage of HJR 529, very little had been done in Virginia to analyze the population demographics of communities surrounding solid waste facilities. Moreover, the analysis which has been conducted on race and facility siting in Virginia was based on only a few sites and defined the community for the site as the entire locality in which the facility was located. With this approach, inaccurate conclusions have been made concerning the role that race plays in Virginia's facility siting process.

In light of this, one primary objective of this study was to more precisely examine the outcomes of the siting process by analyzing demographic data on residents who live within a two-mile radius of recently permitted solid waste facilities. The results from this analysis revealed that an average of seven out of every 10 residents living around these sites are white, thus raising questions about the general assumption that minority communities are targeted in the siting process for solid waste management facilities.

At the same time, it does appear that minorities are disproportionately represented in the communities surrounding approximately 35 percent of the recently permitted SWMFs in the State. In half of these communities, the proportion of minority

residents is at least 20 percentage points higher than the proportion of minorities in the localities as a whole.

Counties with Private Regional Landfills Are Disproportionately Minority

The growing criticism of the siting process for SWMFs in Virginia is that waste management companies are practicing a form of "environmental racism." Various community and environmental groups contend that since the 1988 solid waste regulations were passed, increasing numbers of private companies are focusing their efforts to establish SWMFs in counties with a disproportionate number of minority, low-income residents who are not sufficiently organized to mount effective opposition to the proposed facilities.

One of the first groups to publicly raise this charge was the Conservation Council of Virginia (CCV). Using information on the demographic characteristics of those localities in which the first private regional landfills were sited in the State, CCV found that these counties had a higher proportion of minority residents than could be observed statewide. Based largely on this work, CCV concluded "that there was sufficient anecdotal evidence to suggest that we have problems [of environmental racism] in Virginia."

Although there are limitations to any siting analysis which restricts the facilities under consideration to private landfills, JLARC staff initially focused on determining whether the localities which have agreed to host private regional landfills can be distinguished based on the socio-economic characteristics of their residents. In an attempt to replicate the findings which have provided some of the basis for the criticism of the siting process, this issue was examined by comparing these host localities to the State as a whole using several socio-economic indicators.

Demographics of Counties with Established Or Planned Landfills. In September of 1989, DEQ staff granted a State permit allowing a private company to begin operation of a regional landfill in Charles City County. Over the next four years, similar permits were granted to privately operated regional landfills in Amelia, Henrico, King and Queen, and Sussex counties. Each of these sites is presently operating and, with the exception of the Henrico landfill, is receiving waste from various localities both in and outside of the State of Virginia. Additionally, four other privately operated landfills are being planned in the counties of Brunswick, Gloucester, Hanover, and King George.

As Table 3 indicates, the study team compared the demographics of the host localities to the State as a whole using data on per-capita income, housing values, population density, and race. This analysis clearly indicates that the localities in which the landfills have been sited are significantly different from the State based on these indicators. Most notably, on average, almost half (46 percent) of the residents in localities which now host private regional landfills are nonwhite. This is more than twice the Commonwealth's minority population rate of 22 percent.

Table 3

Socio-Economic Indicators for Virginia Compared to Localities in Which Private Landfills Have Been Sited

Socio-Economic Indicators	Statewide	Landfill Counties
Per-Capita Income (1990)	$19,701	$17,260
Median Housing Value (1990)	$91,000	54,900
Population Density	156/sq mi	25/sq mi
Minority Population Rate (1990)	22%	46%

Data Sources: The *Virginia Statistical Abstract, 1992-1993 Edition* was used for State and locality-level data on per-capita income, median housing value, and minority population.

The 1990 average per-capita income for these counties of $17,260 was 14 percent lower than the figure for the Commonwealth. The localities' median housing value of $54,900 was 65 percent lower than the comparable figure for the State. Similar differences between these counties and the State were observed for the variable measuring the localities' population density. As shown, there are only 25 people per square mile of land area in the counties with these private regional facilities. This is substantially less than the Statewide population density of 156.

Additionally, four other privately operated landfills are being planned in the counties of Brunswick, Gloucester, Hanover, and King George. When the comparative analysis is extended to include these private landfills, the overall difference in minority population rate declines to 37 percent (see Table 4). This occurs in large part because two of the new locations, Hanover and Gloucester, have minority population rates lower than the State average. The differences in population density also declined, but these nine counties, considered together, still have decidedly fewer persons per square mile than observed for the entire State.

County-Level Data Not Sufficient to Assess Role of Race in Facility Siting

The disproportionate number of minorities in localities which host private landfills does raise questions about the role that race plays in the site location decisions of private companies. However, any conclusions regarding the existence of "environmental racism" in the local siting process based solely on observed patterns in county level data are suspect. The more relevant unit of analysis is the neighborhood in which the site is located. Concluding that there is "environmental racism" based on county level data invites a potentially fallacious conclusion, drawn from larger units of analysis (the county in this case), that may be proven invalid when the analysis is replicated on smaller units (the actual neighborhood in which the site is located).

Table 4

Socio-Economic Indicators for Virginia Compared to Localities in Which Private Landfills Have Been Recently Sited or Planned

Socio-Economic Indicators	Statewide	Landfill Counties
Per-Capita Income (1990)	$19,701	$17,095
Median Housing Value (1990)	$91,000	$55,600
Population Density	156/sq mi	35/sq mi
Minority Population Rate (1990)	22%	37%

Data Sources: The *Virginia Statistical Abstract, 1992-1993 Edition* was used for State and locality-level data on per-capita income, median housing value, and minority population.

For example, it is possible that officials in a county with a large minority population may grant a private landfill a permit to operate in the locality yet approve the location in a neighborhood whose residents are virtually all white. Conversely, officials in a locality with an almost negligible proportion of minorities may agree to permit a private landfill in the county and still site the facility in a neighborhood where the majority of residents are nonwhite. In both cases, if the unit of analysis were the county and not the neighborhood in which the sites were eventually established, any conclusions that might be reached about the presence of "environmental racism" could be misleading.

Therefore, JLARC staff conducted a major analysis of the racial composition of the populations at various radiuses (one, two, and three miles) around each of the solid waste facilities that have been sited since 1988. Since the 1988 regulations were passed, the State has granted operating permits to 34 sites, involving 32 different localities (Figure 8). The analysis was also extended to include seven currently planned sites.

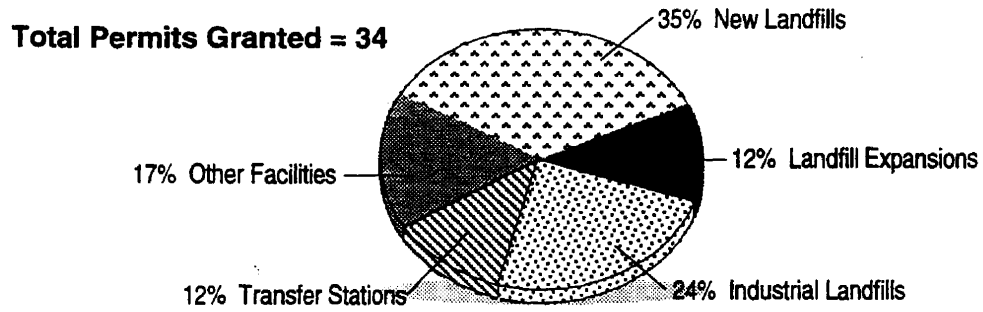
Most Residents Who Live in Communities Surrounding SWMFs Are White

The most serious and common charge about the siting process in Virginia is that waste facilities are usually sited in communities where the majority of residents are nonwhite. While this perception has grown with the landfill siting in King and Queen and recent attempts to locate a medical waste facility and transfer station in a predominantly black neighborhood in Richmond, a systematic assessment of this issue has not been conducted.

The siting controversies in King and Queen and Richmond were spawned by what community groups viewed as deliberate attempts by waste management companies to target and eventually site SWMFs in their neighborhoods. It is also possible, however, that any racial inequities in these or other cases may be unintentional, due to the association between racial residential patterns and certain community characteristics

Figure 8

Solid Waste Permits Granted Under New Regulations by the Department of Environmental Quality



Note: Only those solid waste facilities that were granted permits between 12/21/88 and 2/1/94 are included in this graphic.

Source: JLARC staff analysis of data from the Department of Environmental Quality.

which are favorable for the location of SWMFs — for example, availability of large amounts of inexpensive land and proximity to major transportation arteries.

Under either circumstance, however, the mandate for this study requires JLARC to evaluate the impact of the policies and practices for siting SWMFs in the State, even if the resulting consequences were unintentional. Therefore, in this section of the report, basic findings are presented on the proportion of minorities who live around newly sited or proposed waste facilities without attention to possible explanations for observed racial patterns. The sole objective of this analysis was simply to determine if those facilities which have been sited since 1988 are, in fact, located in communities that are predominantly minority.

Defining the Community Surrounding the SWMF. To facilitate the examination of the racial impact of waste facility sitings in the State, JLARC staff had to develop an operational definition of "SWMF community." Previous studies that have examined the issue of facility siting used a number of definitions. Some researchers defined the community by using census data organized by area zip codes as the unit of analysis. Others relied on census tracts, which are smaller than the areas defined by zip codes and contain information on an average of 4,000 persons per tract. In one such study, researchers defined the community by drawing a two-mile radius around the census tracts in which hazardous waste disposal and storage facilities were located.

JLARC staff conducted a sensitivity analysis using one, two, and three mile radiuses to define census blocks constituting the landfill community. This analysis is based on the tradeoff between drawing a radius that is too broad and one that is too narrow. If the radius is too broad, it will include many people who are not in close proximity to the site. If it is too narrow, it will capture the landfill and its buffer area, but include fewer people. From examining the population around the sites as well as

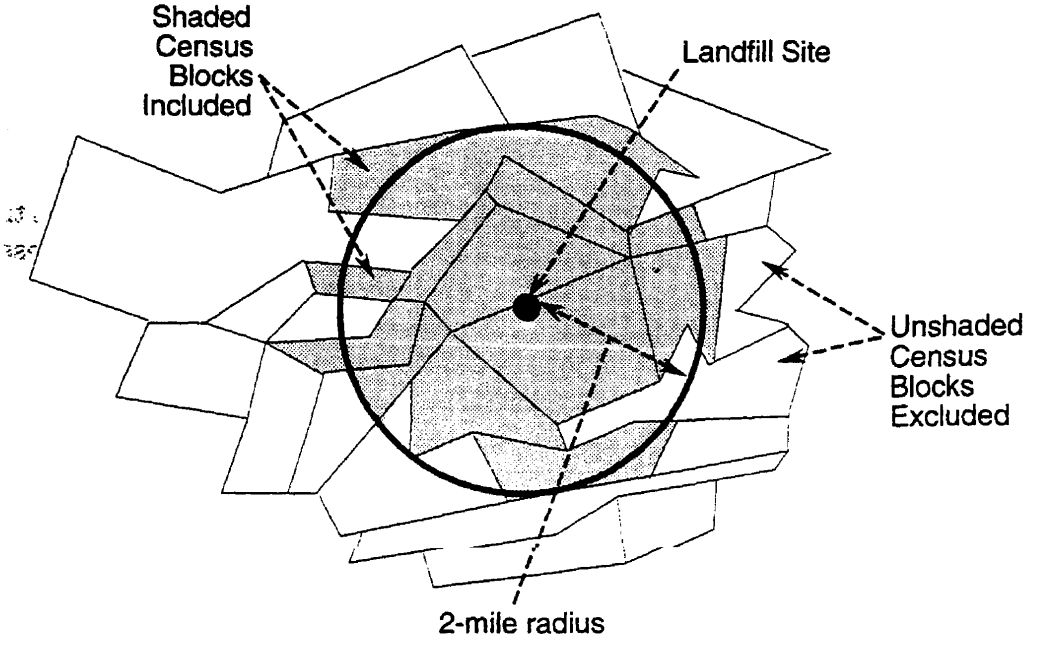
considering the likely distances within which waste management facilities would have a substantial impact, JLARC staff decided that the solid waste facility community would be represented by a two-mile radius around each facility permitted by the State since 1988. Figure 9 illustrates how the solid waste communities were defined. Using site longitude and latitude data, the study team pinpointed each facility on a 1990 Census database which contained race and housing data at the census block level, the smallest geographical census unit. Through the use of a geographical mapping system, the two-mile area was drawn and all census blocks whose geographical midpoint fell within this area were included as a part of the "community" for that site.

After using longitude and latitude data to identify each of the 34 solid waste management facilities that have been granted State operating permits since the 1988 regulations were adopted, JLARC staff created a dataset that included measures of the proportion of minorities who lived within the two-mile radius for these sites. This facilitated an analysis of the demographic characteristics of the neighborhoods in which the most recent solid waste facilities have been sited. The first issue examined using these data was whether solid waste sites are typically located in communities that are predominantly minority.

Proportion of Minorities That Live Near Recently Sited SWMFs. The findings from this analysis do not support the view that most, or even a significant

Figure 9

Defining the Community



Source: JLARC staff graphic.

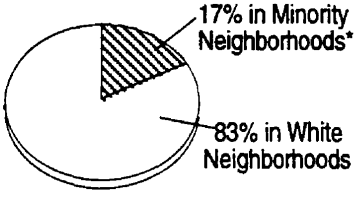
minority of recently sited SWMFs are located in neighborhoods that are primarily comprised of minority residents. On average, approximately seven out of every ten residents who live within two miles of Virginia's newly permitted SWMFs are white (Figure 10). As would be expected given these low average rates, only seven of the 41 communities (17 percent) surrounding existing or proposed sites have a minority population rate that exceeds 50 percent.

With the exception of the private regional landfills, the proportion of minorities in these communities does not significantly change according to the type of facility. As indicated, for public landfills, industrial landfills, and proposed sites for private landfills, the proportion of minorities ranges from 22 to 29 percent. The proportion of minorities for private regional landfills is significantly higher. Almost half (48 percent) of the residents in the communities surrounding these facilities are minority. This is 19 percentage points greater than the highest rate for other types of waste management facilities.

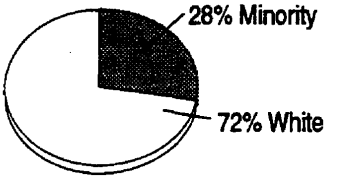
One possible reason for this difference could be the nature of the localities in which these companies have located. As was demonstrated in Table 3, the counties which

Figure 10

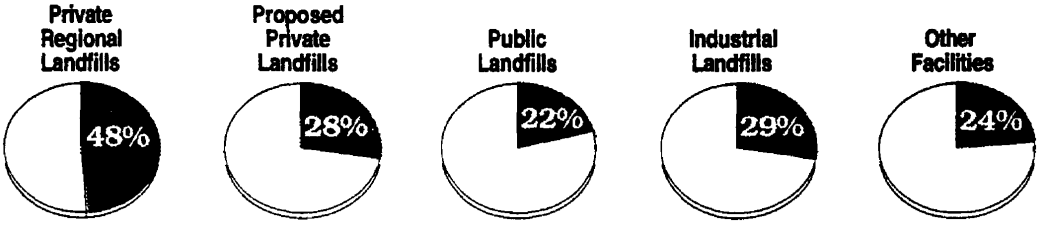
Racial Characteristics of Neighborhoods with Solid Waste Sites



Proportion of Sites That Are in Minority vs White Neighborhoods



Aggregate Racial Composition of All Site Neighborhoods



Proportion of Minorities in the Neighborhoods Surrounding Recently Permitted Sites or Proposed Landfills, by Facility Type

*In this study, a minority neighborhood is defined as a neighborhood where more than 50% of the residents are minorities.

Source: JLARC staff analysis of 1990 census block data and information from the Department of Environmental Quality.

host these facilities are generally more rural, with a disproportionate number of minorities (46 percent) relative to other areas of the State. For example, a private regional site is located in Charles City County which has a minority population rate of 71 percent. With such a large proportion of minorities, it is not surprising that seven out of every ten residents who live within two miles of the landfill are also minorities.

Impact of Changing Community Definition. There are two primary criticisms of studies that attempt to examine the impact of race in the siting of waste management facilities. The first is that some of the residential racial patterns that exist in neighborhoods around these facilities actually developed after the siting process was completed; therefore, race was not necessarily a factor in the site selection decision. The second criticism of these studies is the absence of a uniform definition of community. Without such, it has been suggested that any observed racial pattern could be a function of how the community is defined. The critics taking this position maintain that the conclusions drawn from these studies can be expected to vary significantly according to even subtle changes in the operational definition of community.

In this study, the first concern was not a major factor because of the timing of the siting decisions being examined in this review and the time period represented by the data used to measure community racial composition. For each solid waste facility examined in this study, the time period between when the siting was made and when the racial composition of the community was measured ranged from zero to three years. While it is recognized that neighborhood patterns do change, there is no reason to expect drastic shifts over this short time period for many of the communities in this study.

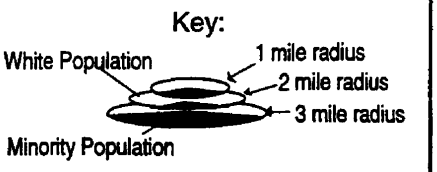
To test the possibility that the results in this study are sensitive to subtle changes in the way community was defined, the study team constructed alternative SWMF communities using a one and three-mile radius in addition to a two-mile radius. After drawing these alternative boundaries, the racial compositions of these communities were calculated and compared to the figures from those neighborhoods defined by the two mile area.

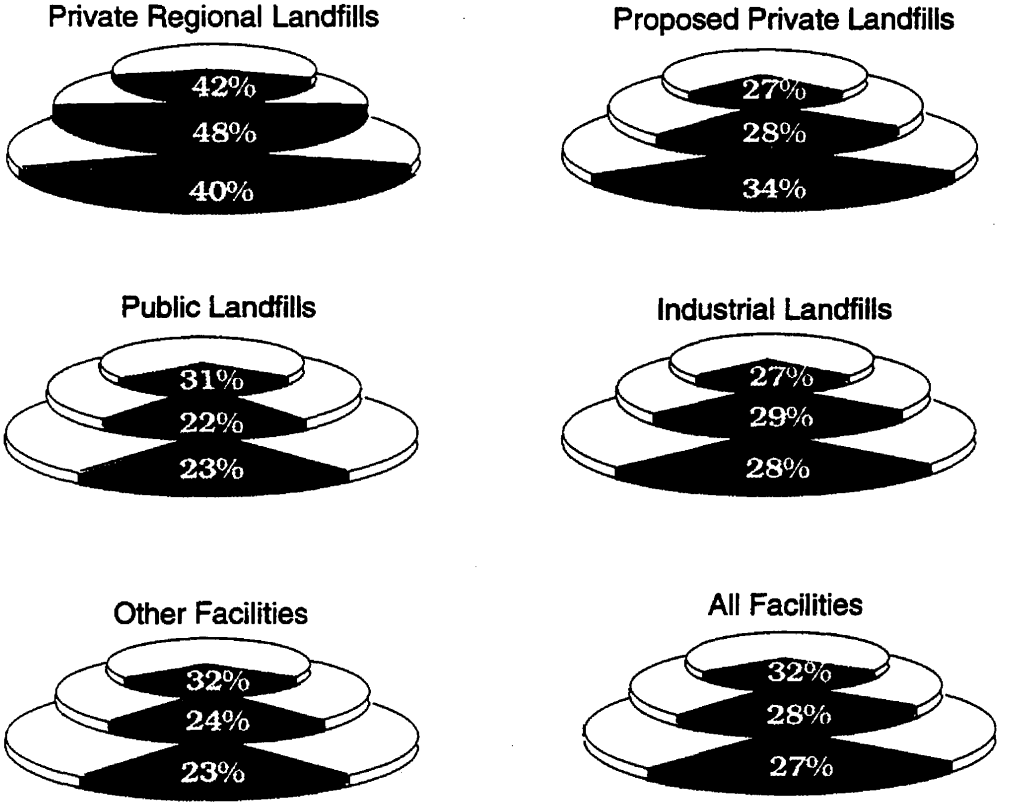
When these alternative definitions were used, only marginal changes occurred in the racial composition of the solid waste communities (Figure 11). Specifically, the proportion of minorities living in a SWMF community was highest in the one-mile area surrounding the facilities (32 percent). When the three-mile area was used, the minority population rate dropped slightly to 27 percent. This is virtually the same rate observed for the communities defined by the two mile radius.

Some differences can be observed when the minority population rates across the different SWMF communities are separated by facility type, but these differences do not change appreciably from the results using the two-mile radius. There is a drop in the minority population for private regional landfills at a three mile radius, but the overall rate of 40 percent remains the highest of all facilities. The rate for public landfills increases by almost nine percentage points at a one-mile radius, but the majority of the persons living around these facilities are still white.

Figure 11

Proportion of Minorities in Solid Waste Neighborhoods Defined by 1, 2, and 3-Mile Radiuses (Controlling for Type of Facility)





Source: JLARC staff graphic based on solid waste facilities data collected from the Department of Environmental Quality and on racial composition data collected from 1990 census blocks.

The findings presented at this point in the analysis do not support the view that SWMFs typically are sited in communities where the majority of residents are nonwhite. The minority population rate is relatively high for private regional facilities, but this may be a function of the racial characteristics of the counties in which these sites are located. However, there is another way that inequities can occur in the siting process. SWMFs may be located in neighborhoods where the proportion of minority residents living around the sites is larger than should be expected given the overall population rates for nonwhites in the localities in which the sitings were conducted.

In the next section of this chapter, the findings are presented from an analysis which compared the minority population rate in each SWMF community to the rate for the entire county or city in which the sites are located.

Minorities Are Disproportionately Impacted by 35 Percent of SWMF Sitings

Legitimate questions can be raised about facility siting patterns which show that minorities live near SWMFs at rates which are higher than should be expected based on their numbers in the overall population in the locality in which the SWMFs are located. This type of disproportionate representation suggests that minorities are, either coincidentally or, as a matter of public policy, being forced to bear a disproportionate share of any burdens or risks which may be associated with living in close proximity to a SWMF. For purposes of this study, a siting impact was considered disproportionate if the percentage of minorities living in the two mile area around the landfill was at least five percentage points higher than the rate of minorities in the locality which was host to the SWMF.

Disproportionate Sitings. Figure 12 presents the results of this comparison of community and locality minority population rates. Two major points emerge from this graphic. First, 14 of the 40 planned or established sites in the Commonwealth do occur in communities which are disproportionately minority. This represents 35 percent of all proposed landfills and facilities which have been granted permits to operate since 1988.

Second, as the bottom half of the graphic illustrates, for nine of the 14 facility sitings that are considered to have a disproportionate impact on minorities, the differences between the community and locality-wide population rate are substantial. This means that although a five percentage point difference between the minority population of the county that conducted the siting and the minority population of the neighborhood or community in which the site is located was used as the basis for identifying disproportionate sites, the actual differences are much greater for most sites. For example, in Hanover County, a private landfill has been proposed for an area where the minority population rate is 56 percent. This compares to an 11 percent rate for the entire County — a difference of 45 percentage points. In the City of Richmond, Halifax County, Bedford County, and Mecklenburg County the differences are at least 23 percentage points.

The total population in the typical solid waste community that is considered a disproportionate site is 390, with 185 minority residents. In eight of the 14 communities considered disproportionate sitings, the two mile radius surrounding the solid waste facilities includes residents from adjacent jurisdictions. According to the literature on local land use, some localities will site facilities that are considered "locally undesirable land uses" near the county border as a means of limiting the opposition to the siting from its own residents. The apparent motivations for the site location decisions in these and other localities will be addressed in a later section of the report.

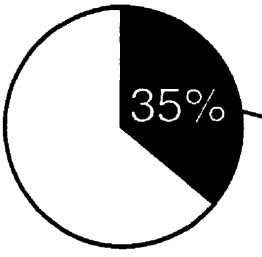
Closely associated with this issue is the question of whether certain types of facilities tend to be sited in communities that are disproportionately minority. According to siting critics, this type of association is to be anticipated for private regional landfills. However, when bivariate statistical measures of association were calculated, virtually no such relationships were observed. The findings indicate that private landfills are no more likely to be sited in communities where minorities are over-represented (relative

Figure 12

Impact of Solid Waste Facility Sitings on Minority Communities

Proportion of Sites in Disproportionately* Minority Communities

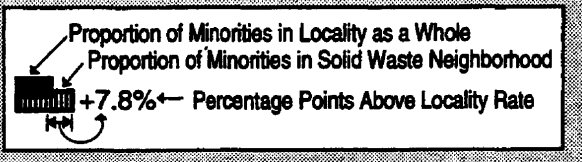
*A disproportionately minority community is defined in this study as a solid waste neighborhood in which the proportion of the minority population is more than 5 percentage points greater than that of the locality as a whole.

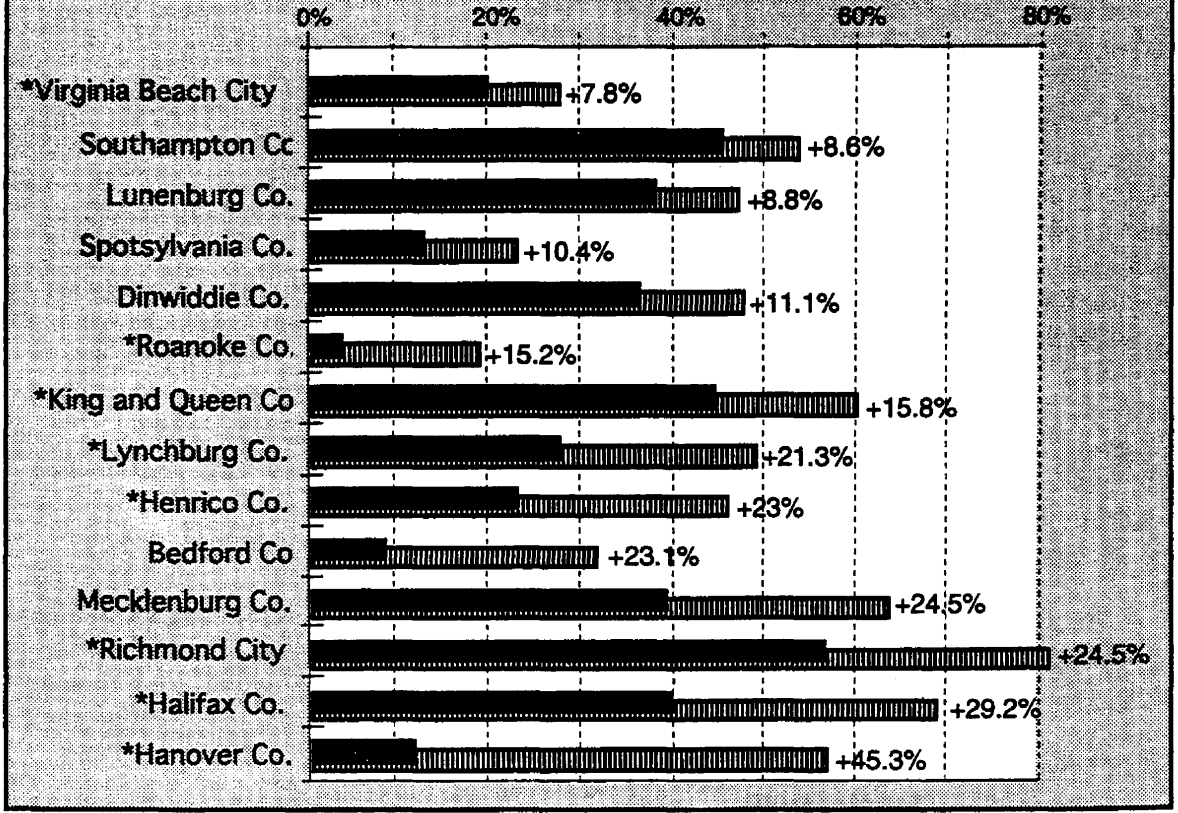


33 Permits granted
±7 Proposed landfills
40 Total sites

Of the 40 sites, 14 are located in disproportionately minority communities. More detail on these 14 sites is provided below.

Minority Population Rates of Solid Waste Neighborhoods Compared to the Localities' Overall Minority Rates





*In these localities, the neighborhood surrounding the site includes residents from adjacent jurisdictions.

Source: JLARC staff analysis of data from the Department of Environmental Quality and 1990 census blocks.

to their numbers in the locality that conducted the siting) than they are in other neighborhoods.

As Figure 13 demonstrates, the proportion of SWMFs that are private landfills in neighborhoods with a disproportionate number of minorities is almost the same as the proportion in other communities. Furthermore, the proportion of proposed private landfills in disproportionately minority neighborhoods (six percent) is approximately the same proportion observed for other communities (seven percent). Finally, the proportion of newly permitted sanitary landfills operated by local governments in minority communities (27 percent) is less than was observed for the other neighborhoods in the study (29 percent).

SITING MOTIVATION: IS THERE EVIDENCE OF A SPECIFIC INTENT TO LOCATE THE FACILITIES IN MINORITY COMMUNITIES?

The benefit of the statistical analysis presented in this study is that it indicates whether the communities in which solid waste facilities are sited are more likely to have a disproportionate number of minorities. The obvious limitation is that it does not explain the cause of this outcome. In other words, it does not indicate whether this impact reflects an intentional bias in the siting process.

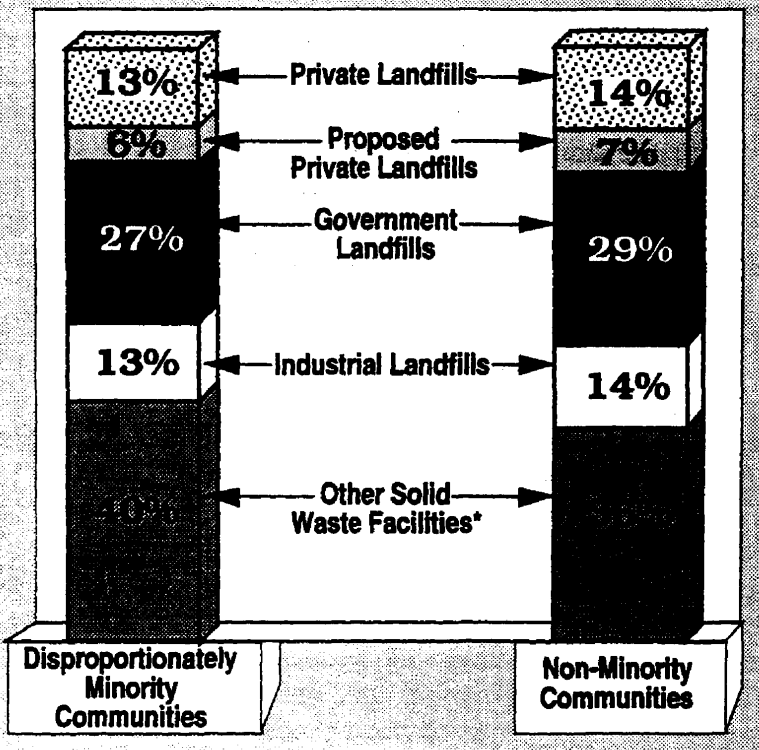
Consideration was given to examining the question of intent by extending the statistical analysis through methods designed to assess the relationship between race and site location, after accounting for the influence of other factors besides race. For example, if income levels within the community are analyzed in combination with race, it may be that an apparent statistical association between race and the location of the site may be due to an association with income. Preceding tables in this chapter have shown that localities with the private regional landfills have lower average income levels, as well as minority population rates that are higher than the Statewide average. However, as has been discussed, the locality level is too broad to define a landfill community. In addition, income data are not available at the census block unit of analysis used in this study. Finally, extending the statistical analysis in this manner could only address whether there is an apparent association between race and facility siting, and it still would not directly address the intent of those who selected the location for the site.

To examine intent, JLARC staff conducted two analyses. First, qualitative data were sought to supplement the statistical analysis conducted on the sitings of the private landfills. Also, a comparative analysis was conducted between the siting processes in sites that were located in disproportionately minority communities and those located in other communities.

Using this approach, there was no evidence which suggested that local governing bodies are intentionally discriminating against minorities when siting SWMFs. However, a number of local governments did a poor job of incorporating community residents in the decision making process.

Figure 13

Types of Solid Waste Management Facilities Located in Minority and Non-Minority Communities



*The category includes transfer stations, compost facilities, industrial and debris landfills, and gas management plants.

Source: JLARC staff analysis of data collected from the Department of Environmental Quality and 1990 census blocks.

Racial Motivation Not Evident in the Siting Process for Regional Landfills

A problem with a heavy reliance on statistical data in assessing the issue of race and facility siting is that other factors which may actually have influenced local government officials and waste management companies in the siting process are ignored. An example of the potential problems created by this approach is the unfounded assumption underlying CCV's previously mentioned conclusion that the counties in which the regional landfills are located were actually targeted by the waste management companies.

Document reviews and interviews conducted by JLARC staff with local officials and management at the private companies which have constructed these new landfills provide information which contradict this assumption. According to the county administrators and members of the board of supervisors in four of the five counties with regional landfills, the services of the private companies were actually solicited by the local governments. In each of these cases, the principal motivating factors for the proposals were the prohibitive costs associated with landfill construction and the possibility of

gaining significant revenue for the locality through host fees or taxes that would be paid by a privately run facility.

In terms of the cost factor, rural localities with limited operating budgets and small tax bases are finding it difficult to meet their solid waste needs in a cost effective manner. Although the 1988 regulatory changes governing the disposal of solid waste brought much needed reform to the industry, the requirements that landfill operators install systems to control leachate and methane gas and monitor groundwater have substantially altered the economics of waste disposal. While the cost of building a modern landfill will vary significantly based on the geological conditions of the proposed site, it is estimated that construction costs can approach as much as $800,000 per acre. Even for a modestly sized landfill, these costs are often more than small rural counties can afford.

This is illustrated by the following comments made by county administrators and members of the board of supervisors when asked by JLARC staff whether private companies approached the counties with plans to build the landfills. The first comments were made by a county administrator.

> There were three [landfill] sites in [Name of County] which did not have any additional capacity for waste disposal. All three sites were closed according to State regulations at a cost of $110,000. During this time, the board of supervisors was in the process of evaluating whether it could afford to operate a new landfill in light of the State regulations and decided that the County could not afford to build a new landfill. With the revenue prospects from a private landfill, the board of supervisors concluded that it would be economically beneficial to have a private company run the County landfill. As a result, [Name of County] purchased the land and leased it to a private company.

Another county administrator made the following comments:

> This county needed to get out of the landfill business because with the new regulations it was too costly to expand the existing landfills or construct a new one. The county determined that it would not be cost effective to construct a landfill that would take trash from only the county's residents. Consideration was given to building a landfill that would accept trash from surrounding counties but we concluded that it was not practical given that the area is so rural. Subsequently, the County decided to send out a request for proposal to construct and operate a regional landfill based on my recommendation.

A member of the board of supervisors in another county also emphasized the impact of the cost of landfill construction on the decision to contract with a private company:

> In 1987, the [State's] Division of Waste Management told the County to close the landfill. According to the State, it was the worst landfill in the world. The board of supervisors was responsible for setting waste management policy for the county, so it had to get involved [in the process for deciding how the County's trash would be disposed]. Because of the costly regulations, the board of supervisors concluded that the private sector was the best alternative. The cost of landfill closure for the county was $750,000. The cost of constructing a new landfill was also $750,000. The County simply could not afford to stay in the trash business so a decision was made to solicit private companies to build and operate the County's landfill.

Another member of the board of supervisors in one county who actually fought the decision to permit a private regional landfill in the county had this to say about the board's rationale for privatizing the county's solid waste system:

> This is a small county under significant fiscal stress. In order to generate the increased revenue that would be needed to pay for a new landfill, large increases in the county tax rates would have been needed. The board of supervisors was also seduced by the revenue potential of a private landfill.

Clearly, the fact that four of the five counties which have sited these private landfills actually initiated the siting process through requests for proposals, weakens the argument that these jurisdictions were targeted by private companies because of the socio-economic characteristics of the localities' residents. Further, the fact that the localities which have entered into agreements with these sites share common characteristics — small populations in rural areas, a weak tax base, and limited operating budgets — which may be correlated with having a disproportionate number of minority residents, could mean that any apparent correlation between the race of a county and whether it hosts a private landfill is spurious. In other words, it may be these factors and not race which impact whether a private regional landfill is sited in a particular county.

Facility Siting Processes Do Not Reflect Racial Differences

To examine the question further of whether there are variations in the siting process that relate to race, JLARC staff selected a representative sample of all of the solid waste facilities which have been sited since 1988. The sample consisted of 23 of the 34 localities in which solid waste sites have been permitted since 1988. Using this sample, the sites were divided into two groups: (1) those which are located in neighborhoods where the proportion of minorities is higher than the county as a whole; and (2) those which are in neighborhoods where minorities exist in proportions that are roughly the same or less than was observed for the locality.

For each site in the two groups, JLARC staff visited the locality and interviewed county administrators, members of the boards of supervisors or city councils, the

managers of the SWMFs, and any community action groups that were involved in the siting process. In addition, all available documents associated with the sitings — public hearing notes, siting studies, news articles — were reviewed so that the issues and activities that were a part of the process would be better understood. Some of the questions JLARC staff raised during the field visits are as follows:

- Was the site selected for the SWMF one of several that was evaluated through a professional siting study?
- If so, did the siting study explicitly consider any socio-economic factors such as race as one of the selection criteria?
- Did the locality or waste management company request any variances from the siting requirements when applying for a State permit?
- Were there any minorities serving on the local governing body at the time the siting decision was made? If so, was the site supported by any minorities?
- Was there any organized community opposition to the proposal to site the facility in the location in which it was eventually placed?
- Were community groups included by the localities in the siting process?
- Were any public hearings held before the local governing body made the decision to approve the site?

Next, through contingency table analysis, the siting process used in each locality was examined to determine whether there were any key differences which could explain why some sites were located in communities that were disproportionately minority. Both private operators and local government officials have stated that the requirements for siting solid waste facilities are so technical and the costs of constructing these facilities so high, that it is not practical to target communities based on the race of the residents. Therefore, while there may be socio-economic implications associated with siting solid waste facilities, these individuals state that there is no intent to target minority communities.

If this is true, the results of this analysis should not reveal material differences in the siting practices of localities across the two study groups. For example, localities which sited facilities in disproportionately minority communities should be just as likely to conduct formal siting studies that do not use socio-economic factors to rank the prospective sites, have open public hearings and a vote regarding the siting, and incorporate residents from the affected communities in the decision making process.

Furthermore, if these communities are not being targeted, these localities or private operators should not be more likely to request major variances from the siting regulations. Such variances could indicate that other sites might be better suited for the construction of a SWMF. Additionally, these localities should not base siting decisions in communities on whether the community has organized opposition to the facility. While

the presence or absence of certain elements in the siting process cannot be treated as indisputable evidence of discrimination, such findings would raise legitimate policy questions about local land use decision making for solid waste disposal and provide a basis for possible recommendations.

Comparison of Siting Processes. Table 5 presents the results of this analysis. As shown, there were no significant differences in the siting process between the two groups of localities which might indicate a bias towards placing SWMFs in communities that are disproportionately minority. One locality did use siting criteria which included a factor that gave a higher weight to communities with low to moderately priced homes. Still, when the recommendations of the siting study were implemented, the county approved the location of the landfill in a community that was neither predominantly nor disproportionately minority.

One of the more important findings relates to the use of siting studies. If the local decision making process for siting SWMFs is racially slanted, there would be little incentive to use objective siting studies to evaluate the suitability of various locations. This analysis indicates that 55 percent of the localities which sited landfills in communities that had a disproportionate number of minorities conducted siting studies and explicitly considered alternative sites as a part of this siting process. In most cases, this was usually accomplished through an analysis which ranked all of the prospective sites on key factors important to the operation of a landfill. The most elaborate of these studies included "detailed walkovers" on all prospective sites by professional engineers and geologists, site borings to determine soil characteristics, and hydrogeologic tests necessary to uncover any flaws in the site which would make it unacceptable for a landfill.

Some of the other studies were less technical in nature but were designed to accomplish the same objective. With these studies, the public works staff in the respective localities typically identified key factors on which each site should be ranked. Each of these factors was then weighted and a total score was calculated for the individual sites based on relative differences across these factors. One county, which located a landfill in a community that had a minority population rate that was 10 percentage points higher than the average for the locality, evaluated 14 sites. Each location was ranked according to how it would be impacted by State environmental restrictions as well as requirements imposed by the locality. Some of the factors which would generate a favorably high score for a site were as follows:

- location within one mile of a primary road;
- access to site through rural non-residential areas;
- more than 200 acres of land available for purchase;
- cost of land less than $500 per acre;
- more than 1,000 feet from key community facilities and residential areas;
- low groundwater table on site;
- no surface waters present at site;
- no other proposed land uses for site;
- no mining conducted on site; and
- landfill use at site is in conformance with existing zoning ordinances.

Table 5

A Comparison of the Process for Siting Solid Waste Facilities, Controlling for the Racial Composition of the Host Community

Elements of Siting Process	Sites Not In Disproportionately Minority Community (n=13)*	Sites In Disproportionately Minority Community (n=10)*
Siting study conducted and alternative sites examined	50%	55%
Socio-economic factors used	16%	0
Variances or special demonstrations required	92%	90%
Minority representation on board	38%	40%
Minority support of site	60%	50%
Community opposition to site	15%	33%
Community input in siting process	8%	33%
Public hearings held prior to vote on site	54%	80%
Public vote taken on siting	50%	70%

*Not all of the variables reported in this table were relevant for each local siting process. Such cases are not included in the calculation of the percentages.

Notes: Since the 1988 solid waste regulations were passed, the State has granted operating permits to 34 facilities. The figures reported in this table are based on data collected from a randomly selected sample of 23 cases — 67 percent of the universe. None of the differences in outcomes presented in this table were significant at either a 5 or 10 percent level of significance.

Source: Document reviews and JLARC staff interviews with county and city administrators, local politicians, facility managers, and members of various community action groups.

JLARC staff were also interested in determining whether the sites that were established in disproportionately minority communities were more likely to involve requests for variances from some of the regulatory siting standards. These variances can be granted by DEQ upon a demonstration by the applicant that special measures will be taken or special conditions exist which make it unnecessary to comply with one or more of the siting requirements. A significant number of variances granted for a site may indicate that other areas would have been better suited for the proposed SWMF. JLARC's analysis revealed that a variance was issued by DEQ for 90 percent of the

permits granted to sites located in disproportionately minority communities compared to 92 percent for the comparison group of sites. As with most of the other differences reported in this table, these are neither statistically significant nor consistent with a pattern that would suggest an obvious intent to discriminate.

Community Input and Minority Support. Other findings from this analysis revealed that there were no important differences between the two groups of sites in terms of community input in the siting process, minority representation on the local governing board, and minority support for the siting decision. If the site was located in a community that was disproportionately minority, the data from this study show that the locality was slightly more likely to have a minority on the local governing board. In terms of supporting the siting decision, minority politicians in one-half of these localities voted in favor of the site. This was only slightly lower than the figure observed for the sites in non-minority neighborhoods. In King and Queen County, as an example, two of the five board members were black. Both of these members voted in favor of siting the regional landfill. There tended to be more community opposition to those landfills that were placed in minority communities (33 to 15 percent), but these localities were also more likely to have community groups who monitored the siting process (33 to 8 percent).

Finally, localities that sited landfills in minority neighborhoods were more likely to hold public hearings and take a public vote on the site. Again, the differences here are probably related to the special circumstances of the sitings. Most of the localities in the comparison group which did not hold public hearings or take a vote before siting the landfill were those that simply added new cells to the old county landfills rather than select a new site. Because the areas in which the new cells were constructed were already zoned for this type of land use, no local public hearing or vote was required.

When considered with the other findings presented in this analysis, there is no reliable evidence which suggests that local governments or private operators are targeting minority communities when locating SWMFs. Though additional research is needed in this area, it appears that site location decisions are driven by a number of factors — large inexpensive parcels of land, a sufficient infrastructure, proximity to old landfills — which could possibly be related to several socio-economic factors, including race. As this analysis shows, even when SWMFs are placed in neighborhoods that are disproportionately minority, most of the elements required for an objective siting process were in place.

More Public Participation Could Diffuse Controversy in Future Sitings

One aspect of the siting process that localities can improve is public participation. In a number of localities visited by JLARC for this study, it was clear that during the early stages of the solid waste planning process there was an insufficient amount of public involvement. In some of the more urban localities, much of the planning for the site was handled by professional staff and consultants. In some rural localities, the county administrators and members of the board of supervisors worked closely on the

project with limited outside involvement. Not coincidentally, many of the residents in communities with SWMFs that have been sited since the 1988 regulations were not aware of how the facilities came to be located in their neighborhoods.

Community Knowledge of Siting Process. As a part of this study, JLARC contracted with the Virginia Commonwealth University Survey Research Lab to conduct a survey of residents living around all SWMFs permitted since 1988. One objective of this survey was to determine whether residents knew anything about how the SWMF came to be located in their community.

The survey responses revealed that most residents living near a SWMF sited since 1988 did not have any knowledge of how the facility came to be located in their community. As Table 6 indicates, only 15 percent of those surveyed indicated that they knew anything about how the SWMF in their community was sited. Seventy-seven percent indicated that they had no knowledge about the siting of the facility in their community.

Table 6

Residents' Knowledge of the Siting Process for the SWMF in Their Community

Residents Surveyed	Aware	Not Aware	Did Not Know
All respondents (n=371)	15%	77%	6%
Minority respondents (n=58)	8%	84%	6%
Residents living around sanitary landfills (n=136)	19%	74%	6%
Residents living within 2 miles of SWMF (n=162)	16%	78%	4%
Residents living in community 8 years or more (n=201)	19%	71%	8%

Source: JLARC survey of 439 residents living near recently sited SWMFs conducted by Virginia Commonwealth University Survey Research Laboratory. The sampling error for the proportions at a 95 percent level of confidence is 5 percent.

The number of minority respondents with any knowledge of the siting process was even lower. Only eight percent of the minority respondents knew anything about the siting process, while 84 percent indicated that they had no knowledge of the process. Further, the respondents' knowledge of the siting process was not affected by the type of facility that was sited in their neighborhoods. Specifically, only 19 percent of those residents who live within two miles of the sanitary landfills indicated that they knew how the facilities came to be located in their community. Seventy-four percent of those

surveyed did not. This compares to 16 and 78 percent, respectively for those living in neighborhoods where other types of facilities were sited.

The Need for Public Support. According to experts in the area of solid waste planning, any locality that proceeds with plans for siting a SWMF without broad public support runs the risk of facing paralyzing conflicts in the future. While the specifics of any siting process will vary, experts suggest that the process should, at a minimum, incorporate the following components:

- a public education campaign sponsored by the local government which explains the solid waste needs of the locality;
- the formation of a citizens advisory group before any siting plans are explored, which includes representatives from across the locality;
- a consultant's study presented to the local governing body and the citizens advisory committee outlining the locality's solid waste disposal needs and the costs and advantages of available options; and
- an independent study of possible sites for the facility selected by the advisory committee, and if relevant, the company which plans to construct and operate the facility.

If citizen participation is not cultivated before the solid waste plan is submitted to the public, a perception may be generated that all of the important decisions have already been made. Consequently, residents will sometimes come to the conclusion that the project is being rushed through the siting process because of some inherent danger associated with hosting these types of facilities. The potential problems associated with lack of public involvement may be heightened if the site being considered is in a minority neighborhood. In these cases, the failure to involve the public in a meaningful way during the early stages of the project may give rise to suspicions that the site is being "dumped in the community" because of the racial composition of the residents.

The lack of public participation was a significant problem for many of the localities which have sited landfills under the new regulations. For example, a community group was formed to work with local officials or private companies on the actual siting of the landfills in only two of the nine localities that selected this method of waste disposal. Indeed, some of the more controversial and contentious solid waste sitings in the State share this characteristic of limited public involvement.

Table 7 illustrates the siting process used by localities in which five of the largest landfills have been recently constructed. As indicated, a lack of citizen involvement was evident in the process used by three of these localities. In King and Queen County, for example, members of the board of supervisors initiated plans for a regional landfill by meeting with a private company to discuss a possible joint venture landfill. The company needed the landfill to dispose of solid waste generated by its industrial operations. Under this plan, the private company would have constructed the landfill, and King and Queen

Table 7

Key Elements of Public Participation in Five Virginia Localities Prior to Constructing a Landfill

Key Elements	King and Queen	Amelia	Sussex	Charles City	Roanoke
Implemented solid waste education campaign	No	No	No	No	Yes
Worked with citizens advisory group prior to site selection	No	No	No	Yes	Yes
Worked with advisory group to select sites	No	No	No	No	Yes
Hired independent firm to evaluate sites	No	No	No	Yes	Yes
Used competitive bidding to select private company	No*	Yes	Yes	Yes	N/A
Citizens group assisted in initial site selection	No	No	No	No	Yes
Community had input in landfill agreement	Yes	No	No	Yes	Yes

*A competitive bidding process was not used by the board of supervisors in King and Queen. However, local officials did solicit proposals from two other companies.

Source: JLARC staff interviews and document reviews.

would have operated the facility in exchange for free waste disposal. When the company decided against this option, the King and Queen board of supervisors initiated discussions with representatives from another waste management company concerning the possibility of constructing a regional landfill on the site which had already been tested for a landfill during planning for the joint venture.

The problem, according to court records and members of R.I.S.E. was that these activities took place before the county had formally announced its plans to build a regional landfill and without the input of any community groups. The problems created by this perceived secrecy in the planning for the site were exacerbated by the fact the community in which the landfill was proposed was predominantly black. Moreover, the specific location of the landfill was directly adjacent to a historically significant black church.

Members of the community pointed to the county's history of locating landfills in minority communities — all three of King and Queen County's old landfills were sited in minority communities — as an example of the racially biased siting practices of the board of supervisors. Further, the fact the county filed a lawsuit against the Department of Waste Management to have the permit revoked for one private landfill which was constructed in a predominantly white community fueled the group's mistrust of a process that they believed was discriminatory.

Although not racially based, similar complaints about secrecy in the planning process were raised in Amelia. In October 1989, members of the Amelia County board of supervisors solicited a request for proposals to operate a regional landfill. At the time this request for proposals was issued, the county had not met with the community to discuss the solid waste plans or held the necessary hearings to determine if the existing zoning ordinance needed to be changed to permit a private regional landfill in the county. According to one member of the board of supervisors, the first public meeting to provide the residents with information on the regional landfill was held on the weekend prior to the board's scheduled hearing to vote on the proposals for a private facility.

In Sussex, the board of supervisors decided to proceed with plans for a regional landfill based on the recommendation of the county administrator. While the recommendation was made following a consultant's study of the county's options for solving its solid waste problems, no effort was made to include local residents in this stage of the planning process.

In contrast to these cases, officials in Roanoke County made the decision to educate county residents about the locality's solid waste needs before decisions were made concerning what areas would be considered for a new landfill or what factors would drive the selection of the site. To assist with the education and siting process, local officials appointed a Landfill Citizens Advisory Committee (LCAC) with members from each magisterial district. In some cases, officials made certain that the LCAC consisted of some members who were strongly against the construction of a new landfill. After this group was formed, they worked with local staff to identify 50 possible sites for the landfill. In addition, the LCAC was involved in selecting the factors which would be used to rank

each of these sites. Working with an independent consulting firm, the list of 50 sites was eventually narrowed to six possible sites.

Unlike Roanoke County, site selection activities in King and Queen, Amelia, and Sussex were handled exclusively by the companies that would eventually construct and operate the landfills. In King and Queen, the waste management company agreed to consider an alternative site that was proposed by R.I.S.E. Later, after a visual inspection of the proposed site, the company concluded that it was unsuitable for a landfill. Members of R.I.S.E. viewed these actions as a perfunctory attempt to mollify the group and decided to file a legal complaint alleging a conspiracy by the board of supervisors to deny the black community the equal protections guaranteed by the 14th Amendment of the United States Constitution.

The Federal Court entered a judgment for the defendants. The Court found that although the placement of landfills in King and Queen County over time has had a disproportionate impact on black residents in the county, there was no evidence of anything unusual or suspicious in the siting process for the BFI landfill. In fact, the Court stated that the Board of Supervisors appears to have balanced the economic, environmental, and cultural needs of the County in a responsible and conscientious manner. At worst, the Court stated, "the Supervisors appear to have been more concerned about the economic and legal plight of the County as a whole than the sentiments of residents who opposed the placement of the landfill in their neighborhood." Thus, the Court found that there was no deprivation of equal protection under the 14th Amendment of the Constitution. When R.I.S.E. lost this case, it filed another law suit challenging the State's decision to approve the proposed design and construction of the landfill. This case is pending.

In both Sussex and Amelia, residents continue to express concern about the counties' lack of involvement in the site selection process and whether the landfills are environmentally sound. In these localities, members of the relevant community action groups still contend that valuable wetlands were destroyed in the construction of the landfills. While it was beyond the scope of this study to assess whether these concerns are justified, the lingering hard feelings are undoubtedly based on the lasting suspicion that the site selection process was not objective.

The final major difference between the siting process in these counties hosting private landfills and Roanoke County relates to the development of landfill operating policies. Although all of these localities have operating policies which define the responsibilities of the landfills, only in Roanoke County was the responsibility for developing this policy left to the citizens advisory group. After the number of potential sites was reduced from 50 to six, the LCAC drafted a report outlining both the permit conditions and operating policies for the landfill. This report was submitted to a subcommittee, which included some LCAC members, for review and modification. The governing body in the county adopted virtually the entire report as the official operating guidelines for the landfill. These policies provide protection for residents should their groundwater become contaminated and guarantees full market value for homes within 5,000 feet of the landfill if they are sold at a loss. The policies also include restrictions

on the operating hours of the site and the type of waste that can be received, and special buffer requirements beyond those imposed by the State regulations.

SITING PROCESS: WHAT IMPROVEMENTS ARE NEEDED TO FACILITATE EQUITABLE RESULTS AND REDUCE SITING CONTROVERSIES?

As the comparison of the local siting processes contained in this chapter indicates, in order to minimize the problems with future landfill sitings, it is important that guidelines be developed which outline some strategies which may be used to ensure community involvement throughout each major phase of the siting process. Local governments need to be certain that members of the communities in which SWMFs may be established are involved in the planning, siting, and development of operational guidelines for these facilities. In light of the national concern about environmental racism, this is especially important in localities which may attempt to site new SWMFs in neighborhoods that are either predominantly or disproportionately minority. The State can further assist localities in this area by providing them with census data on the racial composition of the neighborhood in which a proposed site is planned. Without the proactive involvement of neighborhood groups in these cases, problems which are really a function of poor planning could be misconstrued as environmental racism.

Recommendation (1). **The Department of Environmental Quality, in consultation with the Virginia Association of Counties and the Municipal League, should develop a technical assistance guide for local governments on the process for siting solid waste management facilities. In developing this guide, the Department should solicit the input of private operators and local government officials who have successfully sited SWMFs with the support of the residents in the affected communities.**

Recommendation (2). **The Secretary of Natural Resources should require the Department of Environmental Quality to develop a geographical mapping database to assist it in identifying the racial characteristics of residents surrounding all sites in which SWMFs are proposed. If the communities in which these sites are proposed are predominantly or disproportionately minority, the General Assembly should consider amending the *Code of Virginia* to require the locality or company applying for the permit to demonstrate that representatives from the affected community were given the opportunity to participate in the process for siting the facility as a condition of permit approval.**

III. Oversight of Solid Waste Facilities in Virginia

The adequacy of Virginia's program of oversight for solid waste facilities in minority communities is a major focus of HJR 529. With the passage of the 1988 Solid Waste Management Regulations, the State's regulatory responsibility expanded, and the demands placed on the compliance staff greatly increased. Oversight and enforcement of these major regulatory requirements are important because most of the requirements were adopted in order to minimize the adverse impact of SWMFs on their surrounding environment.

Without enforcement of these requirements, the State could face potentially serious environmental problems and high cleanup costs. For example:

> *In 1972 the State granted the owners of the Kim-Stan solid waste facility in Alleghany County an operating permit for a sanitary landfill. During 1988 and 1989, the owners of the landfill began taking in large volumes of waste. Over time, leachate from the landfill began discharging into surrounding groundwater and ultimately into the Jackson River. In 1989, it was determined that leachate from the landfill was responsible for a large fish kill in a nearby pond. Through legal action, the State was able to force the landfill to shut down. However, the site remains an environmental hazard, and it is projected that it will cost approximately $9 million to clean it up.*

In response to the new regulations, DEQ has established a program of oversight, but it has some significant problems which appear to be at least partly the result of several reorganizations the solid waste program has undergone in recent years. At the State level, key requirements of the 1988 regulations are not adequately enforced. Some staff are not clear on their responsibilities for oversight, and very little attention is given to supervising and coordinating the work of the field staff who are responsible for conducting facility inspections. In the area of groundwater monitoring, these shortcomings may have allowed higher rates of noncompliance for solid waste facilities in minority communities to go undetected.

This chapter presents the results of the JLARC staff analysis of the oversight program at the State level including gaps in DEQ oversight and the need for better guidelines to ensure that hazardous waste is not inappropriately accepted at landfills. Chapter IV then focuses on particular problems that were found in the implementation of state inspection and enforcement activities.

MAJOR REQUIREMENTS FOR VIRGINIA'S SOLID WASTE PROGRAM

In 1988, the Department of Waste Management promulgated regulations establishing comprehensive criteria governing the siting, operation, and closure of SWMFs. In addition to these regulations, the State has also adopted separate regulations requiring private SWMFs to demonstrate financial ability to pay for the closure of SWMFs in accordance with the regulations. Together, these regulations have imposed demands on the management at DEQ to develop a program of oversight to ensure that the new requirements are properly implemented.

New Landfill Regulations Impose Oversight Demands on DEQ

The current regulations establish a comprehensive regulatory system for the siting, design and construction, operation, closure, and post-closure of both publicly and privately operated landfills. Because the current requirements governing solid waste are much more extensive than past regulations in this area, substantial modifications to DEQ's program of oversight were required. The key areas in which oversight functions must now be implemented are summarized below.

Siting Criteria. The regulations establish specific criteria for the siting of solid waste management facilities and provide DEQ with authority to enforce the siting criteria through review of all applications to construct and operate such facilities. The criteria for sanitary landfills, which are the most stringent, require that the active fill area of a landfill be certain minimum distances from surface waters, drinking water sources, schools, residences, parks, hospitals, and roads. In addition, sanitary landfills may not be located in floodplains, wetlands, unstable areas, seismic areas, or fault areas. The regulations also require that sanitary landfills be constructed in areas where groundwater can be monitored and where there is an adequate amount of soil available for cover. Variances are available from some of these requirements upon a demonstration that noncompliance with a requirement will not result in an unreasonable risk to the public health or the environment.

Design and Construction. The regulations also establish extensive requirements for the design and construction of SWMFs. Sanitary landfills must be constructed with a composite liner system that includes a two foot layer of compacted soil and an impervious membrane. They must also have a leachate management system to collect, store, and treat all of the leachate that is generated in the landfill, a gas management plan to ensure the monitoring and control of methane gas that is generated over time at a landfill as decomposition occurs, and a stormwater management system to prevent the flow of stormwater onto the active part of the facility. Additionally, sanitary landfills must have a groundwater monitoring system to monitor the condition of the groundwater around the facility. The regulations also establish design and construction requirements to control access to the facility.

Operational Requirements. The current regulations establish specific operational requirements for sanitary landfills. Disposed waste must be compacted and covered in accordance with specific requirements. In addition, leachate produced by landfills must be regularly collected and stored and then either discharged directly or taken by vehicle to a wastewater treatment facility or in some situations recirculated into the landfill. Operators of sanitary landfills are also required to inspect incoming waste to prevent the disposal of hazardous waste, radioactive waste, or PCBs.

Groundwater Monitoring Requirements. The regulations also require extensive monitoring of both the groundwater around sanitary landfills and the decomposed gas that these landfills produce. The groundwater monitoring requirements establish different phases of monitoring. The first phase of monitoring is required at all sanitary landfills to test for contamination. The second phase, which is referred to in the regulations as "assessment monitoring," is triggered only if the first phase indicates that there is potential contamination. The purpose of the second phase of monitoring is to confirm the presence or absence of contamination. The third phase requirements only apply if corrective action is required and monitoring is needed to support the corrective action.

The requirements for the first phase of groundwater monitoring vary depending on the age of the landfill. Landfills in operation before October 1993 are subject to the groundwater monitoring requirements in the 1988 version of the State regulations which were referred to as "phase I" monitoring. Phase I monitoring required that landfills test for four broad parameters. A statistical increase in any of these parameters required the landfill to go to phase II monitoring which is now referred to in the regulations as "assessment monitoring." Assessment monitoring requires testing for over 200 constituents. If assessment monitoring reveals the presence of any of these 200 constituents at unacceptable levels, then the landfill is required to undertake corrective action and additional monitoring.

Facilities placed into operation after October 9, 1993 are subject to different first phase monitoring requirements. These facilities are required to conduct what is referred to in the regulations as "final detection monitoring" as the first phase of monitoring. This involves testing for concentrations of 62 specific constituents instead of four broad parameters required under phase I monitoring. If there is a statistically significant increase in any of the parameters being tested, then the facility is required to go to assessment monitoring which was described previously. Over the next three years, final detection monitoring will be phased in as the first phase of monitoring for all landfills.

Gas Monitoring. The other type of regular monitoring that must be conducted is monitoring for decomposed gases. The regulations require regular monitoring at some landfills to ensure that dangerous concentrations of methane gas are not being generated and released by a facility. If high levels of gas are detected through regular monitoring, then the operator of the landfill must design and implement a gas control system that will reduce gas concentrations to acceptable levels.

Closure and Post-Closure. The regulations also establish extensive requirements for the closure and post-closure of sanitary landfills as well as other solid waste management facilities. Any facility that stops receiving waste must now be properly closed. Closure for sanitary landfills includes design and construction of a final cover system to minimize infiltration of the landfill. Closure activities must begin within 30 days after a facility receives its known final load of waste or within one year of the most recent receipt of waste if the facility has remaining capacity and there is a reasonable likelihood that the facility will receive additional waste. Closure activities are required to be completed within six months of being commenced unless an extension is granted.

The post-closure regulations require that the owner or operator of a sanitary landfill take certain actions to minimize any threat of contamination from the closed facility. The post-closure requirements include maintaining the integrity and effectiveness of the final cover, maintaining and operating a leachate collection system, continuing to monitor the groundwater, and maintaining and operating a gas monitoring system.

Financial Assurance. Separate financial assurance regulations require that private solid waste disposal facilities demonstrate the ability to pay for the closure and post-closure of their facility. A facility owner may demonstrate financial responsibility through one of several options. The owner may demonstrate it through a surety bond, trust fund, letter of credit, deposit of acceptable collateral, or financial test or corporate guarantee deemed appropriate by DEQ. Owners and operators of private facilities must also secure and maintain liability coverage for claims arising from injuries to third parties. This coverage may be in the form of a financial test, an insurance policy, or other appropriate financial instrument.

DEQ is currently in the process of amending the financial assurance regulations. One of the major changes in the regulations will be to extend the requirement for financial assurance to government-owned and operated facilities. This change is being made to comply with the EPA requirement that states extend the financial assurance requirement to public facilities.

THE COMPONENTS OF DEQ'S OVERSIGHT PROGRAM

With the expanded requirements for solid waste, Virginia, like other states, has been required to develop an oversight program which addresses the State's permitting, monitoring, and enforcement responsibilities. Based on interviews with DEQ staff and an analysis of agency documents, JLARC staff found critical gaps in the State's oversight program.

While it appears that DEQ has established a system to enforce many of the major new regulatory requirements, the agency has not developed the complete program of oversight needed to fully implement the new regulations. DEQ has organized a staff of geologists and engineers to ensure that all new facilities are sited in compliance with the regulations and built with the major new environmental safety features. However,

the agency's oversight program gives only minimal attention to key regulatory requirements regarding groundwater monitoring and landfill closure. In addition, there is a clear lack of oversight and coordination by the central office of compliance activities in the field.

Gaps Exist in DEQ's Oversight Program

In order to implement the solid waste regulations, DEQ has organized its oversight program by major functions (Figure 14). A staff of geologists and engineers have the responsibility for reviewing applications for SWMFs to determine if a State operating permit will be granted. Once a permit is granted, inspectors in the regional offices have been charged with the responsibility of regularly monitoring each permitted site to ensure that the facility operates in accordance with the new regulations. If violations are identified that the facilities refuse to address, the non-compliant site can be referred to a separate enforcement unit. If the case is not resolved at this level, it is referred to the Attorney General's office for legal action. When SWMFs stop receiving waste, agency policy requires the inspectors to inspect these inactive sites to ensure that they are properly closed and maintained so as to reduce the risk of damaging the environment.

To properly administer this system of oversight, a number of elements must be in place. First, staff responsibilities associated with solid waste oversight must be clearly defined. Second, a system of performance assessment and accountability must be established to both monitor and ensure that those staff who are responsible for certain compliance functions are properly implementing these activities. Finally, a management reporting system must be in place so that the compliance status of all legally operated SWMFs can be tracked. With this type of oversight program, any deficiencies in the agency's oversight activities or problems with the compliance rate for SWMFs can be routinely identified and accounted for by making the proper adjustments in the agency operations.

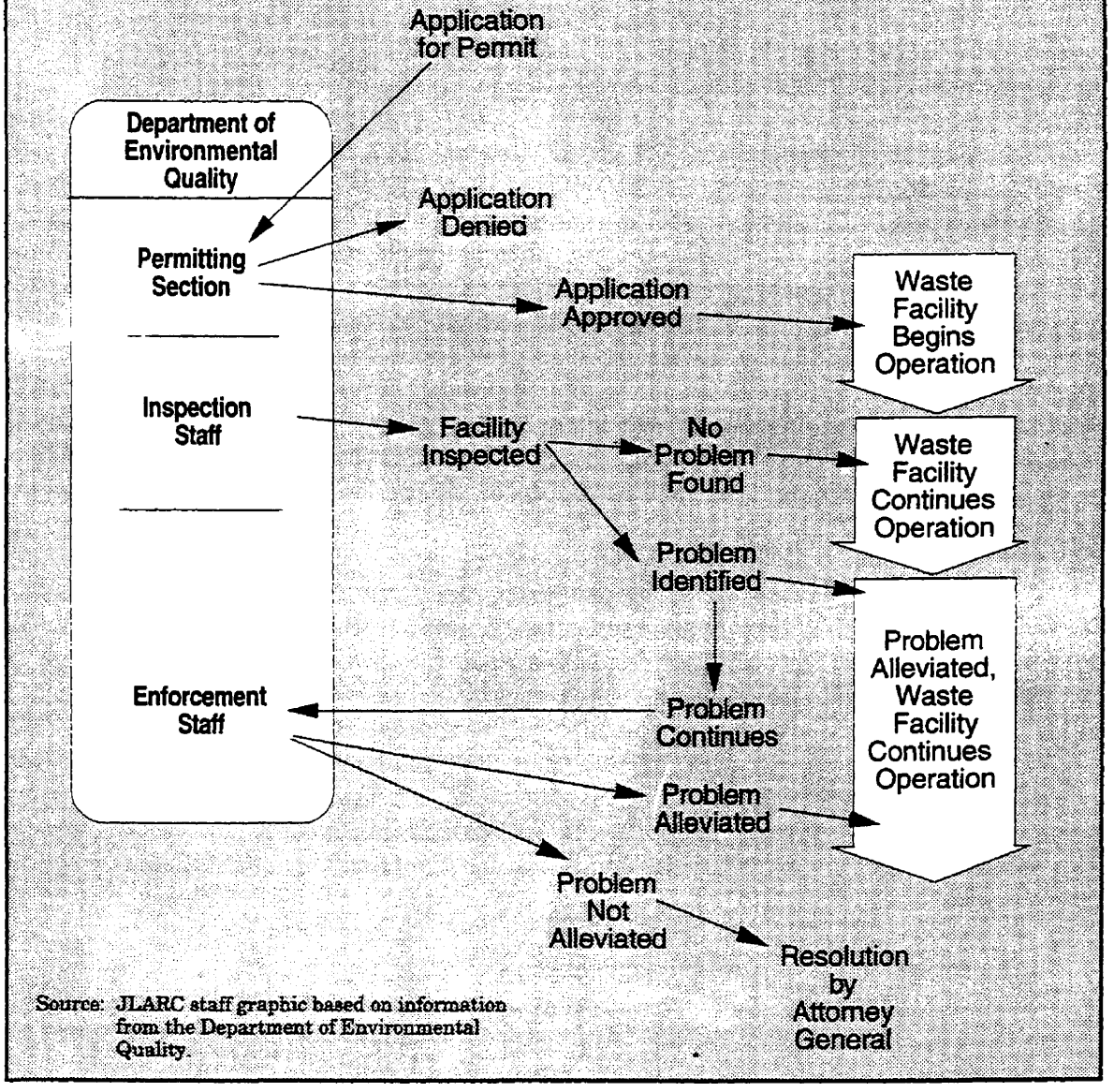
Table 8 summarizes the scope of DEQ's oversight program as it relates to the major areas governed by the solid waste regulations. Based on document reviews and interviews conducted with DEQ staff, it appears that the agency's program of oversight is inadequate, poorly structured, and lacks central control. The areas where the oversight program are the weakest are groundwater monitoring, field operations, and landfill closure.

Inadequate Enforcement of Groundwater Monitoring

Although DEQ has required most of the relevant sites to install groundwater monitoring systems, a program to ensure that the required tests are conducted and the results reported was not evident. The regulations require each landfill to submit an annual report describing its monitoring activities and results for the previous year. Upon JLARC's request, DEQ provided a list of facilities that have submitted their reports for

Figure 14

The Permitting, Inspection, and Enforcement Process



Source: JLARC staff graphic based on information from the Department of Environmental Quality.

this year. The reports were due to DEQ by March 1, 1994. Of the approximately 214 sites that should have submitted the annual report by the March deadline, only 94 had done so as of September of this year.

To determine whether any of the facilities had been referred to enforcement for failure to submit the required report, JLARC staff provided the office of enforcement with a list of the facilities that had not submitted their annual report. The office of enforcement indicated that only three of these facilities had been referred to enforcement for violations related to groundwater monitoring. Therefore, it appears that well over half of the SWMFs required to conduct groundwater monitoring are out of compliance

Table 8

Components of the Oversight Program Established By Central Office Staff at the Department of Environmental Quality

Regulatory Area	Addressed in DEQ's Oversight Program? ☑ Yes ☒ No
Facility Siting / Design and Construction	
Central Office Staff Duties Defined	☑
Central Office Oversight Conducted	☑
Facility Compliance Status Tracked	☑
Field Operations	
Central Office Duties Defined	☒
Central Office Oversight Conducted	☒
Facility Compliance Status Tracked	☒
Groundwater Monitoring	
Central Office Duties Defined	☒
Central Office Oversight Conducted	☒
Facility Compliance Status Tracked	☒
Landfill Closure	
Central Office Staff Duties Defined	☒
Central Office Oversight Conducted	☒
Facility Compliance Status Tracked	☒

Note: This information does not reflect administrative changes that may have been implemented by the Department of Environmental Quality during the time the study was conducted.

Source: JLARC staff interviews with staff at the Department of Environmental Quality and staff analysis of agency documents.

with the monitoring requirements and that no enforcement action has been taken against these facilities.

Based upon inquiries to DEQ about these findings, it is apparent that there has been a lack of agency attention to compliance with the groundwater monitoring requirements. During interviews with JLARC staff, DEQ staff indicated that they had received no guidance from management on how this program was to be implemented. They noted that one reason for the lack of a compliance program in this area may be that this was the first year that annual monitoring reports were required to be submitted for all facilities required to conduct groundwater monitoring. One staff person reviews the

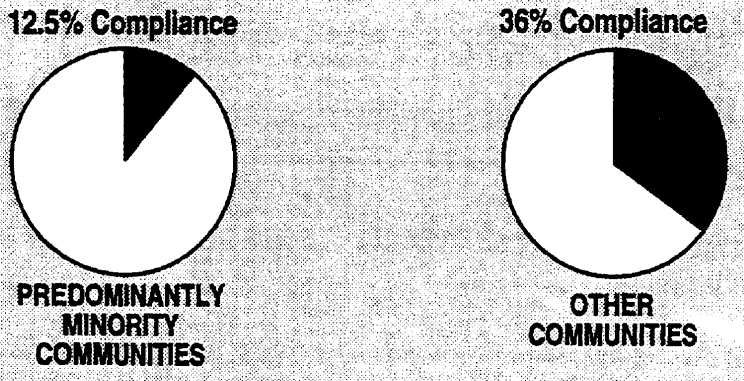
groundwater monitoring reports when they are submitted, but the person's job responsibilities do not include ensuring that all facilities comply with the monitoring and reporting requirements. It was apparent that no one in the central office could speak to the deficiencies in this oversight function because their individual oversight roles were not clearly defined. The acting director of the office of waste management sent a communication to the regional offices requesting information on the groundwater reports after interviews with JLARC staff raised questions about the agency's oversight for this requirement. Six months later the problem had not been resolved.

If this problem is not corrected, DEQ's failure to adequately enforce the groundwater requirements could have important implications for minority residents in neighborhoods with landfills (Figure 15). Using data on the racial composition of the communities surrounding a sample of solid waste sites that were required to submit annual groundwater monitoring reports, JLARC staff found that the proportion of landfills in white neighborhoods that complied with the reporting requirements was almost three times the rate for landfills in predominantly minority neighborhoods.

The absence of central office oversight of this compliance requirement in the regions was also evident from data analysis and interviews. In only three of the seven regions used by DEQ could compliance managers provide complete information on which facilities in their region were out of compliance with the groundwater monitoring requirements. When asked why DEQ has not done a better job of tracking and enforcing compliance with the reporting requirement, regional staff cited limited resources as the primary reason. According to some of the compliance staff, personnel limitations have

Figure 15

Compliance with Groundwater Reporting Requirements by Type of Community



Notes: The figures reported in this graphic are based on a sample of 91 out 214 landfills that are required to submit groundwater monitoring reports. The chi-square value for this relationship was 4.811, which was significant at a level of 10 percent. In nine of the 91 cases, data on the communities' racial characteristics were unavailable.

Source: JLARC staff analyis of data from the Department of Environmental Quality and 1990 U.S. Census for eight predominantly minority and 74 other communities.

forced them to prioritize their responsibilities. The initial focus has been on ensuring that landfills meet basic operating requirements like maintaining adequate cover.

DEQ staff did indicate that in recent weeks they have begun to focus on facility compliance with this annual reporting requirement. Letters have been sent to the facilities that have not submitted their annual reports in some regions advising them that they need to do so. In addition, inspectors are being instructed to begin assessing violation points for those facilities not in compliance.

Dissatisfaction with Groundwater Monitoring

In addition to the large number of facilities that have not submitted groundwater monitoring reports, it appears that a majority of those that have submitted reports are not conducting the groundwater monitoring that is required under the regulations. According to DEQ records, virtually all of the facilities that have submitted annual reports have shown a statistical increase in one of the parameters being tested and thus have triggered the second phase of monitoring. Despite this, DEQ records reveal that less than 20 percent of the facilities required to enter the second phase of monitoring are known by DEQ to have done so.

The low rate of compliance with the groundwater monitoring requirements is at least partially the result of widespread dissatisfaction with the groundwater monitoring requirements imposed by the 1988 regulations. As discussed previously, the initial 1988 regulations required that all landfills test for certain broad parameters in the groundwater around landfills. Where there was a significant statistical increase in one of these parameters, the facility was required to conduct much more extensive and expensive assessment monitoring. The primary complaint has been that statistical increases in these parameters tested during the initial phase of groundwater monitoring are not a reliable indicator of potential contamination of groundwater around a landfill. Critics of the regulations contend that changes in some of these parameters like pH, occur naturally in groundwater samples taken at different times of the year. Although these benign changes will trigger assessment monitoring, they suggest that the tests merely reflect seasonal fluctuations and do not necessarily indicate contamination.

DEQ staff defend the monitoring program required by the regulations. They believe that the initial phase of groundwater monitoring is an accurate indicator of the potential for contamination. As evidence, they cite the fact that three of the four landfills that have completed the second phase of groundwater monitoring have confirmed the presence of hazardous constituents at higher levels than are naturally occurring in the groundwater around the landfills. They further note that many other landfills that are currently in the midst of conducting assessment or phase II monitoring have test results which suggest that there are unacceptable levels of hazardous constituents in the groundwater around the landfills.

Any problems with the first phase of groundwater monitoring required by the initial version of the 1988 regulations will soon be irrelevant because "final detection

monitoring" is being phased in as the first phase of monitoring for all sanitary landfills over the next three years. In the meantime, many localities which triggered more extensive and costly assessment monitoring under the phase I monitoring requirements established by the 1988 regulations are seeking a variance from the regulatory requirements. They are currently negotiating with DEQ to allow them to conduct final detection monitoring that is currently required as the first phase of monitoring for new facilities instead of assessment monitoring which would be considerably more expensive. DEQ is considering these requests for a variance on a case-by-case basis. If a facility can demonstrate that the constituents that are required to be tested for in assessment monitoring are not likely to be found in or derived from the waste at the facility, then DEQ will allow that facility to proceed to final detection monitoring instead of assessment monitoring.

Field Operations Not Adequately Monitored and Coordinated

A major function of DEQ's central office staff is to monitor and coordinate the inspection activities carried out by regional staff. According to a 1992 DEQ report to the General Assembly, "the regional operations staff will do most of the day-to-day work... Headquarters operations staff will be responsible for statewide program implementation, quality control, and consistency among regional offices."

As Table 8 illustrated, there is no one presently in the central office who has the clearly defined role of coordinating the work of the regional offices. In interviews with agency staff, the study team was told that DEQ created the position of statewide inspection coordinator two years ago but then eliminated it before the position could be filled when the agency was required to reduce its budget. Subsequently, no one assumed the role of oversight with respect to the work performed in the regions. As a result, central office staff are presently unable to track the performance of the inspectors, or to regularly evaluate their reports to determine the compliance status of active or closed facilities.

The problems this has created in the inspection process, such as an inadequate number of inspections and a protracted compliance process, will be discussed in greater detail in the next chapter. Based on interviews with staff in the regions and central DEQ, it was clear that these problems have not been given sufficient attention by the central office. Although the agency has developed standards prescribing the number of inspections that should be conducted on an annual basis for SWMFs, inspection outcomes are not systematically reviewed. Moreover, inspection data are not regularly used to assess facility compliance rates in the regions.

Landfill Closure Requirements Not Adequately Enforced

Completely missing from DEQ's inspection program are procedures to monitor the compliance of inactive landfills with federal and State closure requirements. During this study, JLARC requested data from the Office of Waste Resource Management within DEQ on the following indicators:

- the number of inactive landfills that were subject to the State's current closure requirements;
- the last date which the inactive facilities received waste;
- the number of inactive landfills which have successfully implemented a closure plan in accordance with the federal and State requirements.

Despite the fact that this information is needed to assess whether inactive landfills have complied with facility closure requirements, DEQ's central office was unable to respond to this request from its existing database. Instead, regional staff were asked to conduct an inventory of inactive sites and provide JLARC with information on whether these facilities have been properly closed. In subsequent interviews, managers at DEQ acknowledged that no statewide tracking system had been established to determine compliance with these requirements. After an interview with JLARC staff, the acting director of the Office of Waste Resource Management directed regional staff to begin collecting the necessary information on these sites. Six months later, data on the compliance status of these sites was still incomplete. One manager was aware that the closure polices were not being enforced. In this manager's view, enforcing the closure regulations has not been a high priority because of the anticipated problems many local governments — the principal owners of most inactive landfills — would have in paying for closure of old landfills.

Members of the enforcement staff, who are responsible for initiating actions against all sites referred for improper closure, had no knowledge of the number of sites that were out of compliance with federal and State landfill closure requirements. According to these individuals, the enforcement unit is completely reliant upon regional staff to identify non-compliant sites. Yet, regional staff state that they lack the resources to monitor inactive landfills. Moreover, they note that central office staff had never requested information on the status of inactive landfills in Virginia prior to the JLARC review.

Solid Waste Program Has Experienced Organizational Instability

Some of the problems experienced by DEQ's central office may be a function of the numerous changes the solid waste program has experienced since the Department of Waste Management was created in 1986. Both the solid and hazardous waste programs were moved from the Health Department to the newly created agency at that time. Initially, the Department of Waste Management had very limited staff and resources. In 1988, two years after the agency was formed, there were only one manager and six staff to handle all inspection and enforcement activities for solid waste across the State.

In 1990, the Department of Waste Management was reorganized according to program functions and separate solid and hazardous waste units were established. In 1991, the director of the department resigned and was replaced in that same year by a

director who decided to reconsolidate the solid and hazardous waste functions. Two years later in 1993, the department was merged with two other environmental regulatory agencies and the Council on the Environment. As a part of the reorganization which occurred under this merger, all of the responsibilities for solid and hazardous waste compliance were organized in a newly created Office of Waste Resource Management, and a separate enforcement unit, apart from compliance, was established.

While this organizational structure is still in place, the agency is in the process of another reorganization designed to decentralize virtually all of the compliance functions to several regional offices. However, the enforcement unit will remain centralized. Although this strategy will place more responsibilities in each region, management at DEQ will need to strengthen the link between the central office and the regions. Without improved oversight and management by the central office, the compliance monitoring and enforcement problems identified in this report will persist.

Recommendation (3). **The Department of Environmental Quality should improve its oversight program of groundwater monitoring and landfill closure requirements. The Department should clearly define the oversight responsibilities for all central office staff and develop a reporting system which requires regional staff to report quarterly on compliance rates for both active and closed facilities.**

AMENDMENT TO HAZARDOUS WASTE INSPECTION STANDARDS NEEDED

Although an evaluation of Virginia's solid waste management regulations was beyond the scope of this study, JLARC staff have identified one area of the regulations which should be strengthened. The regulations require that all SWMFs have a program to inspect incoming waste for hazardous waste, radioactive waste, PCBs, or other toxic wastes, but the regulations provide very little guidance on what constitutes an acceptable inspection program. The regulations currently state that sanitary landfills must conduct random inspections of incoming waste loads. They do not specify how the inspections should be conducted or the frequency with which they should be implemented. Therefore, each landfill is left with considerable discretion regarding how to structure their waste inspection program.

Landfill Hazardous Waste Inspection Programs Are Inconsistent

The lack of guidance in the regulations has resulted in a noticeable lack of consistency in the inspection programs provided by the various sanitary landfills around the State. Based on interviews with facility managers, it is apparent that there is not much consistency in the programs used by sanitary landfills to inspect incoming refuse for hazardous, radioactive or other unacceptable wastes. Inspection programs range from detailed random inspections conducted daily to detailed random inspections conducted only monthly. Some facilities do not appear to conduct any detailed inspec-

tions of incoming loads but instead rely solely upon visual inspection of the waste when it stops at the gate, or when it is being spread and compacted. Other facilities have not implemented any type of inspection program.

DEQ staff acknowledge that many of the facilities do not have adequate hazardous waste inspection programs and that the programs vary considerably between facilities. Several DEQ staff members indicated in interviews that they believe it would be beneficial to establish more specific standards for waste inspection programs either through policy guidelines or regulations.

Inspection Programs Are Important in Current Environment

Effective hazardous waste inspection programs are becoming increasingly important. With the rising cost to legally dispose of hazardous and other toxic wastes and the growing amount of waste coming to Virginia from out-of-state, there is a greater likelihood that hazardous waste will be brought to Virginia's sanitary landfills. Effective inspection programs would help to minimize the disposal of hazardous waste in Virginia landfills. In addition, more consistent and effective inspection programs would give residents living near landfills greater assurance that hazardous waste is not being disposed of in their community. One of the common concerns raised by community action groups opposed to the siting of large regional landfills in their community has been the fear that hazardous waste would be accepted for disposal by these facilities.

It is recognized that the regulations must continue to provide facilities with some flexibility regarding the type of inspection program that they implement. EPA's Solid Waste Disposal Facility Criteria Technical Manual states that the frequency of inspections may depend on the type and quantity of waste received by a facility. However, even with the need for flexibility, more specific standards could be developed to ensure that each facility has an adequate inspection program while maintaining some flexibility for the individual facilities to enable them to develop a program that meets their specific needs.

Recommendation (4). **The Solid Waste Management Regulations should be amended to provide more specific guidance regarding the hazardous waste inspection programs that SWMFs are required to have to identify hazardous or other toxic waste. The regulations should establish more specific requirements for how often detailed inspections are required to be conducted as well as how incoming waste loads are to be inspected.**

IV. The Adequacy of DEQ's Inspection and Enforcement Activities

One of the primary but untested complaints of persons associated with the national environmental justice movement is that the inspection process for waste facilities and the prosecution of operators who violate environmental regulations is selective. Owners of facilities that are sited in minority communities are thought to be held to a much lower standard of compliance than their counterparts in white communities. Based on these concerns, the Virginia General Assembly included language in House Joint Resolution 529 directing JLARC to examine the oversight, inspection, and enforcement practices of DEQ. In order to address this issue, JLARC staff selected a stratified random sample of all solid waste facilities permitted since 1971 and collected data on their inspection and enforcement records, as well as the racial composition of the neighborhoods in which the facilities are located.

Given that most of the State's SWMFs were established more than 14 years ago, it is very difficult to determine whether race played a role in the actual site location decisions. However, data on the racial composition of the residents who currently live around these sites indicate that only fifteen percent of all SWMFs in Virginia are located in communities which are predominantly minority (more than 50 percent minority population). Nevertheless, in light of concerns about the possibility that State compliance activities lag for facilities in minority communities, JLARC staff conducted an analysis of several inspection measures over time taking into account the racial composition of the SWMF communities. Data from this analysis indicates that some of the historical problems described by DEQ staff in its inspection and enforcement process are still evident.

Specifically, inspectors are not able to consistently conduct inspections for all of the sites in their region. Further, the length of time between inspections is considerable and especially long for sites in minority neighborhoods. Perhaps more critical, the typical length of time that sites remain out of compliance with solid waste regulations has increased over time. The problems with long periods of non-compliance are especially severe for sites in minority communities. Many of these problems have persisted because of chronic staff shortages among inspectors, a lack of guidance from the Department's central office, and an inefficient and weak enforcement process.

LOCATION OF SOLID WASTE FACILITIES PERMITTED SINCE 1971

In Chapter II of this report, the issue of whether minorities are impacted by solid waste facility sitings which have occurred since 1988 was addressed. For the siting analysis, 1988 was used as the baseline year because the regulatory changes that impact how SWMFs are to be presently sited were adopted in that year. While the 34 SWMFs that have been permitted since 1988 represent only six percent of all SWMFs in the State,

the operating history for most of the remaining facilities is too long to include them in the siting analyses. Since these recently permitted facilities account for only a small portion of all solid waste sites in the State, the question of whether the majority of all facilities are located in minority communities remains.

For the analysis of the inspection and enforcement process, JLARC staff selected a sample of SWMFs permitted since 1971. Among the 227 facilities in the sample, 122 (53 percent) received their permits before 1980, and 183 (81 percent) were permitted before 1985 (See Figure 16). Because demographic shifts may have occurred in these communities over time and because census block lines may have changed, it was not feasible to use census block data to measure the racial characteristics of these neighborhoods at the time the facilities were granted operating permits. Notwithstanding this problem, the study mandate directs JLARC to examine the impact of State monitoring and enforcement practices on minority communities, irrespective of the neighborhood demographics at the time that the facility was sited.

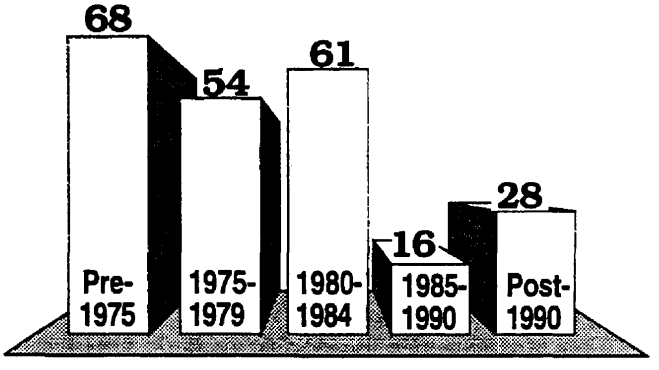
Racial Composition of Neighborhoods with SWMFs. To conduct this analysis, JLARC staff classified the communities around SWMFs according to the racial composition of those persons living within a two-mile radius of the SWMFs. Once the racial characteristics of the residents in the surrounding community were determined, the following three categories were defined:

- *Predominantly Minority Community*: If over 50 percent of the residents living within a two-mile radius of the SWMF were non-white, the community was identified as predominantly minority.

- *Disproportionately Minority Community*: If the percentage of minority residents living within a two-mile radius of the SWMF was at least five percent higher than the minority population for the locality as a whole, the community was identified as disproportionately minority.

Figure 16

Solid Waste Facility Permits Over Time



Source: Data obtained from the Department of Environmental Quality.

- *Non-Minority Community*: A community that is neither predominantly minority nor disproportionately minority.

Utilizing these criteria, the study team found that overall, the majority (65 percent) of SWMFs are in non-minority communities (Figure 17). Of the remaining facilities, 15 percent are in predominantly minority communities and 20 percent are in disproportionately minority communities. Thus, slightly over one-third of the SWMFs in Virginia are located in communities where minorities are either disproportionately represented or constitute the majority of the community's residents.

As Figure 17 further demonstrates, when controlling for the racial composition of the community, there are only minor differences in the types of the facilities that are located in the three categories of communities identified for this study. For example, in all three communities, most of the SWMFs (90 percent) are either landfills or transfer stations. Additionally, these facilities appear to have been granted operating permits around the same time period. Specifically, the average number of years in operation for the SWMFs across these communities range from 12 to 14 years. This is an important finding because it means that if variations are found in the inspection practices of DEQ staff according to the race of the neighborhoods around the sites, it is not likely that these differences can be attributed to dissimilarities in the facilities within the community groups used in the analysis.

When considering DEQ's monitoring role, it is also important to remember that not all of the new regulatory requirements imposed by the 1988 regulations apply to facilities that were receiving waste prior to 1988. Because most of the facilities in this analysis predate the 1988 regulations, they have not been required to install some of the safeguards established by the new regulations. Consequently, the communities around these sites probably face a greater risk of exposure to problems which may be related to such factors as an inadequate liner system under the landfill or no leachate collection system. Thus, it is essential that DEQ closely monitor both the operation and closure activities for these sites in all communities, no matter the race of the residents.

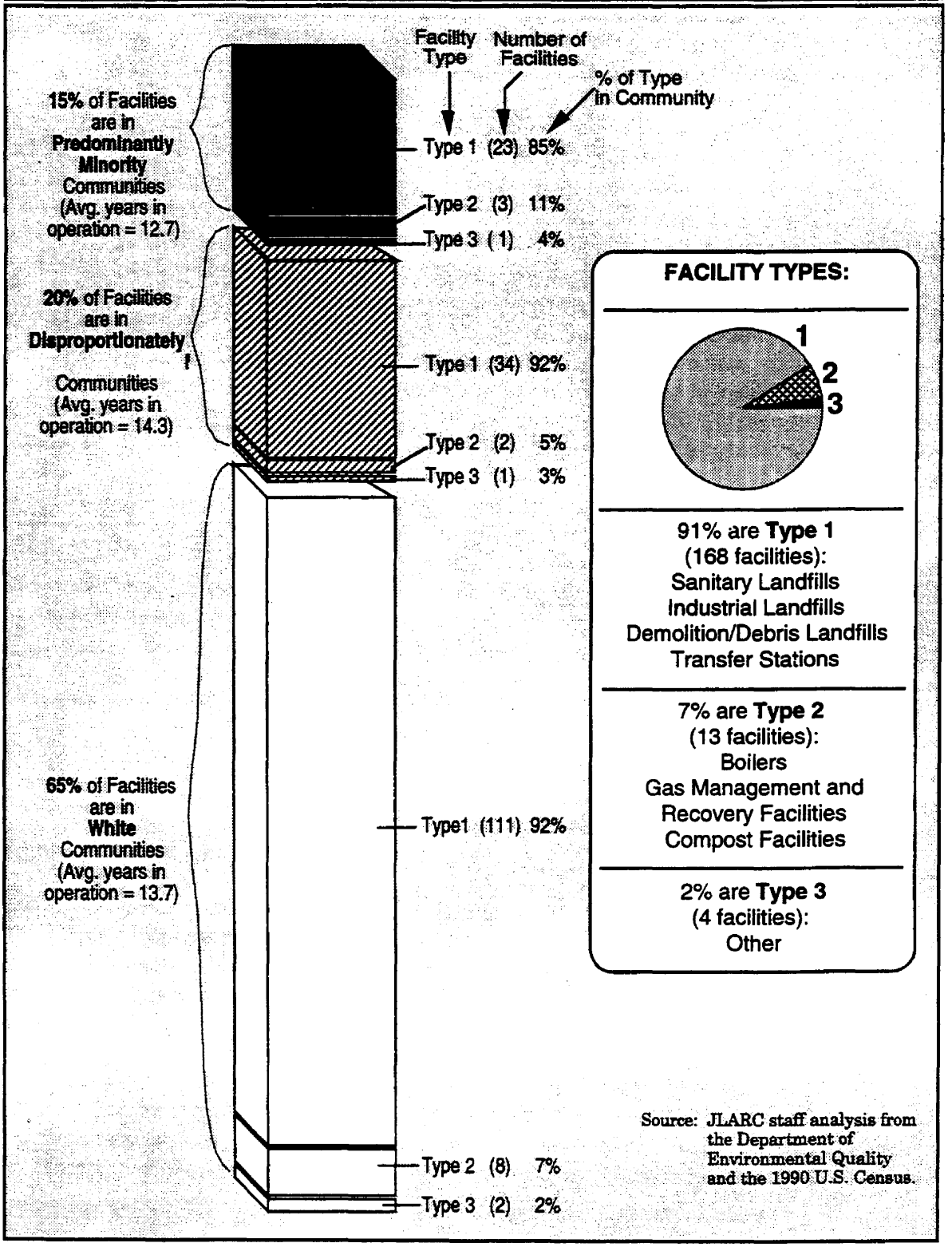
THE DEQ INSPECTION PROCESS

The mandate for this study required JLARC to study the past and present policies "involved in the ... monitoring of solid and hazardous waste facilities." As a part of this review, the mandate further directs JLARC to conduct an analysis of the Commonwealth's past, present, and future monitoring practices to determine if they have had or could have a disproportionately negative impact on minority communities.

This latter requirement created special problems for the JLARC staff analysis because the degree to which solid waste facilities have been monitored has changed considerably since the State assumed its oversight role 23 years ago. Failure to account for this could create misleading results about the past and present nature of the State's

Figure 17

Location Characteristics of Solid Waste Management Facilities



Source: JLARC staff analysis from the Department of Environmental Quality and the 1990 U.S. Census.

monitoring practices, as well as the impact of these activities on minority communities. Therefore, to address this problem, a stratified random sample of facilities was taken.

The findings from reviewing the sample indicate that there are differences in the number and frequency of inspections and the length of time that sites remain out of compliance when taking into account the racial composition of the neighborhoods in which solid waste sites are located. According to the sample, facilities located in predominantly minority communities tended to be inspected less frequently and have longer periods of noncompliance. These problems are likely a function of staff shortages in the regions. Unable to implement a regular program of inspections, compliance staff reportedly spend more time monitoring sites that are the source of more community complaints.

DEQ Inspection Performance Is Inconsistent and Varies by Race

Data from a sample of 227 facilities show some differences in monitoring practices for sites in predominantly minority communities, in terms of some key indicators: (1) the frequency with which facilities have been inspected; (2) the timeliness of these inspections; (3) the rate of resolution for major violations as a part of the inspection process; and (4) the number of days that elapsed before a resolution of major violations was achieved.

Presently, DEQ maintains hard copy records that describe staff monitoring activities for each facility which has been granted a permit to operate since 1971—a total of 562 facilities as of February 1994. Each time a facility is inspected, a separate inspection form is completed. This information is not automated, and JLARC staff had to develop a database containing the relevant monitoring information for a sample of sites.

Because the degree to which SWMFs have been inspected has varied significantly since 1971, any attempt to evaluate the impact of the State's past and present monitoring activities must specifically distinguish between the periods during which the inspection process was virtually non-existent (1971 to 1983), more frequently implemented (1984 to 1988), and enforced according to a sweeping set of new regulations (post 1988). The need for such distinctions is complicated by the fact that some of the presently active solid waste facilities have operated in all three regulatory environments. The following indicates how each stratum was defined for this analysis:

- *Stratum One.* The first stratum consisted of all sites that were granted a permit during the period from 1971 to 1983. The sample included a random selection of 141 (38 percent) of the 369 sites in this stratum.

- *Stratum Two.* The second stratum consisted of all sites that were awarded State permits from 1984 to 1988. The sample included 52 cases (33 percent) randomly selected from the 159 sites in this stratum.

- *Stratum Three.* The third stratum consisted of all sites that were permitted after 1988. The sample included all 34 sites in this stratum.

In evaluating DEQ's inspection performance, JLARC did not determine if inspectors were consistently applying regulations. Rather, the emphasis rested on examining inspection indicators which represent the outcomes of that process. Also, because data were generally not available on the length of time each solid waste facility was in operation, adjustments could not be made to account for any differences in inspection outcomes that could be related to the length of a facility's operating period (such as the number of inspections conducted). However, because inspection activities appear to have been limited for all sites, regardless of how long the facility operated, this data limitation did not affect the analysis or the findings.

Number of Inspections as a Performance Indicator. In 1992, DEQ developed a "Solid Waste Field Operations Guidance for Inspection Staff" which recommended a minimum of four inspections per year. This is an important measure because of the relationship between the frequency of inspections and facility compliance rates. DEQ inspection staff indicate that sites which are regularly inspected have a higher compliance rate and better communication between the inspector and facility management.

The purpose in evaluating the number of inspections conducted in each time period was to determine how DEQ's performance on this measure has changed over time. Based on comments by DEQ staff regarding staff shortages and the early emphasis of the inspection program on ensuring that facilities obtained permits, JLARC staff expected to observe only a minimal number of inspections per SWMF during the earliest time period. There was more interest in determining whether the agency's performance on this measure has improved since the 1971 to 1983 time period.

Table 9 reports the median and the range in the number of inspections per SWMF for each time period. As a measure of central tendency, the median represents the middle point of the data. As a way of summarizing in a single number the distribution of data in this sample, the median presents a picture that is more reflective of the majority of cases than the mean. The mean is more sensitive to extremely high or low values, and better reflects the majority of cases when the data are symmetrically distributed. But many distributions of the data in this sample are highly skewed.

To illustrate, when examining the number of inspections, many solid waste facilities have zero values, while relatively few cases have extremely high values. In the first time period, the mean is much higher than over 75 percent of the observations. Thus, the median, as the middle point in the distribution of data, provided a more meaningful picture of the typical facility, compared to the mean. Because the distributions of data in the sample are so different from one time period to another, the range of values is also shown in Table 9 for each time period.

As expected, from 1971 to 1983, the level of inspection activity was minimal. The typical SWMF was not inspected in the entire time period. JLARC interviews with DEQ

Table 9

Total Number of Inspections by Time Period

Time Period	n	Median	Range
One: 1971-1983	79	0	0-71
Two: 1984-1988	122	11	0-40
Three: 1989-1994	127	5	0-17

n = Number of sites in the sample that were operating in each time period. Some sites have operated in more than one time period.

Note: The figures reported in this table were obtained from a stratified random sample of 227 sites. If a site was not inspected, it was given a value of "0" for number of inspections and included in the calculation of the median.

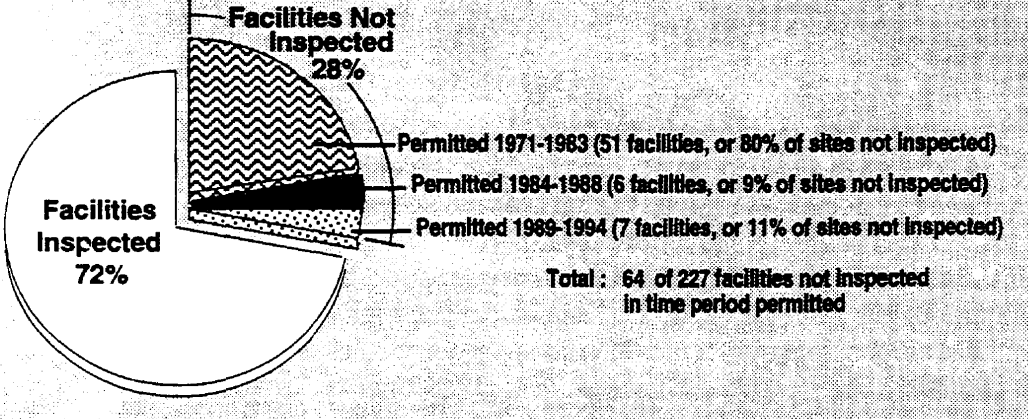
Source: JLARC staff analysis of inspection data from the Department of Environmental Quality.

staff reveal that in the earlier years of solid waste regulation, the inspectors focused more on trying to educate the operators about the State permitting process and the factors that would be considered during inspection reviews. Additionally, there were only five to six inspectors available to cover the entire State and much of their time was spent trying to force facilities that were operating without a permit to either shut down or submit an application for a State operating permit. Under these circumstances, once a site owner applied for and received a permit, he typically did not have further contact with inspection staff.

The data from this analysis suggest that DEQ field staff focused most of their inspection efforts on a few sites and never visited others. This is illustrated by Figure 18. This graphic shows the number of permitted sites which have never been inspected according to the time period in which the site was granted an operating permit. As

Figure 18

Facilities Not Inspected in Time Period Permitted



Source: Based on random sample of 227 sites.

indicated, approximately 28 percent of the SWMFs granted permits since State regulation of solid waste began in 1971 have not been inspected. Most of these sites (80 percent) were permitted during Time Period One.

This uneven inspection pattern is evident upon an examination of the DEQ inspection records for individual sites. For example, DEQ records show that landfills in Alleghany and Arlington Counties did not receive any inspections during Time Period One. In contrast, landfills in Spotsylvania County, Nottoway County, and the City of Petersburg were inspected as often as three times in a month.

There was a sharp increase in the median number of inspections conducted during Time Period Two, but this figure dropped substantially (to five inspections) in the most recent time period. According to DEQ staff, 1990 State budget cuts compelled the Department of Waste Management to reduce travel expenses by cutting back on inspections. The inspection process was further hampered by several staff retirements and job transfers during 1991. By the end of 1991, there were only two inspectors on staff to monitor SWMFs for the entire State. In 1992, many of the existing positions were filled and additional inspector positions were given to the Department. At present, ten inspectors monitor the State's SWMFs.

These findings suggest that the staff shortages have limited the ability of DEQ's inspection staff to regularly inspect all sites. Accordingly, an important question is whether the race of the community surrounding the sites showed any association with which sites were inspected. As Table 10 and Figure 19 indicate, when the inspection data in the sample were examined according to the racial composition of the SWMF communities, some differences were found in comparing the number of inspections between facilities in predominantly minority and non-minority communities.

SWMFs which are now located in predominantly minority communities had fewer inspections than facilities in disproportionately minority or non-minority communities. This pattern observed in the data persisted after the team controlled for type of facility. In Time Period One there were no differences in inspection performance for most facilities. The median number of inspections for the typical site, regardless of the current racial composition of the communities, was zero. The varying effects by race begin to emerge in the second and third time periods.

Length of Time Between Inspections. The study team's next measure of DEQ's inspection performance was an indicator of the number of days between inspections in each time period. Using the number of days between inspections instead of the number of inspections in a time period is a valuable alternative measure of the inspection process because the total number of inspections during a time period can be misleading. For example, some facilities that were in operation for all 12 years during Time Period One may have had more inspections but longer periods between inspections than sites that were open for only a portion of that period. Using the number of days between inspections more accurately reflects how often facilities are being inspected. However, because some facilities were inspected once or not at all, this measure applies only to those that were inspected twice or more in the time period.

Table 10

Total Number of Inspections by Time Period and Racial Composition of the Community

Time Period	Non-Minority			Disproportionately Minority			Predominantly Minority		
	n	Median	Range	n	Median	Range	n	Median	Range
One: 1971-1983	38	0	0-68	11	0	0-71	7	0	0-11
Two: 1984-1988	68	13	0-37	19	12	0-40	15	5	1-16
Three: 1989-1994	78	4	0-17	25	4	0-15	15	2	0-10

n = Number of sites in the sample that were operating in each time period. Some sites have operated in more than one time period.

Note: The figures reported in this table were obtained from a stratified random sample of 227 cases. However, data on the location of each site could only be identified for 185 cases. In this study, a minority neighborhood is defined as a community where more than 50 percent of the residents are minorities. A disproportionately minority community is defined as a neighborhood in which the proportion of minority population is more than five percentage points greater than that of the locality as a whole. If a site was not inspected, it was given a value of "0" for number of inspections and included in the calculation of the measures of central tendency. Racial differences reported in Time Period One may not be reliable because of the uncertainty of the demographics around the site at the time. Consequently, no conclusions are drawn in this report from observed racial differences in Time Period One.

Source: JLARC staff analysis of the Department of Environmental Quality inspection data and 1990 Census block data.

Table 11 indicates that among those sites inspected at least twice in a given time period, the length of time between inspections has grown increasingly longer over time periods. The median figures indicate that the number of days between inspections has

Table 11

Number of Days Between Inspections by Time Period

Time Period	n	Median	Range
One: 1971-1983	623	35	0-2,444
Two: 1984-1988	1,447	70	0-2,915
Three: 1989-1994	633	119	0-2,401

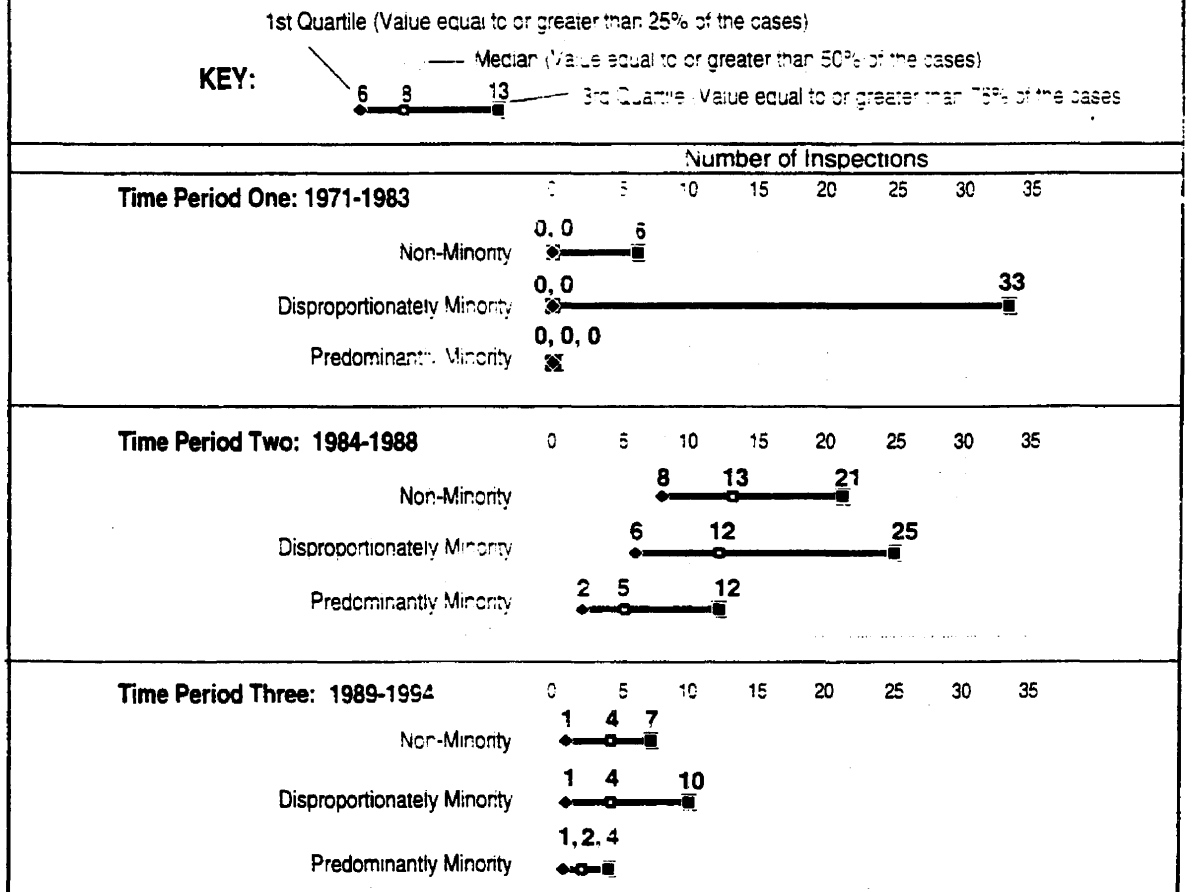
n = Number of instances between inspections.

Note: The figures reported in this table were obtained from a stratified random sample of 227 cases. Only those sites that were inspected at least twice were included in this analysis.

Source: JLARC staff analysis of inspection data from the Department of Environmental Quality.

Figure 19

Number of Inspections by Time Period and Racial Composition of the Community



Source: Department of Environmental Quality data and 1990 Census block data.

nearly doubled for each subsequent time period. As previously noted, DEQ staff blame these lags on the inadequate number of inspection staff, which has not increased proportionately with their workload. In addition, they emphasize that responding to complaints from residents in SWMF communities is a major part of their work. Describing this as the "squeaky wheel" phenomenon, the inspectors interviewed by JLARC stated that their program of regular inspections suffers because of the time they must spend responding to complaints about operational problems at solid waste sites in their region. With the limited staff and the large number of complaints that staff must respond to, regular inspections receive a lower priority and are often not conducted on a quarterly basis.

The figures for the number of days between inspections, when the racial composition of the communities is taken into account, indicate a substantially greater inspection lag for those SWMFs in predominantly minority communities in Time Period

Three (Table 12 and Figure 20). As demonstrated, while the sites in non-minority and disproportionately minority communities were typically inspected every 119 and 91 days respectively, the typical sites in predominantly minority communities were inspected only once every 203 days. This is 84 days longer than the time period between inspections observed for sites in white communities. Disproportionately minority communities appeared to have slightly less days between inspections than non-minority communities. However, these differences are not as great as the differences which emerge upon a comparison of white communities and predominantly minority communities.

Table 12

Number of Days between Inspections by Time Period and Racial Composition of the Community

	Racial Composition of Neighborhoods around SWMFs								
Time Period	Non-Minority			Disproportionately Minority			Predominantly Minority		
	n	Median	Range	n	Median	Range	n	Median	Range
One: 1971-1983	423	**35**	0-2,444	162	**30.5**	1-195	10	**49**	31-83
Two: 1984-1988	920	**73.5**	0-1,245	288	**53.5**	1-2,915	93	**91**	2-787
Three: 1989-1994	380	**119**	0-1,747	134	**91**	3-1,682	43	**203**	44-1,739

n = Number of instances between inspections

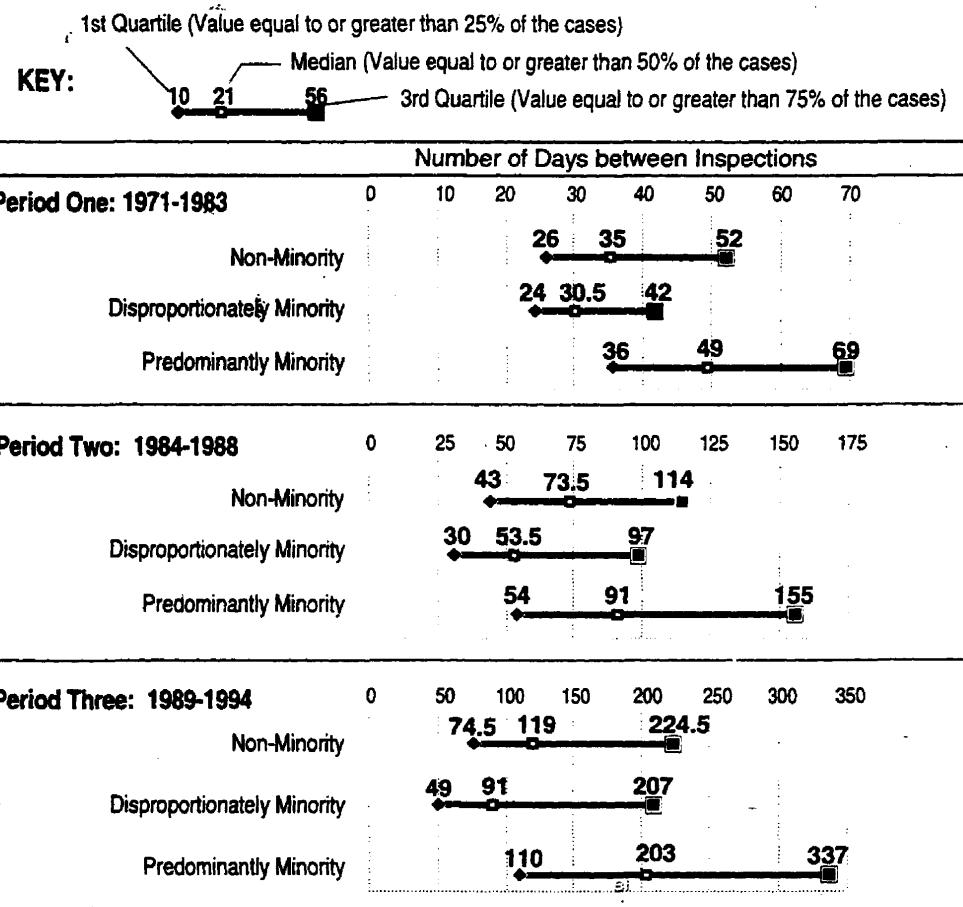
Note: The figures reported in this table were obtained from a stratified random sample of 227 cases. However, data on the location of each site could only be identified for 185 cases. In this study a predominantly minority neighborhood is defined as a community where more than 50 percent of the residents are minorities. A disproportionately minority community is defined as a neighborhood in which the proportion of minority population is more than five percentage points greater than that of the locality as a whole. Only those sites that were inspected at least twice were included in this analysis. Racial differences reported in Time Period One may not be reliable because of the uncertainty of the demographics around the site at the time. Consequently, no conclusions are drawn in this report from observed racial differences in Time Period One.

Source: JLARC staff analysis of inspection data from the Department of Environmental Quality and 1990 Census block data.

DEQ inspectors who were interviewed contend that they are not aware of any type of discrimination occurring in the inspection process. Moreover, these staff could not offer any reasons why these discrepancies are present in the data analysis. They emphasize that the low frequency of inspections in Time Period Three was at least partially the result of the fact that there were only two inspectors on staff in 1992 for the entire State and that they had difficulty simply responding to all of the complaints that were received. The following comments by a DEQ regional compliance manager offer a possible explanation for the patterns observed in the JLARC study sample:

Figure 20

Number of Days between Inspections, by Time Period and Racial Composition of the Community



Source: Department of Environmental Quality data and 1990 Census block data.

> In (my) region, it appears that minority communities tend not to be as vocal as other communities. DEQ focuses on the squeaky wheels. Inspection staff spend most of their time responding to complaints. Because of the inadequate amount of staff, most of an inspector's time is spent visiting the SWMFs in which complaints have been vocalized.

If this employee's perception partly reflects DEQ's inspection process (DEQ does not contend that this is the case), then less vocal minority communities potentially face the prospect of less frequent and less active monitoring. The lack of regular inspections reduces the deterrent effect associated with routine compliance inspections and shifts the burden of identifying problems to the residents of the community instead of the oversight agency charged with this responsibility.

Resolution Rates for SWMFs. In order to address the issue of whether the increasing trend in inspection lags has resulted in SWMFs not remedying known violations, the study team calculated a resolution rate for facilities with major violations. The resolution rate indicates the number of major violations that were resolved as a percent of the total violations identified. This allowed the team to examine whether the inspectors' efforts in working with the facilities have been successful in correcting major problems found at the facilities.

For assistance in defining what constitutes a "major violation," JLARC staff interviewed DEQ staff and facility operators about this issue. The violations most frequently cited as major in the interviews are the ones that JLARC staff selected to use for the study. They include the following:

- continued inadequate soil cover for the working face of a landfill,
- leachate seepage or waste or leachate entering surface or groundwater,
- lack of adequate groundwater monitoring,
- lack of adequate gas monitoring, and
- acceptance of unauthorized waste.

Overall, the rate of major violations that were resolved appears quite high (Table 13). In approximately seventy percent of the cases, the violations were resolved. As Table 13 indicates, the resolution rates were generally consistent across time periods, although there was a ten percent drop in Time Period Three. However, some of the sites that were included in Time Period Three have only recently been granted an operating permit. As a result, a significant amount of time has probably not elapsed since the facilities were sited. This obviously increases the likelihood that the violations would not have been resolved by inspection staff at the time the records were examined.

Table 13

Number of Major Violations Cited and Number of Resolutions by Time Period

Time Period	Number of Major Violations	Number of Resolutions	Resolution Rate
One: 1971-1983	110	87	79%
Two: 1984-1988	249	199	80%
Three: 1989-1994	188	131	70%
Total	547	417	76%

Note: The figures reported in this table were obtained from a stratified random sample of 227 cases.

Source: JLARC staff analysis of inspection data from the Department of Environmental Quality.

The next step in the analysis was to evaluate whether these resolution rates remain high when the race of the residents in the communities around the sites are considered. The findings on this issue are mixed. Clearly, in Time Period Two, DEQ staff were less able to resolve major violations for SWMFs in minority communities (Table 14). However, in Time Period Three, the resolution rate for these sites — 91 percent — was substantially higher than for those facilities with major violations in other communities. It is possible that the high resolution rate for these sites in Time Period Three may simply reflect that DEQ was able to resolve long-standing problems held over from the previous time periods. Accordingly, it was determined that a measure that would provide more information on this issue is the length of time it took to resolve these violations within each time period.

Number of Days to Compliance. While the successful resolution of a case is important, the length of time that it takes to bring a site back into compliance must also be considered. Excessively long periods of non-compliance can reduce the impact of a successful outcome by extending the time in which the surrounding community has to contend with any potential hazards associated with the violation. For example, a landfill in Grayson County was cited for leachate seepage entering the ground or surface water on February 21, 1985. The violation was not resolved until October 24, 1989. This means

Table 14

Comparison of Resolution Rates by Time Period and the Racial Composition of the Community

	Racial Composition of Neighborhoods around SWMFs					
	Non-Minority		Disproportionately Minority		Predominantly Minority	
Time Period	n	Median	n	Median	n	Median
One: 1971-1983	76	80%	25	84%	5	60%
Two: 1984-1988	169	85%	48	81%	15	47%
Three: 1989-1994	94	64%	59	73%	11	91%
Total	339	78%	132	75%	31	64%

n = Number of major violations

Note: The figures reported in this table were obtained from a stratified random sample of 227 cases. However, data on the location of each site could only be identified for 185 cases. In this study a minority neighborhood is defined as a community where more than 50 percent of the residents are minorities. A disproportionately minority community is defined as a neighborhood in which the proportion of minority population is more than five percentage points greater than that of the locality as a whole. Racial differences reported in Time Period One may not be reliable because of the uncertainty of the demographics around the site at the time. Consequently, no conclusions are drawn in this report from observed racial differences in Time Period One.

Source: JLARC staff analysis of Department of Environmental Quality inspection data and 1990 Census block data.

that leachate contamination likely occurred for over four years before the facility remediated the problem.

Because of these concerns, the study team examined the median number of days until compliance was achieved for those SWMFs with major violations. The data presented in Table 15 reveal that the length of time between identification of the violation and resolution has increased over time. The non-compliance period is the longest in Time Period Three. This is not surprising since Time Period Three has had the longest number of days between inspections.

Table 15

Number of Days Until Compliance by Time Period

Time Period	n	Median	Range
One: 1971-1983	87	63	7-3,547
Two: 1984-1988	199	80	0-2,882
Three: 1989-1994	131	198	14-3,080

n = Number of cited violations which were resolved.

Note: The figures reported in this table were obtained from a stratified random sample of 227 cases. Only those sites that were inspected at least twice were included in this analysis.

Source: JLARC staff analysis of inspection data from the Department of Environmental Quality.

One example of this problem of lengthy noncompliance of facilities in Time Period Three is a landfill in Appomattox County. DEQ inspection records show that the landfill was cited with a violation for having inadequate daily cover and a leachate problem on May 5, 1989. The cover problem was not resolved until a year and a half later on November 11, 1990. Moreover, according to DEQ inspection records, the leachate problem has not yet been corrected.

Because of the uncertainty concerning the demographics surrounding solid waste sites that were permitted in Time Period One, no conclusions were drawn based on racial differences for this time period. These differences are shown in Table 16 and Figure 21. However, in Time Period Three there are noticeable differences. The median length of time for facilities in non-minority communities to reach compliance is 176 days while the median for the SWMFs in predominantly minority communities is 449 days — a difference of 273 days or approximately 9 months.

There are also differences for those SWMFs located in communities that are disproportionately minority in Time Periods One and Two. For the sites inspected in these communities, the length of noncompliance tended to be shorter, compared to both non-minority and predominantly minority communities. However, in Time Period Three, problem resolution appears to have taken about the same amount of time in the

Table 16

Number of Days Before Compliance Achieved by Time Period and Racial Composition

Time Period	Racial Composition of Neighborhoods Around SWMFs								
	Non-Minority			Disproportionately Minority			Predominantly Minority		
	n	Median	Range	n	Median	Range	n	Median	Range
One: 1971-1983	61	**64**	7-3,547	21	**45**	21-310	3	**410**	44-410
Two: 1984-1988	143	**92**	3-1,367	39	**62**	1-2,882	7	**90**	54-834
Three: 1989-1994	60	**176**	14-2,046	43	**417**	43-3,080	10	**449**	84-2,654

n = Number of cited violations which were resolved.

Note: The figures reported in this table were obtained from a stratified random sample of 227 cases. In this study a minority neighborhood is defined as a community where more than 50 percent of the residents are minorities. A disproportionately minority community is defined as a neighborhood in which the proportion of minority population is more than five percentage points greater than that of the locality as a whole. Racial differences reported in Time Period One may not be reliable because of the uncertainty of the demographics around the site at the time. Consequently, no conclusions are drawn in this report from observed racial differences in Time Period One.

Source: JLARC staff analysis of inspection data from the Department of Environmental Quality and 1990 Census block data.

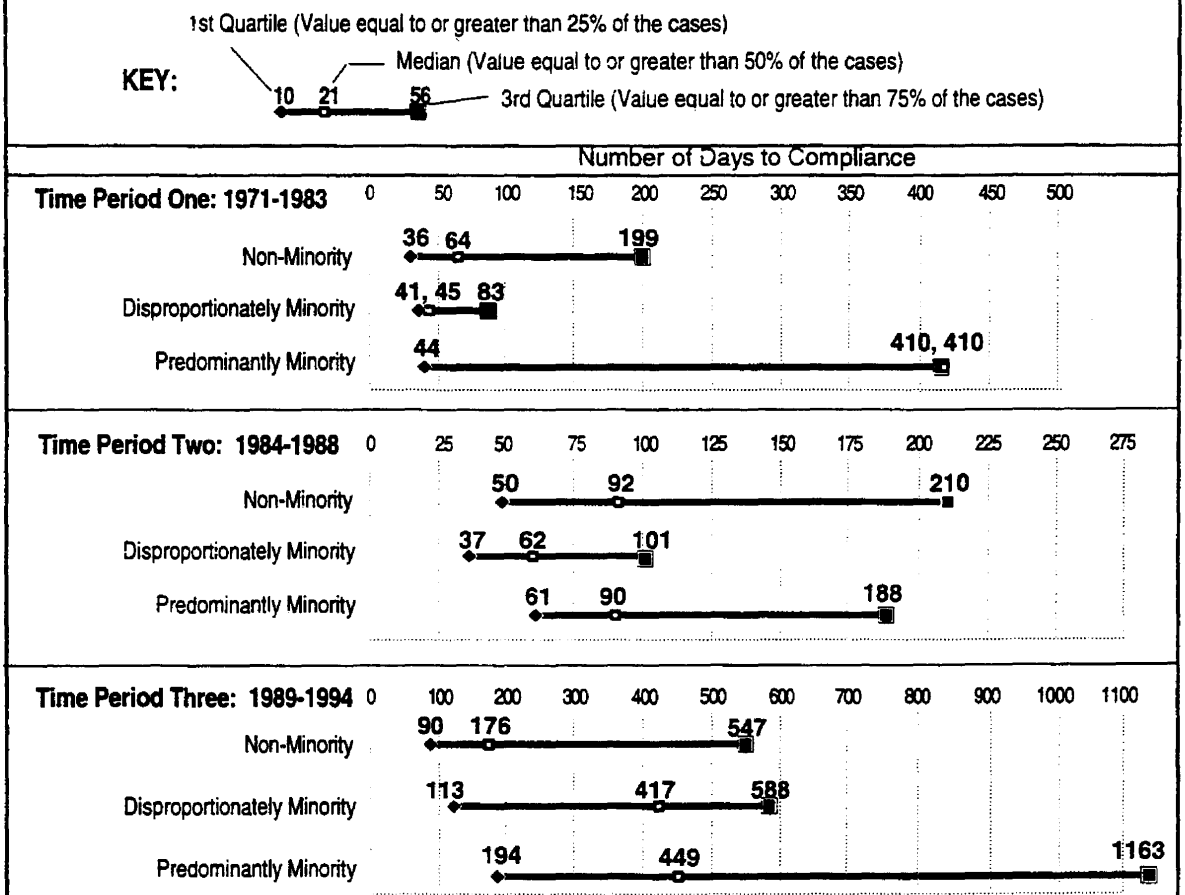
predominantly and disproportionately minority communities, while it was much shorter for non-minority communities. While the lack of sufficient staff to conduct inspections has clearly weakened DEQ's inspection process for all sites since 1988, the long length of non-compliance for facilities in the minority communities relative to facilities in white communities is a problem.

One example of this problem was found in DEQ records for a landfill located in Sussex County, whose minority residents comprise 59 percent of the community's total population. This facility was out of compliance for over three years, from June 18, 1986 until August 24, 1989, because of inadequate compaction and cover of the landfill. That is over six times as long as the average noncompliance period for facilities in non-minority communities. On a March 28, 1989 visit to the facility, the inspector wrote "this facility has been poorly maintained and operated."

It should be noted that there are factors that affect how long a facility is out of compliance which are out of the inspector's control like the severity of the violation, the methods required to correct the violation, and competing demands on an inspector's time. However, it is not clear why any of these factors would be associated with the race of the community surrounding a SWMF.

Figure 21

Number of Days to Compliance, by Time Period and Racial Composition of the Community



Source: Department of Environmental Quality data and 1990 Census block data.

DEQ staff noted that predominantly minority communities, like Sussex, tend to be poorer than suburban counties. With the greatly increased expense of landfill operation already noted in this report, it is less likely that communities like Sussex County have the funds to bring their facilities into compliance with the new solid waste management standards. Therefore, they are likely to stay out of compliance longer.

Although discussion of these results has been in terms of the data from a random stratified sample, there is reason to believe that the patterns observed in this sample would very likely be observed if data from all 562 facilities were examined. A sampling strategy was necessary because it was not feasible to examine the records of all 562 facilities within the time frame of this study, especially given the state of the DEQ data management system. The sample consists of a sizable portion — over one third — of all facilities. The sample cases in each stratum were randomly selected, but in such a large number that alternative draws would still include a large portion of cases that are indeed

in this sample. While the possibility exists that the patterns observed in this sample may be unrepresentative due to some anomalous draw of the data, the size of the sample in relation to the total population of cases makes the likelihood of this occurring remote.

DEQ's Solid Waste Inspection Process Needs Reform

At the time of this study, DEQ was organized into seven regions for the purpose of conducting inspections. It has been the goal of those administering the solid waste program since the early 1990s to establish a regional presence for the waste program throughout the State. It is believed that having regional directors and inspectors will make DEQ more accessible to the SWMFs and their operators. Moreover, having a regional presence, it is thought, will improve communication between DEQ staff and facility operators.

Management at DEQ is in the process of reorganizing the agency again with the goal of "empowering" the regional offices to bring about a more efficient delivery of services. However, before this strategy can improve the agency's inspection process, several reforms will be needed. First, the agency should conduct a workload analysis for each region and determine the number of inspectors that will be required to enhance the integrity of the inspection process. Second, a notice of violation point system should be put in place to bring greater consistency to the inspection process. Third, an automated data management system should be developed which will allow the inspectors to more efficiently track the compliance status of all SWMFs in the State and enable central office staff to provide better oversight of the inspection process.

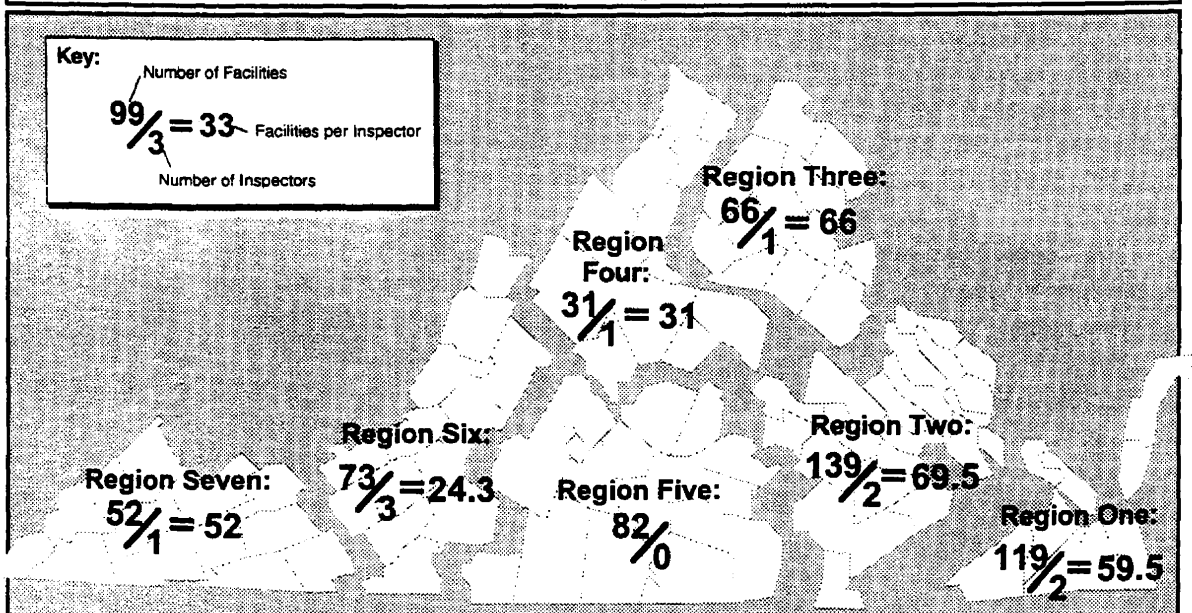
Workload Analysis. One of the main reasons for the observed inconsistencies in the inspection process is that DEQ's central management has not properly addressed resource and workload problems faced by the compliance staff. Although staffing for inspections has been a problem for the agency since the inspection function was removed from the Department of Health in 1986, no attempts were made to address these shortages until 1992. At that time, DEQ requested and received funding for 51 positions from the General Assembly, but these positions were allocated among compliance, enforcement, permit writing, and environmental response and remediation. By 1994, the agency staffed the regional offices with 10 solid waste inspectors. However, this allocation was not based on workload.

As Figure 22 reveals, some regions have only one inspector. One region has three inspectors but fewer sites to monitor than other regions that were allocated fewer staff. A third region does not have any staff. The work in this region is handled by inspectors from two other offices. With this unsystematic approach to staffing the regional offices, the number of facilities that must be monitored per inspector ranges from a low of 24 to a high of 69. In light of this uneven allocation of resources, the inconsistency observed on several key inspection indicators in this study is to be expected.

Notice of Violation Point System For Solid Waste. In 1992, when DEQ established a Waste Strategic Plan and a Solid Waste Field Operations Guidance for

Figure 22

Regional Variations in Inspectors and Workload



Note: DEQ regional definitions used.

Source: JLARC staff analysis of data on solid waste facilities from the Department of Environmental Quality, Division of Waste Management.

Field Staff, the agency's objective was to bring greater consistency to the inspection process. Both publications provide guidelines and goals for the inspection staff. For example, the Solid Waste Guide recommends a minimum of four inspections a year for active sites and two inspections per year for inactive sites. In addition, the Guide sets forth the procedures that should be followed when referring cases to enforcement, processing variances, and conducting routine inspection visits.

Nonetheless, neither document addresses how long a site should be allowed to remain out of compliance before the case is to be referred to enforcement. As a result, there is no mechanism in place to ensure that the compliance and inspection processes are conducted consistently. This lack of consistency contributes to the problems observed with the variations in the length of time that facilities are allowed to remain out of compliance and has led to charges that DEQ staff treat one group of operators — local governments — more favorably than others.

This problem could be addressed with a notice of violation point system similar to the program in place for DEQ's water program. With this system, points are assigned to various violations. The highest values are reserved for violations that are considered to pose the most immediate and significant threat to the environment or human health. In the case of landfills, for example, the highest value could be assigned in cases where there is evidence of leachate leaving the site and entering surface or groundwater.

Minor water violations which generate less than one point do not trigger what DEQ refers to as a notice of violation. This is reserved for anyone who commits a violation that has an assigned value that is worth at least one point. When a facility accumulates a point, the inspector delivers a notice of violation to the facility operator and conducts an additional inspection to determine if there are other problems. Any violator who accumulates at least four points within a six month period is automatically referred to enforcement. A point system in the solid waste program would bring more consistency to the compliance process by standardizing when cases would be referred to enforcement.

Management Information System. In order to have an effective compliance tracking system and a strong central office program of oversight, an automated data management system is a necessity. DEQ's data management system is located in a file room in the central office. It primarily contains inspection records for some of the permitted SWMFs. The majority of the inspection reports are located in the regional offices. During this study, DEQ management decided to decentralize the data system by sending all copies of the files from the central office to the relevant regions. Only the files that pertained to the regions in the Central Virginia area remain in the central file room.

The files in both the regional and central offices are manually updated whenever an inspection report is filed or any other correspondence is generated on the site. The problems generated by this system are numerous and include the following:

- Central office staff do not have the capability to evaluate the compliance status for SWMFs on a statewide basis. Therefore, management has no means for determining whether the regulations they are charged with enforcing are, in fact, being successfully implemented.

- Central Office staff are not able to evaluate the performance of inspectors in terms of the frequency, timeliness, and outcomes of their monitoring activities.

- There is no mechanism in place to ensure the integrity of the system. Without a central file, a tracking system to minimize problems with misplaced or incomplete files cannot be maintained.

Establishing a database in the central office will not be sufficient unless the system is automated and designed to maintain data on all of the key aspects related to compliance. DEQ's current system of storing hard copy files in file drawers is antiquated, inefficient, and replete with problems of inadequate, inaccurate, and missing data. Some of the problems encountered in this study are listed below:

- Information on the results of DEQ inspections had often been removed from the files, and the tracking system in operation to identify the location of the files was not properly implemented.

- Some of the basic information on the history of the SWMFs in the State was either not reported or unreliable.

- The files lacked key information on the status of closure activities for sites which are no longer operating, and compliance with groundwater reporting and financial assurance requirements.

Recommendation (5). **The Department of Environmental Quality should conduct a workload analysis for each region and determine the number of inspectors needed to successfully implement its inspection program.**

Recommendation (6). **The Department of Environmental Quality should standardize the inspection process by establishing a notice of violation point system.**

Recommendation (7). **After conducting a cost analysis, the Department of Environmental Quality should request from the Secretary of Natural Resources the necessary funds to develop an automated management information system that can be used to electronically monitor inspection activity and maintain regularly updated information on the compliance status of each SWMF in the State.**

STATE ENFORCEMENT PROCESS

In some instances, staff in DEQ's enforcement unit are called upon to assist the inspectors with attempts to bring sites with violations back into compliance. In this study, the enforcement process and the associated outcomes were examined to determine if varying results could be observed based on the racial characteristics of the residents in communities with sites that have been referred to enforcement. While it appears that there are problems in the enforcement process, the race of the neighborhoods in which solid waste sites are located is not associated with staff activities in this unit.

Race Not a Factor in State Enforcement Process

DEQ's Solid Waste Enforcement Program is designed "to protect human health and the environment in the Commonwealth of Virginia through the administrative enforcement of solid waste laws and regulations." The official enforcement process is initiated when a facility is referred from the compliance staff (the inspectors). However, enforcement staff usually attend several compliance meetings before the matter is referred to enforcement in order to help convince the operator to comply with the regulations. According to both compliance and enforcement staff, the majority of the enforcement staff's activities fall into this category of "pre-enforcement actions."

Once a matter is referred, the operator is informed of the available enforcement options and is given the opportunity to supply information about the case and to meet with the enforcement staff. Enforcement staff then prepare an Enforcement Course of

Action Plan for management which outlines the facts and the unit's official position on the compliance issue being investigated.

Enforcement cases are settled in several ways. After a detailed investigation, enforcement staff may conclude that no violation was committed and terminate the case. If both parties agree that a violation was committed, a letter of agreement is written which outlines the plans to bring the site back into compliance. This letter may include the payment of civil charges if the offending party agrees. If the operator refuses to consent to such an agreement, the unit can issue an enforcement order requiring the facility operator to take the necessary steps to remediate the problem. Should the operator refuse to comply with the consent order, enforcement has the option of referring the case to the Attorney General's office who can then bring a legal action seeking civil penalties.

According to DEQ staff, a decision on whether to refer a facility to enforcement often depends on the efforts of the owner to correct the problem at the site. If an inspector sees incremental improvements, the case will probably not be referred. If no attempt is made to address the problem, a referral is likely. At the time of this review, 25 percent of the 227 SWMFs in the study sample were out of compliance with State regulations governing solid waste management. Of these cases, however, only 19 percent were officially turned over to the enforcement staff for investigation.

State Enforcement Process Is Protracted and Needs to Be Strengthened

A key problem with solid waste enforcement is the enforcement unit's lack of authority to issue administrative penalties. Waste Division enforcement staff are responsible for enforcing the Waste Management Act and the various solid and hazardous waste regulations adopted by the Waste Management Board. Section 10.1-1455(F) of the *Code of Virginia* authorizes the enforcement staff to issue enforcement orders by consent and levy civil charges but only in an amount agreed upon by the violator. This means that DEQ has no authority to impose administrative penalties on violators of the Solid Waste Regulations without the consent of the party in violation. Site owners who do not agree with the Enforcement Unit's findings of non-compliance are subject to civil penalties which may be assessed through a successful legal action brought by the Office of the Attorney General.

According to enforcement staff, the following options are available to the agency when pursuing an action against an owner who is operating a SWMF in violation of the regulations:

1. Convince the facility through pre-enforcement meetings to comply with the solid waste regulations.

2. Negotiate a settlement based on the facts of the case.

3. Conduct a formal administrative hearing at DEQ in which the Office of the Attorney General acts as the advocate for the agency.

4. Refer the case to the Attorney General's Office for a possible civil suit.

The first option is the one most often used. Enforcement staff spend much of their time trying to convince the facilities to comply with the regulations. In most cases, they work with the inspectors to try to achieve compliance and avoid a referral. After a facility is referred, the enforcement staff once again try to convince the facility to comply with the regulations. Based on these negotiations, a decision is made whether to hold a formal administrative hearing.

When an administrative hearing is held, a hearing officer presides over the meeting. The Office of the Attorney General represents DEQ in the hearing. After both sides present evidence, the hearing officer issues a ruling. If a ruling is granted in favor of DEQ, the hearing officer then writes an enforcement order.

According to DEQ staff, the current hearing process is not an effective tool for obtaining compliance. The main reason is that the hearing officer can only order a facility to comply with the regulations. No administrative penalties can be levied by the officer. Therefore, there is no financial incentive for a recalcitrant operator to obey the enforcement order. This lack of authority to impose administrative penalties undermines the efforts of enforcement staff to force a noncompliant owner back into compliance. In most cases, if a party refuses to comply with an enforcement order, the enforcement staff decide whether to refer the case to the Attorney General's office to bring a civil action. Only at this stage — a civil court proceeding — can civil penalties be assessed.

It is important to keep in mind that only a small number of cases are actually referred to the Attorney General for civil action. According to DEQ management, one of the reasons that DEQ has been reluctant to refer cases in recent years is that the Natural Resources section of the Attorney General's Office has been understaffed and simply has not had the resources to handle all of the matters referred to them. As Figure 23 shows, only nine percent of all the cases that the enforcement unit has received from inspectors since 1980 have been referred to the Attorney General. Approximately 62 percent of the cases were still pending at the time of this study. Only 29 percent have been resolved.

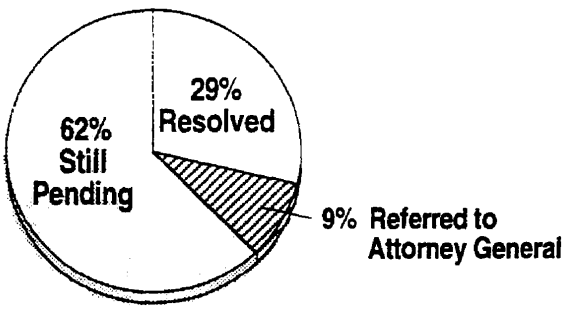
DEQ staff noted that in addition to the staff shortages in the Attorney General's Office, one of the problems with referring cases to them for possible civil action is that by the time the case is heard by a court, the facility may have been out of compliance for several years. During this time, the facility may have been exposing nearby residents to substantial risks.

At the time this analysis was conducted, the average length of time that had elapsed since cases that were referred to the Enforcement Unit, but are now in the Attorney General's Office, was almost six years. The following case study from the Enforcement Unit files demonstrates the sometimes protracted nature of the process for cases referred to the Attorney General's office:

> On January 30, 1989, an inspector for the Department of Waste Management referred the owners of [Name of Company] to the En-

Figure 23

Disposition of Cases Referred by Inspectors to Enforcement Unit



Total Referrals = 139

Note: Data was available for 144 of the 148 cases that have been referred to enforcement. The figures in this graphic do not included those cases that were returned to the compliance unit.

Source: JLARC staff analysis of data from the Department of Environmental Quality.

forcement Unit for operating an "unpermitted dump." According to the files, this dump contained sanitary waste, construction, demolition, and debris materials, tires, and unmarked drums. Six months after the case was referred to the Enforcement Unit, it was turned over to the Attorney General's office on June 19, 1989. Almost five years later, on March 3, 1994, DEQ's enforcement staff requested an "inspection and status report" for the Attorney General's office. That was the last notation made in the file from the Enforcement Unit, and the case remains unresolved.

Even when the case is not referred to the Attorney General's office, the length of time that it remains in enforcement can be considerable. The current average for resolved and pending cases is around three years. This process could be expedited by using enforcement staff to act as the advocates for DEQ in a formal hearing process. In this way, the additional time needed to educate the Attorney General's Office about the case could be avoided. The system could be further improved by giving the hearing officer the authority to impose civil penalties upon finding a violation. With the threat of a quickly and efficiently implemented administrative penalty process, potential violators would have a much greater incentive to resolve any violations raised during the inspection process.

Recommendation (8). **The General Assembly may wish to amend Section 10.1-1455 of the *Code of Virginia* to authorize the imposition of administrative penalties by a hearing officer pursuant to a formal hearing conducted in accordance with the Administrative Process Act if the hearing officer finds that the party before the hearing officer is in violation of the Solid Waste Management Regulations or the Financial Assurance Regulations.**

V. State Closure and Cleanup of Solid Waste Facilities

Since 1986, the Virginia General Assembly has established two funds to provide for the cleanup or remediation of solid or hazardous waste facilities across the State. One requirement of House Joint Resolution 529 directs JLARC to determine if the policies and practices associated with the State's clean-up programs have been implemented in a racially discriminatory manner.

Although the State adopted a solid and hazardous waste contingency fund in 1986 and established an emergency response program in 1992, there have been no large scale State cleanup activities for solid waste facilities in any community. Therefore, the lack of a substantial cleanup program, not discrimination in the allocation of the program's resources, is the major issue. The primary reason for this has been the inadequate level of funding for the cleanup programs. Virginia funded these programs largely through revenue generated from fines levied against persons found guilty of environmental pollution. In seven years, this funding mechanism has generated less than $1 million. This amount falls considerably short of the revenue that would be needed to clean up contaminated sites of any significant size.

Among solid waste facilities, the largest potential sources of environmental pollution in Virginia are landfills. Because landfills pose a risk to the environment even after they stop receiving waste, careful attention must be paid to the methods used by landfill operators to close inactive facilities. Although DEQ is required to regularly inspect inactive and closed landfills to ensure that the closure standards are implemented, the agency has provided only minimal oversight in this area. As a result, many of the owners of inactive landfills have to date escaped the closure requirements governing their facilities.

This chapter presents the results of JLARC's assessment of DEQ's implementation of the State cleanup program. Because of the adverse impact an improperly closed landfill can have on the environment, some attention is also given to the success with which the agency has carried out its responsibilities regarding the closure of these facilities.

VIRGINIA'S CLEANUP PROGRAM FOR SOLID WASTE FACILITIES

In 1986, the Virginia General Assembly established the Virginia Solid and Hazardous Waste Contingency Fund to be administered by the Department of Waste Management. The purpose of this fund was to provide resources to clean up contaminated sites that were not eligible for funds made available under the Superfund program which was established by the Comprehensive Environmental Response Cleanup and Liability Act (CERCLA). However, in five years, the resources made available through

the State's program — approximately $473,000 — were not adequate to support major cleanup projects.

The State modified its cleanup policy in 1991 by establishing an emergency response program for environmental pollution problems. Still, only modest changes were made in the method of financing the program, and the funding problems persisted. In the first two years of this new program, only $201,489 was raised for emergency environmental pollution problems. This was less than the amount required merely to stabilize contamination at the Kim-Stan landfill in Alleghany County. It is estimated that the cleanup costs for this one site could surpass $9 million.

Federal Superfund Cleanup Program

With the passage of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA or Superfund) in 1980, the federal government took the lead in the cleanup of hazardous waste sites across the country. Under CERCLA, EPA has the authority to clean up sites and then seek reimbursement from the responsible parties. Both owners and operators of property which has been contaminated by a release of a hazardous substance are potentially liable for the cleanup of a contaminated site as well as any other parties who disposed of their hazardous waste at the site. Liability not only extends to owners and operators of the property at the time that the contaminant was disposed of, but also to present owners of the property. In addition, liability under Superfund is retroactive. Thus, parties can be held liable for cleanup even if it was not illegal to dispose of the contaminant at the time it was disposed.

Not all contaminated sites qualify for cleanup under the Superfund program. Only those sites which are listed on EPA's National Priority List (NPL) are remediated through Superfund. Sites that are identified as contaminated with hazardous waste are first evaluated to determine the extent of the contamination. Using a system called the "Hazard Ranking System" each site is ranked according to the potential risks posed by the contamination at the site. Only those sites that receive a ranking of 28.5 or more are placed on the NPL. Presently, there are more than 1,300 sites on the NPL, including 26 sites in Virginia.

Once a site is placed on the NPL, an attempt is made by EPA to find the party or parties that are potentially liable for the cleanup. In most cases, an effort is made to identify the responsible parties and get them to agree to clean up the site before EPA spends funds from the Superfund program on cleanup. If it is determined, however, that pollution at the site represents an environmental emergency, EPA will fund the cleanup and seek reimbursement from the responsible parties after the cleanup has been completed.

Virginia Supplements Superfund with a Contingency Cleanup Program

One of the problems with the Superfund program is that contaminated sites do not qualify for federal cleanup under Superfund unless they receive a high enough hazardous ranking. This means that a site could have a problem that is serious enough to generate a score of 27 points, for example, but not be placed on the NPL because it falls less than two points short of the ranking needed to become a Superfund site. In light of this, the General Assembly passed Section 32.1-177.1 of the *Code of Virginia* which established the Virginia Solid and Hazardous Waste Contingency Fund. According to State statute, this fund was to be used for "purposes of responding to solid and hazardous waste incidents and the clean-up of sites which have been improperly managed..."

In the five years that this program was in place (FY 1987 to FY 1991), the Solid and Hazardous Waste Contingency Fund was not extensively used to clean up abandoned solid or hazardous waste sites. The primary problem was a lack of funding which was directly related to the program's funding structure. With the cost of cleanup of abandoned sites not fully known, the General Assembly was unwilling to have the State assume the responsibility for cleaning up problems that could cost millions of dollars to remediate. As a result, the General Assembly decided to make the Solid and Hazardous Waste Contingency Fund "a non-lapsing, revolving fund consisting of money received for violations of solid and hazardous waste laws." The purpose of establishing this funding mechanism was to impose the financial burden of the cleanup of abandoned sites on those persons who contribute to problems of environmental pollution in the State.

However, as Table 17 indicates, from FY 1987 to FY 1991, the amount of money received by the State from environmentally-related civil penalties or fines totaled $473,813. Over these five years, the total amount spent on solid and hazardous waste cleanup problems was $341,269. This amounts to 72 percent of the available funds. Civil penalties generated the largest amount of revenue in FY 1991, but that was only $111,375. With a program funded at this level, only small scale cleanup projects were undertaken.

According to the Director of Enforcement at DEQ, most of the money that was spent was used to address small hazardous waste problems. For example, the State spent $1,990 in FY 1989 to remove several unmarked drums that were abandoned on the roadside in Nottoway County. Another DEQ staff person who worked in the cleanup unit for the Department of Waste Management commented that because of the absence of a significant cleanup fund for solid waste, enforcement staff focused most of their cleanup efforts on small private sites with owners who volunteered to clean up their sites. As the comments of a DEQ staff person reveal, cases involving larger waste sites such as public landfills were a low priority:

> *Prior to 1991, if a closed or abandoned site began to create environmental problems, it was supposed to be handled under the State's old cleanup program. In this program, we would get cases in two ways. The most common source would be situations where the owner of the property wanted to sell [the land] and approached the Department with*

Table 17

Revenue and Expenditure History for the Solid and Hazardous Contingency Fund Fiscal Years 1987-91

Fiscal Year	Total Funds Available	Total Revenue Collected	Carryover from Prior Year	Expenditures
1987	$20,500	$20,500	0	0
1988	$111,886	$91,386	$20,500	$46,425
1989	$171,335	$105,875	$65,460	$1,990
1990	$227,295	$57,950	$169,345	0
1991	$425,397	$198,102	$227,295	$292,854
Total	N/A	$473,813	N/A	$341,269

Source: The Department of Environmental Quality.

an agreement for voluntary cleanup. Other cases would be situations where a closed site was identified as an [environmental] problem and the owner either refused to clean it up or could not be found. In theory, if we could not get compliance in the these cases, they were referred to enforcement. As a matter of practice, the staff who worked in the cleanup program spent all of their time on cases of voluntary cleanup. There were enough cases involving people who wanted to clean up their property to keep us busy. The Department did not pursue cleanup of landfills — especially municipal landfills in which the owner did not volunteer to clean up the site. The Department had more success with private companies than municipalities and for that reason, private companies like [Name of Company] would receive more attention than municipalities.

State Cleanup Program Amended. In 1991, the General Assembly enacted legislation which replaced the Solid and Hazardous Waste Contingency Fund with the Virginia Environmental Emergency Response Fund (VEER). The purpose of VEER was to provide the State with a vehicle for responding to environmental emergencies not covered by Superfund. In creating this fund, the General Assembly provided the agency director with the discretion to authorize emergency cleanup payments from the fund for amounts not to exceed $100,000 per cleanup. Since this legislation was passed, DEQ has developed a policy which lists the following situations under which the director may authorize use of the fund:

- When there is a necessity for an immediate response to a pollution incident, and the responsible party will not or cannot respond appropriately;

- When it is necessary to spend resources from the fund to investigate the nature and extent of pollution; or

- When the expenditure is necessary to develop and implement a corrective action for a pollution incident.

In the three years since VEER replaced the Solid and Hazardous Waste Contingency Fund, little has changed in Virginia's cleanup program. The VEER does not currently have sufficient funds to support the cleanup of abandoned solid waste sites. Although the enabling legislation of this fund was altered to focus more on environmental emergencies, the General Assembly did not appreciably change the method of funding the program. In FY 1993, $132,543 was credited to the fund as a carryover from the Solid and Hazardous Waste Contingency Program (Table 18). In the following years, another $334,032 was collected in civil penalties and interest. When this amount is added to the funds carried over from the Solid and Hazardous Waste Contingency Fund, the total amount of money available through the VEER for environmental emergencies reached a high of $466,575. This amount decreased to $398,710 when funds were used to pay for a small cleanup in that same year.

The inadequacy of this program as a source of funds to remediate problems at abandoned sites was demonstrated by the Kim-Stan case. In 1972, the Department of Health granted a permit for a sanitary landfill to owners of a company called Kim-Stan. At the time this permit was granted, there were no requirements for landfills to install liners, leachate collection systems, or groundwater monitoring systems. In 1989, it was determined that the source of a fish kill in a pond adjacent to the landfill was toxic leachate flowing from the refuse buried in the Kim-Stan landfill.

Table 18

Revenues and Expenditures for the Virginia Environmental Emergency Response Program

Source of Funds	Total Revenue
Carryover from solid waste contingency fund	$132,543
Fines, civil penalties and interest	$334,032
Funds available	$466,575
Expenditures	($67,865)
Total Funds	$398,710

Notes: Included in the available fund balance is $1,258 held in trust for closure of the Kim-Stan Landfill.

Source: The Department of Environmental Quality.

After several years of litigation, the Department of Waste Management revoked the operating permit for the company which forced it into involuntary bankruptcy. In June of 1993, the State was able to recover $174,679 from Kim-Stan in bankruptcy court. However, based on a recent assessment of the contaminated site, the cost of cleanup is projected to be around $9 million. At the time of this assessment, VEER had a balance of only $395,322. This was $58,000 less than the $453,000 that the General Assembly appropriated from 1990 to 1994 simply to stabilize the site and prepare it for proper closure.

At the time of this study, problems at the site had not been remediated and the landfill was not officially closed. Presently, DEQ staff inspect the site on a monthly basis. According to a DEQ report, the facility is generating 24,000 gallons of leachate per day which is visible in the surface ponds around the site. The samples of water examined from the site reveal higher than recommended concentrations of arsenic, barium, and lead.

The Policy Issue of a State Cleanup Program. The problems which surround the Kim-Stan landfill raise a number of questions about the possibility of future contamination from other sites, the implications this could have for the State's emergency cleanup program, and how any expansion of the State's program should be funded. With the goal of determining the potential magnitude of the cleanup problem faced by the State, the General Assembly directed DEQ to conduct a survey of abandoned waste sites in 1993. This study found that there were more than 2,000 sites across the State with improperly disposed waste or where proper remediation of the site had not been conducted.

However, in identifying these sites, DEQ did not distinguish between those sites which were once legitimate solid waste facilities and those that were small illegal trash dumps. In addition, no information was readily available on whether the sites had been abandoned. As a result of these limitations, DEQ requested $300,000 but only received $125,000 from the General Assembly to conduct a more detailed site assessment. This report is due to the General Assembly in 1994.

A key policy issue that the State will have to address in the coming years is whether the Commonwealth should develop a program that is sufficiently funded to cover the costs of remediation of abandoned, contaminated sites. In light of the inadequacies of the State's current emergency program, Virginia has no reliable method to pay the cleanup costs for abandoned sites. Based on results from a DEQ survey, there are at least 12 other states which have not addressed this problem.

The dilemma faced by Virginia is deciding what type of funding mechanism should be employed to generate the revenue that will be required to pay for the cleanup costs. Clearly the most equitable approach would be to require those who caused the contamination to either pay to have the site remediated or clean up the site themselves. The problem is that in many cases, the person or company who polluted the site may be difficult to locate or financially unable to support a cleanup.

Revenue options used by states that are addressing this issue have included a tax on the solid waste industry, a broad based tax, or a bond issue. In 1993, 15 states taxed the solid waste industry through levies applied to tipping fees, waste import taxes, or levies on specific types of waste. Another nine states appropriated resources for cleanup out of the general fund. At least 10 other states used bonds to fund local grants for cleanups in the localities where the sites existed. Discussing the advantages and disadvantages of these approaches is beyond the scope of this study. However, in light of the possibility that a number of abandoned, contaminated sites are present in the State, the General Assembly may wish to consider evaluating several approaches designed to generate revenue for a fund that could be used to defray the cleanup costs associated with abandoned and contaminated sites.

VIRGINIA'S LANDFILL CLOSURE PROGRAM

Currently among solid waste facilities, inactive or abandoned landfills represent the most significant threat to the environment. If landfills are not properly closed and monitored after the last ton of waste has been buried, problems can develop that provide an avenue for toxic leachate to flow from the site and threaten groundwater, streams, and ultimately rivers.

In order to minimize the possibility of long-term contamination from these facilities, State regulations require DEQ to implement a program of regular monitoring and inspection of closed sites. However, almost half of the landfills that have stopped receiving waste have never been inspected by DEQ. Additionally, the majority of inactive landfills which are now required to close under tougher State and federal regulations have not been forced to do so. Finally, despite the fact that all of these sites are out-of-compliance with federal and State regulations, enforcement staff within DEQ are presently evaluating only a small number of these cases.

Old Landfills Are Potential Cleanup Problems

A key focus of any effort to identify the magnitude of solid waste sites that have the potential to threaten the environment should include a detailed assessment of the inactive landfills across the State. Currently, there are 284 landfills in Virginia that are no longer accepting solid waste. In 1988, part of the comprehensive reform implemented for solid waste management was the promulgation of a more stringent set of closure requirements for inactive landfills. These requirements recognize that the potential environmental damage associated with these facilities do not end when the operators stop receiving waste. As noted in Chapter III of this study, if a landfill stops receiving waste after 1988, the owners of the facility are required to formally close the site and implement a set of post-closure activities. The two major sets of requirements for a proper closure include the following:

1. A final cover system that includes a non-permeable cap that contains 18 inches of earthen material to prevent rain from seeping through to the buried refuse, and an additional six inches of earthen material to support the growth of vegetation as a safeguard against erosion.

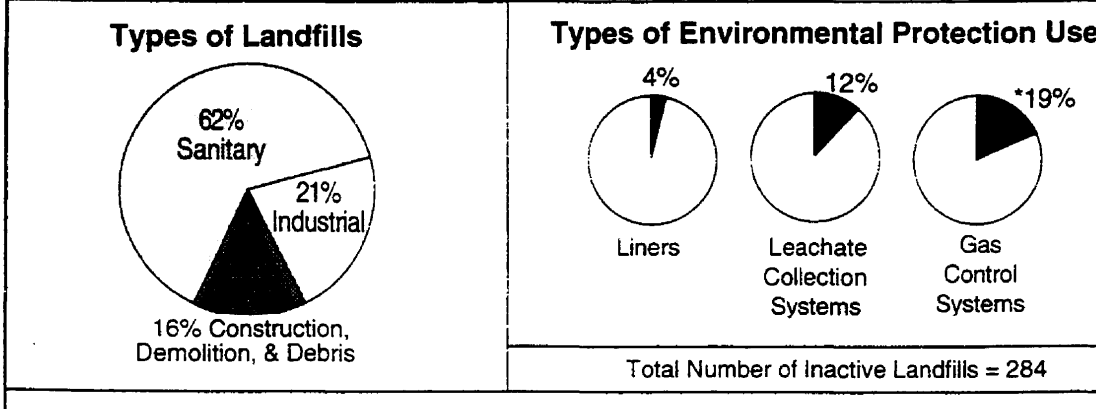
2. A post-closure program which is designed to maintain the integrity and effectiveness of the final cover through repairs which address any erosion or settlement problems, the operation of a leachate collection system, implementation of a groundwater monitoring program, and the operation of a gas monitoring and control system.

However, these regulations do not apply to landfills that officially closed prior to 1988. According to the State regulations in effect at the time, landfill owners could officially close the facilities by meeting a "final cover and grade" standard. Simply put, the regulations required the operator to cover the operating face of the landfill and grade it so that surface water did not accumulate on the site. Because these regulations are silent on questions of leachate control, gas management, and the permeability of the "landfill cap", legitimate questions have now surfaced about the long-term safety of the sites which closed under these regulations.

As Figure 24 reveals, 62 percent of all the inactive landfills in the State are sanitary landfills. Another 21 percent are industrial sites and 16 percent are construction, demolition, and debris facilities. More important, at least 50 percent of the landfills in each of these categories are subject to the less stringent closure requirements that were in effect from 1971 to 1988. For most of these landfills, the possibilities for environmental pollution problems are heightened because these facilities were not constructed in accordance with current regulatory requirements.

Figure 24

Environmental Safeguards Used in Landfills that No Longer Receive Waste



*Calculated for sanitary landfills.

Source: JLARC staff analysis of data collected from the Department of Environmental Quality.

As one county administrator pointed out, many of the old facilities are "no more than holes in the ground." Indeed, only four percent of all inactive landfills have liners. Only 12 percent have installed leachate collection systems needed to control the potentially dangerous "garbage juice" that is created when rain saturates the buried refuse. Furthermore, less than 20 percent of the sanitary landfills in the State have gas control systems in place to properly manage the methane gas that is generated by decomposing trash.

DEQ's Enforcement of Closure Regulations Is Poor

With so many inactive landfills in Virginia and landfills which have closed under the old requirements, it is crucial that the State oversight agency develop and implement a regular program of inspection of inactive and closed sites. There are two main reasons such a program is needed. First, inspections allow DEQ staff to determine if the owners of inactive landfills have properly implemented a plan to officially close the site. Staff can evaluate whether the landfill has been properly capped and whether access to the site is restricted.

Second, these inspections can be used to identify problems that may have developed at closed sites since their closure. Even when sites are closed according to the regulations, problems can develop if the owner does not have an adequate post-closure program. For example, once a site is graded, a vegetation cover needs to be established to prevent erosion of the cap. At the same time, steps must be taken to prevent the growth of plants and trees on top of the cap because the root system for large plants can break open the cover and expose the buried waste to rain. This could create problems with leachate.

DEQ recognizes the importance of inspecting inactive sites, and it is agency policy that compliance staff visit these sites quarterly. Once they have been properly closed, inspections are supposed to be conducted twice annually. If a site has recently stopped receiving waste, the inspector's job is to see that the owner closes the site according to the specific regulations governing landfill closure. If the site is already closed but the compliance staff find problems that the owner refuses to address (for example, eroded caps, leachate leaving the site, or no groundwater monitoring), the case is supposed to be referred to the Enforcement Unit where legal action can be pursued to resolve the problem.

The objective in this part of the study was to assess whether inactive sites are given proper oversight by DEQ as a means of reducing long-term site contamination problems. To accomplish this, JLARC staff analyzed data from an inventory of inactive sites that was conducted by DEQ as a part of this study, reviewed inspection and enforcement data on a sample of these sites, and interviewed compliance and enforcement staff. The key questions that were addressed are as follows:

- Has DEQ effectively implemented State policies which require that inactive landfills be officially closed and capped?

- How much time is allowed to elapse between when a landfill stops receiving waste and when DEQ requires that the relevant closure requirements be implemented?

- What are the agency's actual inspection practices for closed sites in terms of the frequency with which they are conducted?

- Does the Enforcement Unit take action against inactive landfills that are out-of-compliance with closure regulations?

Implementing Closure Requirements. Although the regulations require all inactive facilities to be closed within six months after the last load of waste is received, four out of every 10 inactive sites in the Commonwealth have not met this requirement. The figures of non-compliance are highest for those landfills that faced more stringent closure requirements (Table 19). For example, only eight percent of the landfills which stopped receiving waste prior to 1988 failed to meet the minimum standards of placing the required cover over the portion of the site in which waste is buried. The next highest non-compliance rate — 27 percent — was observed for facilities that closed under what DEQ staff refers to as an interim set of regulations. In addition to detailed requirements for final cover, these sites had to install groundwater monitoring, leachate collection, and gas control systems. Moreover, the owners of these sites had to submit a closure plan and have a certified engineer verify that the plan was properly implemented.

Table 19

Proportion of Landfills Closed in Virginia Since 1971 According to Three Different Sets of Closure Regulations

Closure Standards for Inactive Landfills	Proportion of Landfills That Have Not Met Closure Requirements
Final cover standards in effect for sites from 1971 to 12-20-1988 (n=140)	8 Percent
Interim standards in effect from 12-21-88 to 3-14-93 (n=15)	27 Percent
Final closure standards in effect since 3-15-93 (n=84)	89 Percent
All inactive landfills that have not officially closed (n=244)	39 Percent

Notes: There are a total of 284 inactive landfills in the Virginia. The figures reported in this table do not include 40 landfills for which DEQ inspectors could not determine whether they had been closed according to the regulations.

Source: JLARC staff analysis of data collected by the Department of Environmental Quality on the universe of closed or inactive sites.

The highest non-compliance rate (89 percent) was found for those sites that were subject to the closure requirements that took effect after March of 1993. In terms of how the sites are to be closed — final cover system, groundwater monitoring, or gas control — the requirements for these facilities are similar to those prescribed by the interim standards. The difference is that no closure plan is required for this group, and the final inspection by a certified engineer was eliminated.

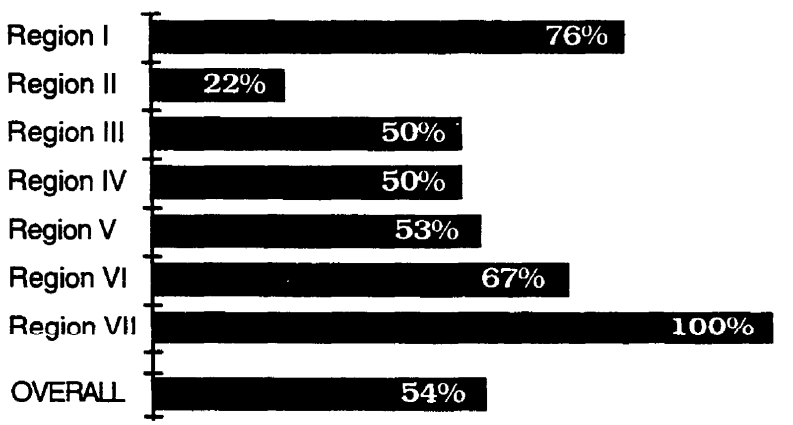
Even with sites that were officially closed, it does not appear that this was accomplished in a timely fashion. Using information from the 42 landfills for which information on closure dates was available, JLARC staff found that the average length of time it took to close the facility was approximately 1.4 years. For sites that closed after 1988, this is substantially longer than the six months allowed for closure in the regulations.

According to DEQ, a combination of an insufficient number of staff and other priorities has limited the time that inspectors have been able to spend on inactive sites. The inspectors indicated that while increased attention will be given to this problem in the future, without additional staff, the process of eliminating the backlog of cases in this area will be slow.

Inspection of Inactive Sites. The findings on the frequency with which DEQ inspects inactive sites reflect the inability of the regional offices to give much attention to this issue. Specifically, only 54 percent of these sites have been inspected since receiving their last load of solid waste (Figure 25). For those sites that are inspected, the average length of time that elapsed between compliance visits was 3.9 years. The regional differences in these indicators are considerable. For example, one inspector in Region Seven visited all nine of the inactive sites in his area. The average amount of time

Figure 25

Regional Variations in DEQ's Inspection Rate for Inactive Landfills



Source: JLARC staff analysis of inspection reports from the Department of Environmental Quality.

between these inspections was 1.7 years. By comparison, in Region II, which has one inspector to cover 34 inactive sites, only 24 percent of the facilities have been inspected. The average length of time between inspection visits was over five years.

Role Of Enforcement Unit for Inactive Sites. As noted earlier, when solid waste sites are out of compliance with State regulations and are referred to enforcement, it is the responsibility of DEQ's enforcement staff to implement the necessary steps to bring these sites back into compliance. In the case of inactive sites, DEQ's oversight program requires that all facilities that are not meeting the regulatory requirements for closure be referred to enforcement. Also, under some circumstances, enforcement staff do not rely on referrals and conduct compliance audits on their own.

To determine if enforcement staff have taken an active role in the area of landfill closures, JLARC staff examined the enforcement database to identify the number of non-compliant inactive sites that were under review by staff. A site was considered to be out of compliance if the owner had not officially closed the facility in accordance with the current regulations. Additionally, based on information from a recently conducted inventory by DEQ, any sites that had problems such as standing water, leachate, improperly graded slopes, exposed waste, erosion, or off-site gas leaks were also considered to be out of compliance.

Two patterns emerged from this analysis. First, more than 50 percent of all inactive sites are not in compliance with some aspect of the State's 1988 regulations governing the closure and maintenance of inactive sites. Second, only a small proportion of these sites (less than three out of every ten) were being reviewed by enforcement staff at the time of this study. Clearly, if the closure requirements for landfills are to achieve their intended purpose of minimizing the environmental impact of inactive sites, both the inspection and enforcement activities of DEQ have to be strengthened and better coordinated.

Recommendation (9). **Managers for the enforcement and compliance units within the Department of Environmental Quality should develop a plan to identify all inactive landfills which are out of compliance with State closure regulations so that these sites can be officially closed and routinely monitored. A part of this plan should address the feasibility of using some enforcement specialists to reduce the backlog of landfills that inspectors must visit to adequately evaluate the closure activities for the relevant sites.**

VI. Solid Waste Disposal Capacity in Virginia

The last issue raised in HJR 529 concerns the State's capacity for the disposal of solid waste. The federal and State regulations governing the management and operation of SWMFs are believed to have had a significant impact on the solid waste industry in Virginia. It is suggested that the cost of the new regulations has forced the closure of many public landfills and given rise to the development of large private regional facilities that receive much of their waste stream from outside of the Commonwealth.

Indeed, the growth in private landfills has raised some geographical and racial equity issues in Virginia. Specifically, by 1995 these facilities will account for almost one-half of all the solid waste that is disposed of in Virginia. Given the location of these private sites, it appears that a disproportionate number of minorities in one region of the State will be living in close proximity to this waste. In light of this, local governments and private waste companies need to make a special effort to prospectively involve the residents of these counties in any future siting decisions as recommended in Chapter II of this report.

Another issue raised by the recent trend in importation of out-of-state waste is whether a disproportionate amount of landfill capacity in Virginia is now used primarily for out-of-state waste, thereby limiting the capacity which is available to accommodate the waste disposal needs of the Commonwealth. The results from this analysis do not support this view. Although the number of private regional landfills in the State has increased, government-operated landfills remain the most common method of waste disposal in Virginia, and they account for the vast majority of the State's landfill capacity, if remaining capacity is measured in terms of the number of years that a facility can continue to receive waste. This measure of capacity was selected for the analysis because it best reflects how long existing landfills can continue to meet their current demand for waste disposal.

Based primarily on these findings, there is no compelling reason to support State regulation of the construction of new private landfills. Without an imminent shortage of landfill space, the strong market competition between private regional landfills should limit the growth of these facilities across the State. Moreover, even if there were a need to regulate these facilities, absent a change in federal law, an attempt at such regulation might be found to be unconstitutional under current law.

This chapter presents the results of the JLARC staff analysis of the magnitude of solid waste that is disposed in landfills in the Commonwealth and the amount of capacity that is available to receive this waste.

METHODS AND COST OF WASTE DISPOSAL IN VIRGINIA

Until recently, most Virginia localities operated their own landfills to dispose of their solid waste. However, the establishment of five private regional landfills in Virginia over the last few years, combined with the more stringent regulations governing solid waste management, has caused a number of Virginia localities to seek alternative arrangements for the management and disposal of their refuse. Those localities that have hosted private regional landfills are able to dispose of their trash free of charge at these facilities. Also, other localities in the State are choosing to ship their trash to these private landfills instead of operating their own landfill.

Despite this recent trend, the most common means of disposal for Virginia localities remains disposal through sanitary landfills owned and operated by the localities themselves. Some localities have also joined regional public service authorities or other public regional bodies and dispose of their waste in landfills operated by these regional organizations.

With the substantial costs associated with solid waste management, the method of disposal used by a locality has significant financial implications for the locality. From a financial standpoint, hosting a regional landfill clearly is the optimal approach. In addition to handling disposal of the locality's trash free of charge, the solid waste companies that establish regional landfills generally compensate the locality through host fees or rent. This study found that localities using this approach incur less than ten percent of the disposal costs of other localities that operate their own landfills. Moreover, these localities receive twice the amount of revenue from solid waste disposal.

Localities Are Using Alternative Arrangements for Waste Disposal

In order to determine how localities are managing their solid waste needs with the new regulations, JLARC staff conducted a mail survey of cities and counties in Virginia. The survey results indicated that local governments are using a number of approaches for waste disposal. They include hosting private regional landfills, transporting waste to private facilities, operating public landfills, and participating in regional authorities.

Private Regional Landfills. Over the last six years, several of the large national waste disposal companies have established private regional landfills in Virginia localities. Five private regional landfills are already in operation in Virginia localities, one expects to begin accepting waste within the next few months, and two are currently in the permitting process. Typically, localities that host these private regional landfills are able to negotiate an agreement for the disposal of their trash free of charge. The companies that operate these large landfills solicit waste disposal contracts from other localities as well as from business and industry. Some of the agreements negotiated between solid waste companies and the host localities restrict the geographical area from

which the waste can be brought. Other contracts do not appear to have such restrictions and allow the landfills to receive waste from a much wider geographical radius.

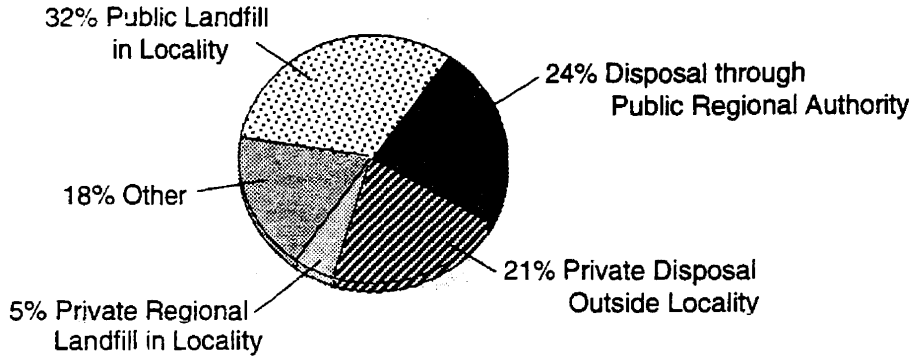
Shipment to Private Landfills. With the establishment of these regional landfills in Virginia and North Carolina, many localities have decided to close their public landfills and contract with one of the regional landfills for disposal of their waste. The JLARC staff survey of local governments revealed that 21 percent of responding Virginia localities currently ship their waste to private regional landfills located either in Virginia or North Carolina (Figure 26). Most of the localities that dispose of their waste through this method have constructed a transfer station in their locality. The waste generated in the locality is collected directly from the households or from drop-off centers and taken to the transfer station. The waste is then transported by truck or rail from the transfer station to the regional landfill.

Continued Use of Public Landfills. Despite these recent trends, the most common method of waste disposal used by Virginia localities remains disposal through government-owned landfills. Thirty-two percent of the localities responding to the JLARC staff survey still have their own sanitary landfills (Figure 26). Some localities are taking advantage of the provision in the *Code of Virginia,* enacted by the General Assembly in response to concerns raised by local governments, which allows them to continue to expand vertically without having to upgrade their landfill to comply with the new regulatory requirements. Other localities are adding new cells to existing landfills. Still other localities are building entirely new landfills.

Publicly Operated Regional Authorities. Another method of waste disposal used by a large number of Virginia localities is disposal through membership in a public service authority or other public regional body. Twenty-four percent of the Virginia localities that responded to the survey handle their waste disposal through some form of

Figure 26

Methods of Solid Waste Disposal Used by Virginia Localities



Source: Analysis of data from JLARC survey of all Virginia cities and counties. Survey response rate was 68 percent.

regional authority. Typically, a separate entity is established to operate a landfill which is supported by each of the localities that is a member of the authority. The size and membership of these regional authorities varies widely across the State. The largest authority in Virginia is the Southeast Public Service Authority (SPSA) which handles waste disposal for eight localities in southeastern Virginia. Other regional authorities around the State have as few as two member localities.

Other Methods of Disposal. Eighteen percent of the localities use methods of disposal that cannot be placed in any of the four categories discussed above. For example, Arlington County and the city of Alexandria operate a waste-to-energy facility through a joint venture. Several localities ship their waste to public landfills in other localities. The city of Virginia Beach and Henrico County use a combination of disposal methods. Virginia Beach disposes of its waste both through its own landfill and through participation in a regional public service authority. Henrico County operates its own landfill and also hosts a private regional landfill. Finally, Albemarle County does not assume any responsibility for disposal of the waste generated by its citizens but, instead, requires its residents to contract directly with a regional authority.

Although there has been considerable change over the last six years in the methods of disposal used by localities with the new regulations and the influx of private regional landfills, most localities appear to have now selected the method of waste disposal that they intend to use for the foreseeable future. A majority of the local governments surveyed indicated that they do not have any plans to change the method by which they currently dispose of their waste.

Localities Hosting Regional Landfills Have Benefited Financially

The JLARC survey of localities also asked respondents to provide information on their waste disposal costs and revenue received from solid waste disposal. Based on the survey responses, the financial benefits to localities that host regional landfills are substantial. In contrast, localities that use non-private methods for waste disposal experience substantially higher costs.

Benefits for Localities with Private Regional Landfills. Hosting a private regional landfill offers two primary types of financial benefits for a locality. First, localities that have recently hosted these large private landfills typically negotiate a contract where the solid waste company agrees to compensate the locality in exchange for the locality agreeing to allow the facility to operate within its jurisdiction. As Table 20 indicates, the average amount of money projected to be received by Virginia localities that will have private regional facilities in operation in FY 1995 is approximately $1.5 million, or almost 14 percent of total local revenue. The average amount received in FY 1994 was $2.3 million, or almost 23 percent of total local revenue.

The revenue paid to localities is typically in the form of either a host fee, rent, or both. A host fee arrangement usually involves the payment of a specific amount of

Table 20

Average Cost and Revenue Related to Solid Waste Disposal for Localities That Have Hosted Regional Landfills Since 1988

Fiscal Year	Average Cost of Disposal	Average Revenue Generated from Waste Disposal	Average Total Local Revenue
1993-1994	$100,408	$2,379,584	$10,324,316
1994-1995	$65,416	$1,533,832	$11,232,856

Note: JLARC surveyed all cities and counties in Virginia. Sixty-eight percent of the localities responded to the survey. Revenue for Gloucester County only includes rent that has been paid to the county by Waste Management and does not include revenue that the county expects to receive in fiscal year 1994-1995 from tipping fees when the Waste Management landfill opens at the end of this year or early next year.

Source: Data on local waste disposal costs and revenue generated from solid waste were obtained from a JLARC survey of local governments in Virginia. The total local revenue data was obtained from the *Comparative Report of Local Government Revenues and Expenditures.*

money per ton of waste that is disposed of at the landfill. Thus, the amount of revenue received by a locality is directly linked to the amount of waste that comes into the facility during the year. With a rental agreement, the solid waste company agrees to pay the locality a certain amount in rent each year regardless of how much waste is disposed of at the facility. At least one agreement between a private solid waste company and a Virginia locality calls for compensation from the company through a combination of host fees and rent.

The other major financial benefit for localities that agree to host these private facilities is free waste disposal. In exchange for allowing the landfill to operate in its locality, these companies accept the waste of local residents free of charge. Residents are usually required to deliver the waste to drop-off stations at the landfill or "green boxes" which are located across the county. As a result, the local government is able to avoid most of the costs associated with operating a landfill or other type of SWMF.

As Table 21 demonstrates, these localities have relatively low solid waste disposal costs. Not surprisingly, for most of these counties, the decision to host a regional landfill is primarily based on economics. As Table 21 shows, counties which operate their own facility generate substantially less revenue than their counterparts. One county administrator pointed out that the Board of Supervisors in his county viewed the regional landfill as a magnet for industry that they believed would spur economic development in the area.

Localities that have received revenue from hosting regional landfills have used the funds for a variety of local purposes. One locality, which has received approximately five million dollars, used the money to raise teachers' salaries and to build a local government complex. This locality hopes to use projected future revenue to build

Table 21

Cost and Revenue Associated with Waste Disposal for Localities by Method of Disposal Projected for Fiscal Year 1994-95

Method by Which Locality Handles Waste Disposal	Average Cost Incurred by Localities for Waste Disposal	Average Revenue Received by Localities from Waste Disposal	Average Total Local Revenue of Localities
Private regional landfill in locality	$65,416	$1,533,832	$11,232,856
Public landfill in locality	$618,247	$801,057	$36,223,449
Contract for private disposal outside locality	$723,974	$54,822	$31,642,164
Member of public regional authority	$1,007,285	$136,206	$50,707,715

Note: JLARC survey of local governments. The figures in the table for local governments with public landfills represent annual operating costs and do not reflect all of the costs that must be incurred by localities that operate their own landfills like pre-development costs, initial construction costs, closure and post-closure costs, and indirect costs. A joint subcommittee of the General Assembly prepared a report entitled "Identifying Costs of Solid Waste Management Services" for the 1994 General Assembly session which outlines all of the costs, both direct and indirect, that a locality operating its own landfill is likely to incur.

Source: JLARC survey of local governments in Virginia and the *Comparative Report of Local Government Revenues and Expenditures*.

infrastructure for an industrial park so that the county can attract business and industry to the area.

Two localities have used the revenue received from hosting regional landfills to fund school construction. Another local government projects that it will receive 6.5 million dollars annually in host fees which it plans to use to develop a regional water and sewer infrastructure for the county. In addition, the locality intends to use the money to fund capital school projects. It should be noted that future revenue for localities from these facilities is not guaranteed. In recent years, the market for waste disposal contracts has become highly competitive, and there are indications that some solid waste companies operating regional landfills in Virginia are having some difficulty bringing in as much waste as they had projected they would.

Cost of Other Methods of Waste Disposal. For localities that are not hosting a private regional landfill, solid waste disposal costs are substantial. As Table 21 demonstrates, the average annual operating cost of disposal for localities which have their own landfills is projected to be $618,247 in FY 1995. In addition to the annual

operating costs, localities with their own landfills also incur substantial capital costs. Based on the survey of local governments in Virginia, these localities have incurred total capital costs of $1.85 million on average for the six year period 1988-1994. Localities that contract with private companies for disposal out of their jurisdiction project that they will incur $723,974 on average in waste disposal costs in 1994-1995. Finally, localities that are members of regional authorities project that they will pay $1,007,285 on average for solid waste disposal in FY 1995.

In addition to incurring more costs, localities that do not host regional landfills generate far less revenue from solid waste disposal. Localities that have their own landfills project that on average that they will generate $801,057, primarily from tipping fees, during FY 1995. This amount is substantially less than the average amount of revenue projected to be received by localities that are hosting regional landfills. Localities that are members of public regional authorities will also generate substantially less revenue. These localities project that they will receive on average $136,206 in revenue in the current fiscal year. Localities that are shipping their waste to private landfills project that they will generate even less money from solid waste disposal.

While the growth in private regional landfills in Virginia has obviously benefited a number of small counties that are experiencing a high degree of fiscal stress, this trend raises several important policy issues for the Commonwealth. For example, does the State now have too much solid waste capacity? Or, should the State be concerned about the impact of increasing amounts of out-of-state solid waste on the available landfill capacity? In other words, will Virginia need additional landfill space to accommodate the waste disposal needs of its residents because of the landfill space being used to receive refuse from outside of the State? And finally, if these are valid concerns, should the State consider regulating the construction of future landfills? These issues are discussed in the next section of this chapter.

LANDFILL CAPACITY IN VIRGINIA

In 1994, operators of sanitary landfills will dispose of more than eight million tons of waste in Virginia. Approximately 13 percent of this waste will be imported into the Commonwealth by large private regional landfills. These regional facilities, which are located in Central Virginia, account for almost 45 percent of all the solid waste that is disposed in the State and are typically located in neighborhoods that are disproportionately minority.

With the growth in both the number of regional landfills and the amount of out-of-state waste received by these facilities, questions have been raised concerning the need for State regulation of this industry, possibly through restrictions on the construction of future facilities. The findings from this study do not support such restrictions. Even with the growth in these regional facilities, local governments still control more than 90 percent of all available landfill capacity for sanitary waste, and in most cases, this capacity appears equally dispersed across the State.

Also, it is not presently clear whether Virginia possesses the legal authority to regulate the construction of private regional landfills or otherwise restrict the flow of out-of-state waste into Virginia. Several recent United States Supreme Court decisions have held that restrictions on the flow of out-of-state waste imposed by states violate the Commerce Clause and are thus unconstitutional. During this session of Congress, the Senate failed to pass legislation enacted by the House which would have given state governments authority to control the flow of out-of-state waste.

Imported Waste a Key Factor in Growth of Solid Waste in Virginia

One focus of the mandate for this study is on the growth in solid waste disposal activities in the Commonwealth and the impact of these "new solid waste facilities" on the amount of waste disposed in the State. As a result, the objective of this portion of the analysis was to evaluate the projected trend in solid waste disposal for Virginia including the impact of imported waste.

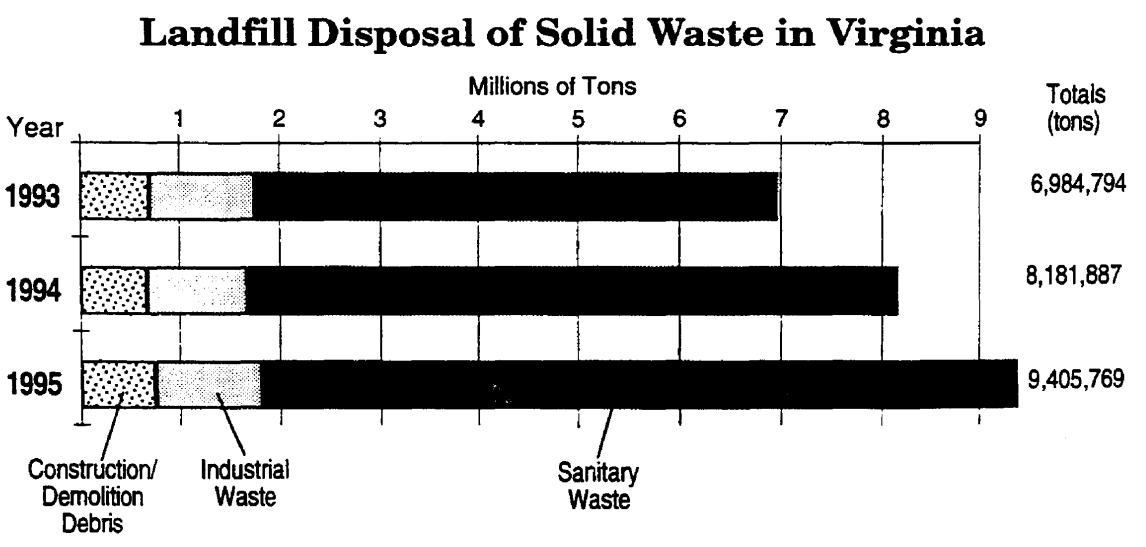
To examine issues related to the amount of waste disposed in the State, JLARC staff conducted a survey of all landfills that had been granted an operating permit as of May 1994. Among other questions, the survey respondents were asked to indicate how much waste was disposed in their landfills in 1993 as well as provide projections for 1994 and 1995. The overall response rate for the survey was 90 percent, including responses from 100 percent of the private sanitary landfill operators in the State. It is important to note that only landfill operators were included in this survey. This means that any waste which is burned in incinerators or recycled through any of the numerous local recycling programs throughout the State was not reflected in the survey data.

Solid Waste Projections for Virginia. Figure 27 illustrates the trend for solid waste disposal in the Commonwealth. As shown, by 1995, there will be a 35 percent increase in the average amount of solid waste disposed annually in Virginia. In 1993, a total of 86 facilities received and disposed of about 7.0 million tons of solid waste. By 1994, this figure had increased to almost 8.2 million tons, and is projected to reach more than 9.4 million tons of waste by 1995. On an annual basis, this projected increase is approximately 16 percent.

Not surprisingly, the majority of this refuse is buried in sanitary landfills. In 1993, the data show that almost 8 out of every 10 tons of solid waste that was buried in the State was disposed of in sanitary landfills. Proportionately, these figures do not change for 1994 and 1995. This indicates that most of the expected increase in solid waste disposal will be from household and commercial sanitary waste.

Impact of Imported Waste. In recent years, a considerable amount of attention has been focused on the amount of imported waste that comes into Virginia. Proponents of waste importation suggest that to the extent that this occurs in the Commonwealth, it is not unique. They point to recent studies which indicate that states are becoming increasingly interdependent in managing their solid waste. In 1992, the National Solid Waste Management Association conducted a study on the interstate

Figure 27



Source: JLARC survey of landfills in Virginia. The universe of landfills (121 facilities) was surveyed, with a response rate of 90 percent.

movement of solid waste and concluded that more than 19 million tons of solid waste was shipped across state borders.

This study found that Virginia, which exports all of its hazardous waste for disposal to other states, receives non-hazardous solid waste from Maryland, the District of Columbia, New Jersey, New York, and Pennsylvania. The results from the JLARC survey of landfill operators indicate that in 1993, imported waste accounted for 14 percent of the total amount of solid waste disposed in the Commonwealth. By 1995, this figure is projected to grow to 18 percent — an almost 30 percent increase (Figure 28).

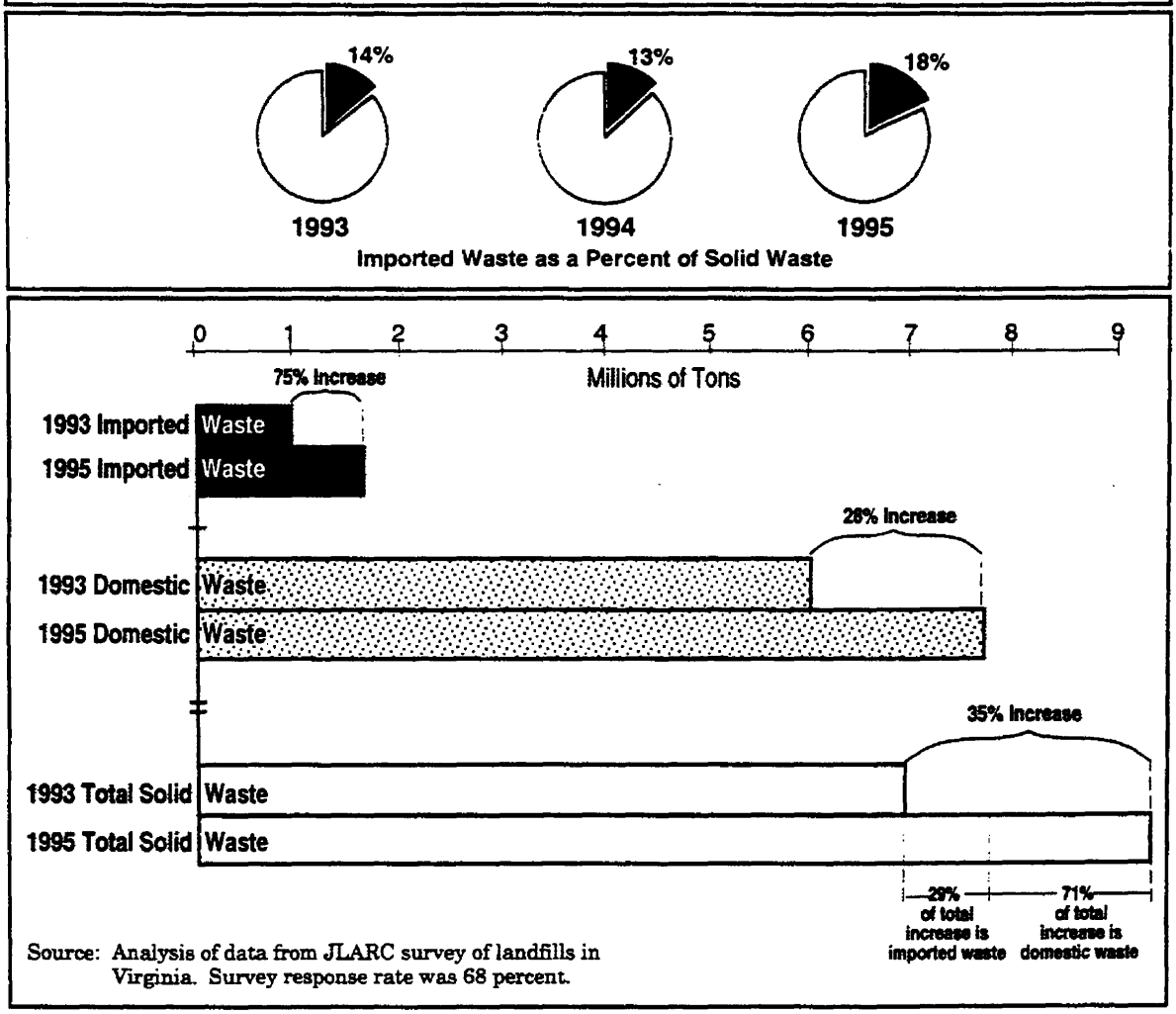
The growth rate for imported waste relative to solid waste as a whole helps put this figure into perspective. As shown in Figure 28, the projected three year growth rate for imported waste of 75 percent is twice the rate expected for total solid waste. As a result, waste imports will account for almost 30 percent of the increase in the growth of solid waste in Virginia by 1995. Thus, out-of-state waste imports are a key factor in the increase in the amount of solid waste that will be disposed of in the Commonwealth.

Most Solid Waste Is Disposed in Central Virginia

Critics of the waste management companies that import waste into Virginia contend that there are potential environmental equity considerations that should not be ignored. Because most of these companies operate landfills of several hundred acres and rely on regular deliveries from large garbage trucks, community action groups contend that the social costs imposed on the surrounding communities can be significant. In addition, HJR 529 expresses the concern of many environmentalists that the increase in

Figure 28

Virginia's Solid Waste Imports, 1993-1995



Source: Analysis of data from JLARC survey of landfills in Virginia. Survey response rate was 68 percent.

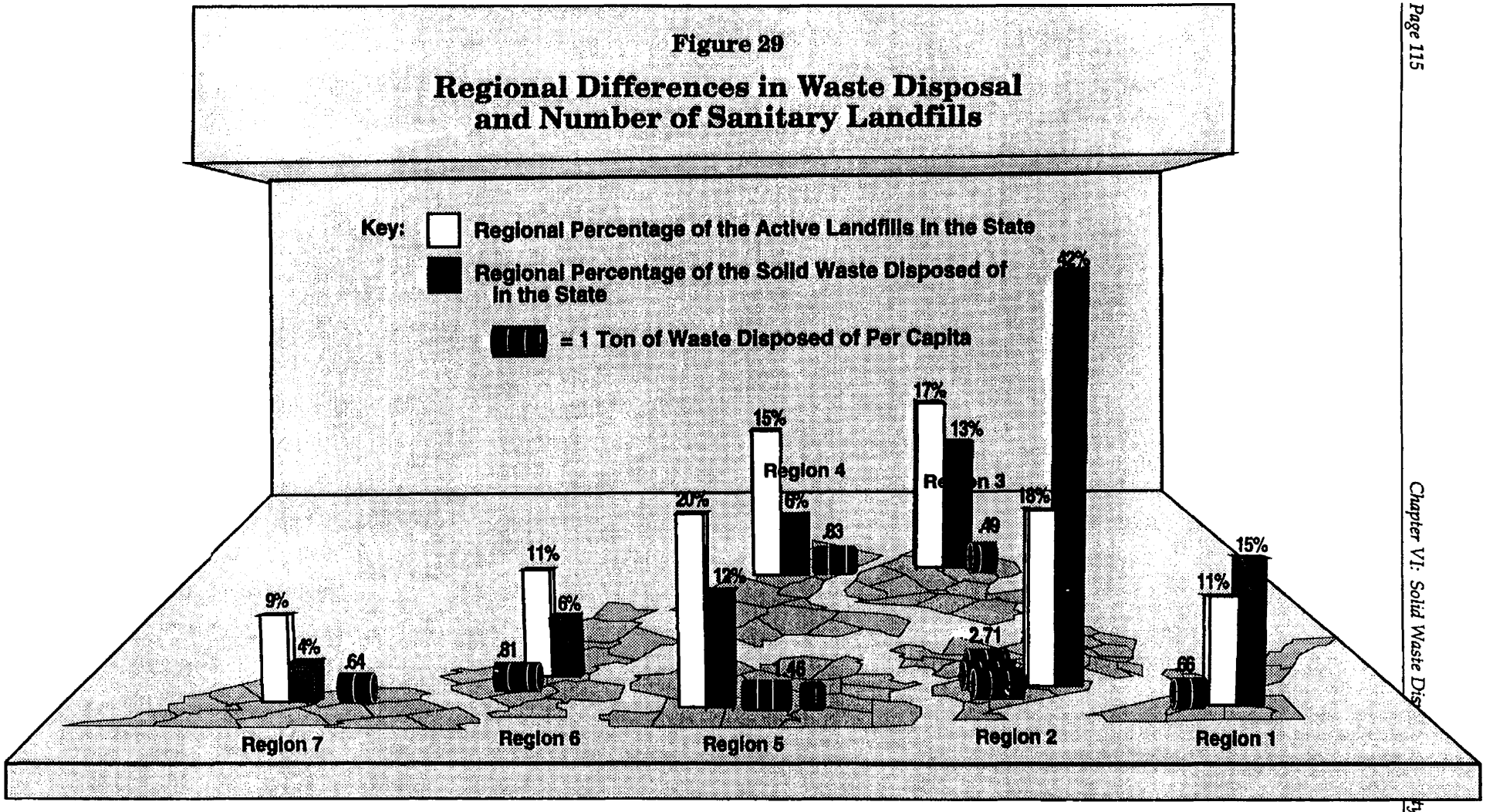
"major new solid waste sites" can create potential equity problems associated with waste disposal.

To examine this issue, JLARC staff analyzed the distribution of active landfills in the State as well as regional differences in the amount of waste that is disposed within Virginia. In addition, the problem of racial inequities, first discussed in Chapter II, was briefly reexamined with the focus on the private sites that import solid waste.

Geographical Differences In Waste Disposal. There are sharp geographical differences in the amount of waste that is disposed in the various regions across the State. As Figure 29 shows, although only 18 percent of all sanitary landfills are located in Region Two — Central Virginia — 42 percent of the refuse buried in the Commonwealth is disposed in this area. This amounts to 2.7 tons of waste for every resident in this region. No other regions dispose of comparable amounts of waste.

Figure 29

Regional Differences in Waste Disposal and Number of Sanitary Landfills



Notes: The total amount of sanitary waste that is projected for disposal in Virginia in 1994 is 6,490,834 tons. Of this amount, 1,064,525 will be imported from out of state.

Source: JLARC survey of landfill operators.

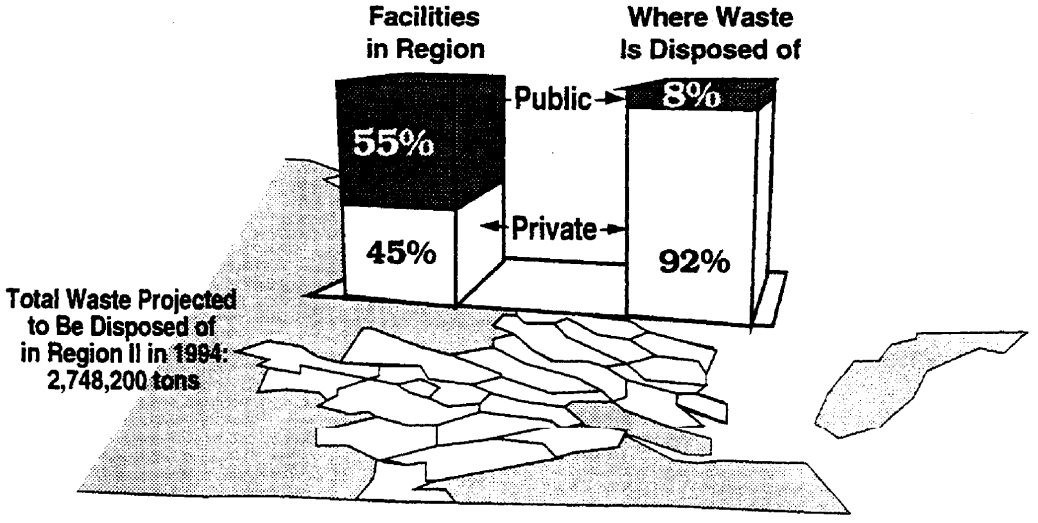
For example, 20 percent of all sanitary landfills are located within the boundaries of Region Five (Southside Virginia); yet only 12 percent of the total amount of solid waste is disposed in this area. The Tidewater area, Region One, contains 11 percent of all landfills but receives approximately 15 percent of the waste in the State. This is less than one ton of waste per capita. In fact, Region Five is the only other region that disposes of at least one ton of waste for every resident in the area. If this trend does not change, by the end of 1995, almost one-half of the total amount of waste projected for the State will be disposed in Central Virginia.

The significance of regional landfills in explaining these waste disposal patterns is demonstrated by Figure 30. While six of the 11 sanitary landfills in Region Two are run by local governments (55 percent), these facilities handle only eight percent of the solid waste for the area. The remaining 92 percent is received by the five private facilities, four of which are regional landfills. These landfills receive almost 40 percent of their solid waste from out-of-state imports.

Racial Differences Around Regional Sites. As noted in Chapter II of this report, the counties which typically host private regional facilities in Virginia are generally more rural, with a larger proportion of minorities relative to the State as a whole. Consequently, when these facilities are sited, there is the potential that minorities will be disproportionately impacted. Indeed, the minority population rate in three of the four counties in which the private landfills in Region Two are located, as well as the neighborhoods in which the facilities were actually constructed, exceeds 45 percent.

Figure 30

Source of Waste Received by Sanitary Landfills in Region Two



Source: JLARC survey of landfill operators.

This study confirmed, however, that the waste management companies were invited to these localities by government officials. The solid waste companies considered the locations attractive because they are in the middle of their major market areas, are easily accessible from interstate highways, and have a substantial amount of remote land. Moreover, the process which led to the sitings appeared to be without intentional racial bias. Nonetheless, with so much of the total solid waste being disposed in areas where minorities live in high concentrations, questions about company and local government motivations in siting landfills will likely persist. For future sitings, this underscores the need to address the problems identified by JLARC staff in this study concerning the failure of local governments and company officials to adequately incorporate the community in the facility siting process.

Local Governments Control Most Landfill Capacity in the State

The final issue raised by HJR 529 relates to the question of landfill capacity. There is a particular concern that the large regional landfills in the State have created a substantial amount of landfill space that is used primarily to dispose of out-of-state waste. Under these circumstances, there is concern that there may not be sufficient landfill capacity in the State to serve both the short and long-term needs of the Commonwealth while private companies continue to import solid waste.

Measuring Landfill Capacity. As a part of the JLARC survey, landfill managers were asked to provide information that the study team could use to develop a measure of landfill capacity for all active facilities in the State. With the data made available through the survey, JLARC staff used several methods to develop a measure of capacity for each facility. The first method calculated a capacity figure based on the total acres available for landfill use and the rate at which the facility had used acres in the past. In other words, the number of years of remaining capacity using this approach is a function of how much landfill space the facility has which is unused and the rate at which previous acres were filled to capacity. The formula employed to derive this estimate of capacity is shown below.

Capacity = (Remaining Acres x (Acres At Capacity/Years In Operation))

While this approach could be used to develop a measure of capacity for most landfills that were surveyed, it was not reliable for those facilities that were in the initial stages of operation. For these sites and those landfills whose operators could not provide accurate data on all of the variables needed to apply the formula, a measure of capacity was determined by calculating the number of years to the facilities' anticipated closure dates.

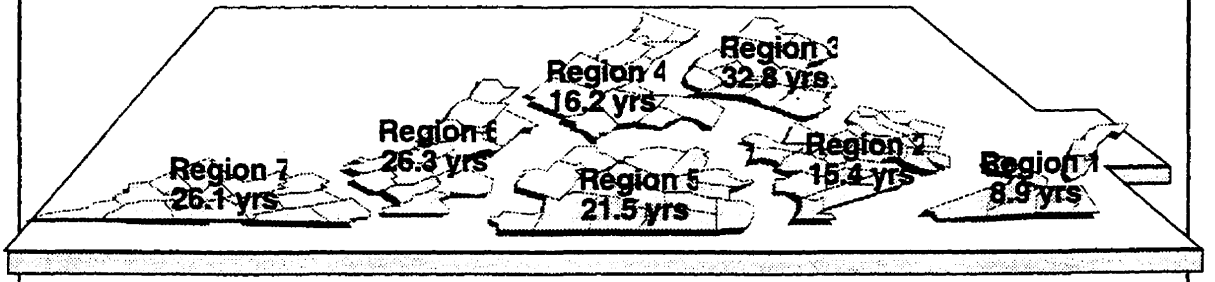
Although a number of units of measurement could have been used to measure remaining capacity in Virginia, JLARC staff determined that capacity measured in years was the most meaningful measurement. Capacity measured in years reflects how long

a landfill can continue to receive waste based on the rate at which waste has been disposed of at the facility in the past. Thus, measuring capacity in years provides an indication of how long landfills in the State will be able to meet the demand for disposal in their landfills based on currently available landfill space and past disposal rates at the landfills.

Total Capacity for Sanitary Landfills in Virginia. Figure 31 illustrates the average amount of capacity that currently exists for sanitary landfills in the seven DEQ management regions used for this study. As shown, three areas of the State — Regions Three, Six, and Seven — have more than 25 years of average capacity. In Region One, the typical facility has almost nine years of capacity remaining. In Region Two, where most of the large private landfills are located, the typical facility has approximately 15 years of available capacity remaining.

Figure 31

Current Average Capacity of Sanitary Landfills in Virginia (by Region, Expressed as Years of Remaining Life)



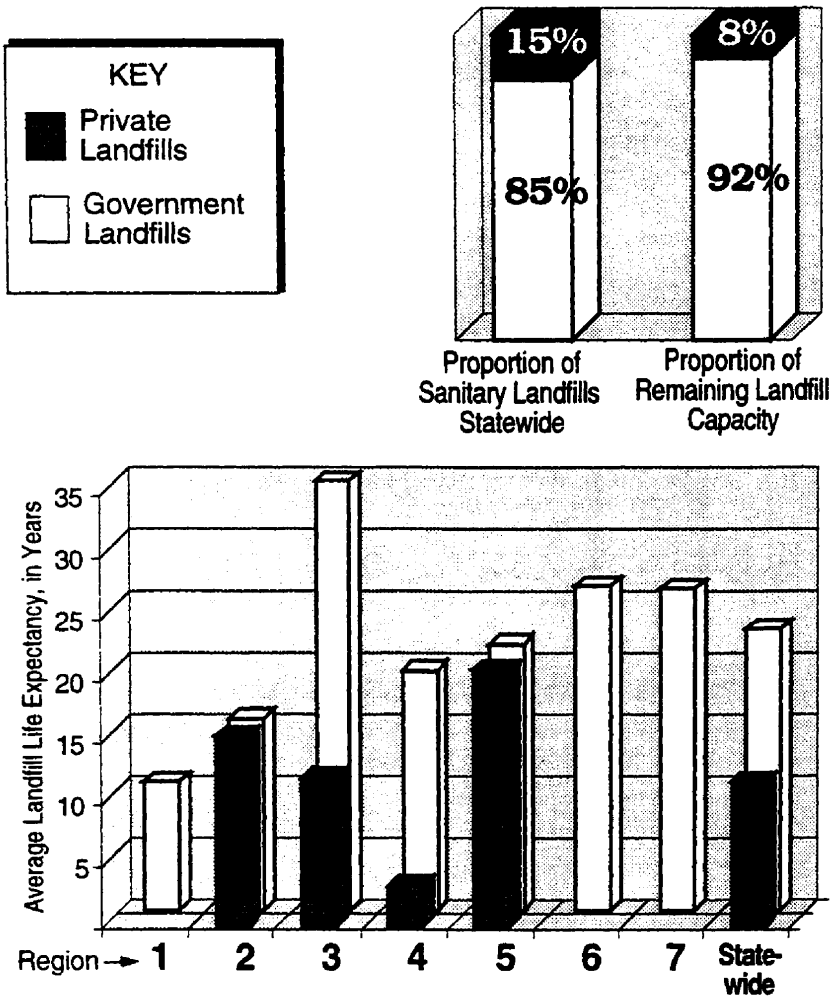
Source: JLARC survey of landfill operators.

Government and Privately Held Landfill Capacity. The next step in this analysis was to examine these capacity figures according to whether the landfill was public or private. The purpose of this analysis was to determine how much of the State's landfill capacity had shifted to non-government operators. This, as noted earlier, is a special concern of HJR 529 because of the implications such a shift could have for the long-term management of the State's waste disposal needs. However, the findings of this study indicate that concerns about private sector control of waste disposal in the State have been exaggerated. Public landfills represent 85 percent of all sanitary facilities, and they control 92 percent of the remaining landfill capacity in the Commonwealth. On average, government landfills have twice as much remaining capacity as private facilities (22 to 11 years). As Figure 32 illustrates, in three regions of the State, there are no private landfills permitted to receive sanitary waste.

It should be emphasized that years of capacity is not a measure of remaining volume or remaining landfill space. It merely measures how many years an existing landfill can continue to operate based on the past rate of disposal at the facility. For

Figure 32

Available Capacity (Life Expectancy) for Sanitary Landfills According to Type of Operator



Source: JLARC survey of landfill operators.

example, a 300-acre landfill that is receiving high volumes of waste may have only 10 years of capacity remaining while a 10-acre landfill that has a small incoming waste stream may have 20 years of capacity remaining because its waste stream is so small. In fact, although they control less of the waste capacity in the State, private landfills are substantially larger than public facilities. For example, as of 1994, private landfills had an average of 173 remaining acres available for waste disposal. By comparison, government facilities had an average of 73 acres.

Nevertheless, these findings do not suggest a need for regulation of the construction of private landfills. There does not appear to be an approaching shortage of landfill space designated solely for the waste disposal needs for citizens of the

Commonwealth. Moreover, concerns about the possibility of a flood of new private facilities ignore the market forces presently at work in the solid waste business. The widespread popularity of recycling programs and the development of landfills in the northeast area of the United States — the primary source of out-of-state waste for most private facilities in the State — has, according to some analysts, already created a glut in the solid waste business that will restrain future growth. With the capital and operational costs associated with constructing and operating a large regional landfill, solid waste companies will need some assurance that they will have enough waste contracts to make the business profitable before they undertake the commitment required to construct and operate one.

Currently in Virginia, there is intense competition for waste contracts among the private solid waste companies that operate the large regional landfills. At least some of the regional landfills in the State are not taking in as much waste as they projected. Therefore, in this competitive environment, it seems unlikely that there will continue to be the proliferation of large private regional landfills in Virginia in the near future. With these controls already in place, it seems unnecessary for the State to become involved in regulating the flow of solid waste into Virginia.

Attempts to Restrict the Importation of Waste Could Be Unconstitutional

Even if it were determined that there is a need to regulate imported waste, Constitutional restrictions could limit the State's ability in this area. Recent court decisions have limited the authority of states to restrict the flow of solid waste. The final section of this chapter briefly discusses these legal issues.

Out-of-state waste could be regulated in two ways. The importation of waste could be regulated in the short term by placing restrictions on out-of-state waste that can come into existing Virginia landfills. In the long term, the importation of waste could be regulated by prohibiting the construction of new SWMFs absent a demonstration of need for the facility. Under current law, either type of regulation might face significant legal hurdles.

Directly Restricting the Importation of Out-of State Waste. Three recent United States Supreme Court cases have made clear that virtually any state legislation or regulation which restricts the flow of out-of-state waste violates the Commerce Clause and is thus unconstitutional unless a State can demonstrate that: (1) the regulation serves a legitimate local purpose related to the citizens' health and safety; and (2) there is no alternative nondiscriminatory means to achieve this purpose. In *Chemical Waste Management v. Hunt*, 112 S. Ct. 2009 (1992), and in *Oregon Waste Systems, Inc. v. Department of Environmental Quality of the State of Oregon*, 62 USLW 4209 (1994), the Supreme Court struck down state statutes that imposed additional disposal fees on out-of-state waste. Similarly, in *Fort Gratiot Sanitary Landfill v. Michigan Department of Natural Resources*, 112 S. Ct. 2019 (1992), the Supreme Court held unconstitutional a Michigan statute that restricted the flow of solid waste between counties in Michigan and from other states into Michigan counties. In all three of these cases, the Court made clear

that it would be extremely difficult for a state that discriminated against out-of-state waste to establish that there was not some other nondiscriminatory means to achieve its purpose.

It should be noted that the Courts have established what is referred to as the market participant exception which provides that government-owned and operated landfills can still restrict waste disposal to waste generated within their jurisdiction without violating the Commerce Clause. It should also be noted that some of the agreements between the large regional landfills and localities that host them include geographical restrictions which limit the waste that can be received to waste generated within a certain geographical area. For example, the waste management company for the private regional landfill in King and Queen County negotiated and agreed to contract provisions which prohibit the landfill from disposing of waste that is generated outside of a 150 mile radius of the landfill. In Henrico County, this same company agreed to provisions which prohibit the landfill from disposing of any waste that is generated from outside of the State. Under current law, it is not clear whether these restrictions would be found constitutional if challenged as a violation of the Commerce Clause.

Restricting Construction of Landfills. It is less clear under current law whether Virginia could establish a certificate of need program and limit construction of new SWMFs to those which could demonstrate the need for a new facility. South Carolina adopted a regulation which prohibited the construction of any hazardous waste treatment facility or expansion of an existing one unless the need for such a facility could be demonstrated. The regulation stated that "need" could not include out-of-state need. A trade association brought a legal action claiming that the regulation, along with several other regulations, were unconstitutional. The case, *Hazardous Waste Treatment Council v. State of South Carolina*, 945 F.2d 781 (4th Cir. 1991), was appealed to the Fourth Circuit Court of Appeals. While the Fourth Circuit did not reach the issue of the constitutionality of the need provision, the Court suggested that the need provision might be susceptible to a constitutional challenge. The court stated that the plaintiff "appears to have a substantial argument that regulation 61-99 [the regulation that prohibits construction of hazardous waste treatment facilities without a demonstration of need] is unconstitutional." The Court further stated that a need requirement where out-of-state need could not be considered "appears not to regulate evenhandedly" and thus might violate the Commerce Clause. While not definitive, language in the Fourth Circuit's opinion suggests that a court faced with the issue might find a certificate of need program in which need was limited to need in Virginia to be unconstitutional.

There is some indication that Congress may act to change the law in this area. Apparently, many states are lobbying Congress to give them more authority to restrict the flow of waste into their states. A bill that would have allowed states to restrict the volume of waste coming into their states was passed overwhelmingly by the House in this session of Congress but was not acted upon in the Senate. Similar legislation is likely to be introduced again in the next session of Congress.

Conclusion. Regardless of the potential legal constraints, there does not appear to be the need for the State to become actively involved in regulating the flow of waste into Virginia. These private regional facilities appear to be providing some clear

benefits for Virginia and its localities. As discussed previously, a significant number of Virginia localities have gotten out of the solid waste disposal business and now send their waste to the regional landfills that have located in the State. In addition, these landfills have generated significant revenue for several of Virginia's poorest localities. Rather than restricting the flow of waste, the State's best approach may be to focus on ensuring the safety of residents around the sites. This need can be addressed by providing appropriate oversight and enforcement of the Solid Waste Management Regulations which are intended to minimize the potential adverse impacts of these facilities.

Appendix A

House Joint Resolution No. 529

Requesting the Joint Legislative Audit and Review Commission to study the practices leading to the siting of solid and hazardous waste facilities and the effect thereof on minorities.

WHEREAS, the United States Environmental Protection Agency has recently found that racial and ethnic minorities have a greater degree of exposure to noxious emissions from waste facilities and other pollution sources; and

WHEREAS, a 1987 report by the United Church of Christ's Commission for Racial Justice found that race was the most common characteristic of the communities which are exposed to toxic waste and siting of waste facilities; and

WHEREAS, the book *Dumping in Dixie*, by Robert D. Bullard, a sociologist at the University of California, Riverside, detailed numerous examples of inequities and discriminatory practices in the siting of pollution-emitting facilities and in the treatment of the communities surrounding such facilities when it came time for a cleanup or for compensation for contamination; and

WHEREAS, a 1991 Greenpeace U.S.A., Inc., report entitled *An Encyclopedia of Environmental Crimes and Other Misdeeds* set out a list of environmental activities and operations which breached various statutes and regulations, raising concern about various operators of waste facilities; and WHEREAS, numerous solid waste disposal entities are taking steps to site, or have expressed the interest to undertake the siting of, major new solid waste facilities in the Commonwealth in the immediate and near future, raising the prospects of both further disproportionate impacts on minority communities and the creation of possible excess, unneeded waste disposal capacity; and

WHEREAS, the fact of such discrimination and of such disproportionate exposure of minorities to the emissions from such facilities has raised serious concerns over the siting, clean-up and compensation practices of industry and governments and the operation practices of waste facilities and has led to a nationwide movement to address these practices and injustices; and

WHEREAS, it appears that such practices and injustices have resulted in adverse impacts on the health, social and economic well-being of minorities and others; and

WHEREAS, there is concern that such discriminatory and other practices should not occur in the Commonwealth; and

WHEREAS, there is an overwhelming desire on the part of the General Assembly to ensure that such injustices or practices are not occurring in Virginia and to correct those which have occurred in the past; now, therefore, be it

RESOLVED by the House of Delegates, the Senate concurring, That the Joint Legislative Audit and Review Commission (JLARC) be requested to study the past and present policies and procedures involved in the siting, monitoring and cleanup of solid and hazardous waste facilities, with an emphasis on how they have been operated and how they have impacted minority communities. The study shall include, without limitation, (i) an analysis of the Commonwealth's past, present and future siting, clean-up and monitoring policies, practices and procedures relating to such facilities and the implementation of such policies, practices and procedures to determine whether they are or have been in accord with regulatory and statutory requirements or have had or could have a disproportionately negative or discriminatory impact on minority communities; (ii) a site by-site review of waste facilities, noting their practices and the makeup of the communities around them; (iii) an analysis of current solid and hazardous waste disposal capacity within the Commonwealth and short- and long-term needs for capacity to serve the needs of the citizens of the Commonwealth; and (iv) recommendations of what steps should be taken to prevent discriminatory or illegal practices, to correct any injustices or improprieties which are found and to prevent the creation of excess waste disposal capacity which would exacerbate the concerns set forth herein.

All agencies of the Commonwealth shall, upon request, assist in the conduct of the study. Upon receiving recommendations from JLARC, the Board and the Department of Waste Management shall review their regulations and procedures to consider any changes which are recommended. Until such changes are considered, if the Department of Waste Management receives the local government certifications required by §10.1-1408.1 B 1 of the *Code of Virginia*, after July 1, 1993, the Department shall inquire as to the impact the siting has on minority communities. If there is an adverse impact, the local government shall indicate how the impact was considered in its siting decision.

The Joint Legislative Audit and Review Commission shall complete its work in time to submit its findings to the Governor and the 1995 Session of the General Assembly as provided in the procedures of the Division of Legislative Automated Systems for the processing of legislative documents.

Appendix B

Agency Response

As part of an extensive data validation process, State agencies involved in a JLARC assessment effort are given the opportunity to comment on an exposure draft of the report. This appendix contains the response of the Department of Environmental Quality. Appropriate technical corrections resulting from the written comments have been made in this final version of the report. Page references in the agency response relate to an earlier exposure draft and may not correspond to page numbers in this version.

COMMONWEALTH of VIRGINIA

DEPARTMENT OF ENVIRONMENTAL QUALITY

P.O. Box 10009
Richmond, Virginia 23240-0009
(804) 762-4000

December 14, 1994

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

Re: JLARC Report Under House Joint Resolution 529

Dear Mr. Leone:

Following a review of the staff's presentation to the Joint Legislative Audit and Review Commission (Commission) and a review of the revised report, "Solid Waste Facility Management in Virginia: Impact on Minority Communities," the staff of the Department of Environmental Quality (Department) extends its appreciation to you and your staff for their hard work and for the revisions made to the report based on the comments raised by the Department on November 21, 1994.

The issue of environmental justice is of special importance to all Virginians. The duty of the Department extends to all citizens of the Commonwealth, regardless of their race, creed, color, gender, national origin, income, or other status. We are pleased with JLARC's finding that there is no evidence of an intent to discriminate or of a causal relationship between the siting and monitoring of solid waste facilities and the racial composition of communities in which sold waste sites are located. While the clear statement of this finding was presented in the staff briefing to the Commission, the finding should be prominently highlighted in the report itself.

As we stated earlier, with some modifications, the recommendations of the report are appropriate and would improve the ability of the Department to carry out its mission. The Department is reviewing its policies and procedures, and is hiring an Environmental Justice coordinator, to help assure that the agency carries out its duties evenly. Other changes will be implemented as the reorganization of the Department is completed.

Department staff have reviewed the report presented to the Commission and have prepared additional comments, which are attached for your use. The Department still has concerns regarding data bases, methodology and findings in general, and, in particular the assessment of the inspection process. However, the staff appreciates the difficulty in assembling and reviewing the complex data bases and information necessary to accomplish the purpose of the study.

If you have any questions, please do not hesitate to contact me at 762-4040.

Sincerely,

Harry H. Kelso, Director
Enforcement, Policy, and
Public Affairs

HHK:1015

cc: Peter W. Schmidt

JLARC Staff Comments on the DEQ Response:

We are pleased to see that DEQ considers many of the report's recommendations to be appropriate and to have the potential to improve the ability of the agency to carry out its mission. However, there are a number of specific comments made by DEQ in its response to the report which are either inaccurate or misleading and therefore merit further comment by JLARC staff. These JLARC staff comments have been labelled, boxed, and inserted into the text of the DEQ response at the appropriate places.

Comments of the Virginia Department of Environmental Quality
on the
JLARC Study Entitled:

"Solid Waste Facility Management in Virginia:
Impact on Minority Communities
Commission Draft
November 22, 1994"

1. Introduction and Summary

This memorandum presents the comments of the Virginia Department of Environmental Quality ("the Department," or "DEQ") on the study entitled: "Solid Waste Facility Management in Virginia: Impact on Minority Communities - Commission Draft - November 22, 1994" ("Report"), which has been prepared for the Joint Legislative Audit and Review Commission ("JLARC"). The Report was undertaken pursuant to 1993 House Joint Resolution No. 529 ("HJR 529"), which was agreed to by the House of Delegates and the Senate in February, 1993.

With modifications, many of the recommendations of the Report are appropriate and would improve the ability of DEQ to carry out its mission. In particular, DEQ is reviewing its oversight of requirements for Part A applications, inspections, groundwater monitoring, and closure/post-closure care, and its enforcement process to determine whether changes are appropriate. However, DEQ takes issue with many of the statements and conclusions in the Report. As detailed below and in DEQ's previous comments, many statements and conclusions appear to be unsupported either by the facts or by valid scientific analysis.

The Department appreciates JLARC's incorporation of many of the comments that DEQ offered on the "Exposure Report" of the report. Many comments were not incorporated, however, and the Department reiterates its request for those changes. Chapter-by-chapter comments are not set out again, except in cases of special importance or where it appears that changes were made to one portion of the Report, but corresponding changes were not carried throughout the Document.

2. General Comments

a. With Modifications, Many of the JLARC Recommendations are Appropriate

With modifications, many of the recommendations are appropriate and would improve the ability of the DEQ to carry out its mission. In particular, DEQ is

reviewing its oversight of requirements for Part A applications, inspections, groundwater monitoring, and closure/post-closure care, and its enforcement process to determine whether changes are appropriate.

Most importantly, DEQ staff prioritize their work to first address the sites posing the most significant risks to public health and the environment, in accordance with strategic plans, guidance for field operations, and enforcement guidance. Furthermore, it is critical to note that issues of land-use, including the siting of landfills, is statutorily the province of local governments. DEQ's role has been restricted to issues concerning the technical suitability of a site.

D. The Report Should Highlight The Findings Presented by JLARC in Its Staff Briefing of November 22, 1994, That There is No Evidence of an Intent to Discriminate

In the JLARC Staff Briefing of November 22, 1994, the first finding is as follows:

> There is no evidence of an intent to discriminate or [of] a causal relationship between the siting and monitoring of solid waste facilities and the racial composition of communities in which solid waste sites are located. (JLARC Staff Briefing at 19)

It does not appear that this statement is fully set out in the Report itself. Since this is the most important finding, it should be given prominence in the Report.

JLARC STAFF RESPONSE:

As is customary for JLARC reports, this report summarizes the major study findings in the report summary and in the first several pages of each chapter. At the beginning of each chapter in this report, the major study findings are summarized particularly as they relate to whether an intent to discriminate in the local siting or State monitoring process was observed. For example, on the first page of the chapter addressing the issue of race and facility siting, the following is stated:

> *Concerning the siting process, there is no reliable evidence to indicate the race of the communities was explicitly considered as a part of local decision making. Localities that approved solid waste sites in minority communities were just as likely to have conducted formal independent siting studies, objectively evaluated alternative sites, and were almost as likely to have had minority representatives on the local governing board who supported the siting decision.*

The differences that JLARC observed in inspection outcomes for sites in minority communities could not be ignored. However, as the following statement from the second page of Chapter IV indicates, these differences were not attributed to an intent to discriminate.

> *Many of these problems have persisted because of chronic staff shortages among inspectors, a lack of guidance from the Department's central office, and an inefficient and weak enforcement process.*

c. <u>While the Report Does Not Conclude that There Has Been Intentional Bias, Language in Parts of the Report Is Imprecise and Gives An Appearance of Such An Intent</u>

The issue of Environmental Justice is extremely sensitive and important to Virginians, and to the nation as a whole. Indeed, the challenges faced by local and state governments in involving all of their citizens in decisions affecting their lives, deserves a more thorough, and thoughtful, analysis of the true impacts of solid waste facility siting in the Commonwealth, than is represented in this Report document.

Nowhere does the Report conclude that there has been intentional bias. As noted above, the JLARC Staff Briefing finds that there is no evidence of an intent to discriminate or of a causal relationship between the siting and monitoring of solid waste facilities and the racial composition of communities in which solid waste sites are located. DEQ appreciates the changes that have been made to the Exposure Report in response to DEQ comments. However, there is still language in parts of the Report is imprecise and can be interpreted to imply intent or to presuppose that environmental discrimination exists. Examples include the following: "According to this view, minority communities have been targeted because they lack the political power to block these sites" (p. 5) (general statement); "[the results] are consistent with national data which clearly indicate that race has been injected in the decisionmaking process for the siting of solid waste facilities" (p. 7) (general statement); "it does not indicate whether this impact reflects an intentional bias in the siting process, or is due to other factors" (p. 35); "[o]wners of facilities that are sited in minority communities are thought to be held to a much lower standard" (p. 101); and "if variations are found in the inspection practices of DEQ staff according to the race of the neighborhoods around the sites, it is not likely that these differences can be attributed to dissimilarities in the facilities within the community groups" (p. 104).

JLARC STAFF RESPONSE:

Four of the statements referenced in DEQ's response as language that gives the "appearance" of discriminatory intent by DEQ (pages 5, 7, 35, 101) represent background information summarized from numerous sources which address the issue of "environmental racism" in general. These statements are intended to familiarize the reader with the issue of "environmental racism" and are used for no other purpose. It would be difficult, at best, to write a report on the subject of "environmental racism" without discussing the theories which have been proffered on this subject both nationally and in Virginia. A discus-

sion of such theories in the context of this report is not tantamount to a conclusion that such problems are present in Virginia. It merely familiarizes the reader with the issues according to the literature.

The fifth statement referenced in DEQ's response —"if variations are found in the inspection practices of DEQ staff according to the race of the neighborhoods around the sites, it is not likely that these differences can be attributed to dissimilarities in the facilities within the community groups used in the analysis.") — is a conclusion that is legitimately drawn from the analysis JLARC staff conducted on this issue.

As reported, the findings from the study indicate that there are no important differences in the nature solid waste sites (for example age, or type of facility) which would explain the variations observed in inspection outcomes according to the race of the community. This means that the differences JLARC staff found in inspection outcomes were most likely endemic to the process used by inspectors to monitor solid waste sites.

d. The Report Suggests that a Disproportionate Impact has Adversely Affected Minorities with the Resulting Implication that This Result was Racially-Motivated

Despite repeated disclaimers to the contrary, throughout this document, the Report concludes that a disproportionate siting impact has adversely affected minorities in Virginia, with resulting implication of minority discrimination. In point of fact, nothing in the Report provides any causal evidence of discrimination. At the least, the Report's arguments are confusing. For example, on p. 43 of the Report it is stated:

> The results from this analysis revealed that an average of seven out of every 10 residents living around these sites are white, thus raising questions about the general assumption that minority communities are targeted in the siting process for solid waste management facilities.

And on p. 50 of the Report it is stated:

> The findings from this analysis do not support the view that most, or even a significant minority of recently sited SWMRs are located in neighborhoods that are primarily comprised of minority residents.

But on p. 56 of the Report it is stated:

> [F]or nine of the 14 facility sitings that are considered to have a disproportionate impact on minorities, the differences between the community and locality-wide population rate are substantial.

JLARC STAFF RESPONSE:

This comment appears to reflect a misunderstanding by DEQ of the difference between cases where sites are located in neighborhoods where most of the residents are minority, and those neighborhoods where minorities live in disproportionately high numbers relative to their numbers in the locality in which the site is located.

HJR 529 directed JLARC to determine if minorities have been disproportionately impacted by solid waste sitings in Virginia. This aspect of the resolution required that JLARC staff first determine what proportion of minorities live in proximity to recently sited solid waste facilities. JLARC staff conducted this analysis and found that in 17 percent of the solid waste communities, the majority of the residents are minorities. Additionally, in 35 percent of the neighborhoods in which recently sited solid waste facilities have been located, minorities live in higher proportions than can be observed for the locality as a whole. These are irrefutable and reconcilable facts.

Nowhere does the report state, suggest, or imply that the decisions which led to these siting patterns were racially motivated. In fact, in a later analysis, the report concludes that there was no evidence that race was the motivating factor behind these sitings. This, however, does not change the fact that the disproportionate impacts exist, nor does it release JLARC from its responsibility to report the incidence of these impacts as required by HJR 529.

e. <u>The Report's Definition of Minority Does not Meet the Charge of HJR 529 In that It Is Under-Inclusive</u>

The charge to JLARC in HJR 529 was to investigate impacts on "minorities." The resolution makes no reference to a limited focus on racial minorities only. Instead of complying with the legislative charge, the Report makes clear that it focused only on impacts to racial minorities, rather than minorities in general (p.1, 4th paragraph, 1st sentence; p. 2, 1st full paragraph, 1st sentence; and p. 3, 1st full paragraph, 1st sentence; p. 32, 1st full paragraph, 1st sentence; and, p. 39, the heading for Part II, etc.). HJR 529 makes no reference to a focus on racial minorities.

The categorization of "minorities" includes:

- The Fair Housing Act, which addresses race, color, religion, national origin, sex, familial status, disability and age.

- Title VII of the Civil Rights Act of 1964, which states:

> No person in the United States shall, on the grounds of race, color, or national origin be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving federal financial assistance.

- The Louisiana Department of Environmental Quality Environmental Justice Program, which calls for:

> The equitable treatment of all people, regardless of race, income, culture or social class with respect to the development, implementation and enforcement of environmental laws, regulations and policies.

JLARC STAFF RESPONSE:

HJR 529 offers nine reasons in the preamble to the resolution as to why JLARC was requested to perform the study. The first three of those reasons relate to findings regarding race and waste facilities. The initial reason given is that the Environmental Protection Agency "has recently found that racial and ethnic minorities have a greater exposure to noxious emissions from waste facilities and other pollution sources." The second reason is that a 1987 report had "found that race was the most common characteristic of the communities which are exposed to toxic waste and siting of waste facilities." The third reason cited is a reference to a work, Dumping in Dixie, the focus of which is on the question of waste facility location and racial minority communities.

The preamble to the resolution as well as the legislative history of the passage of HJR 529 make it clear that race was the focus of concern. During the JLARC briefing of the report and since the briefing, neither the patron of the resolution nor any legislator raised a concern that JLARC staff misread legislative intent in the way in which "minority" was defined for the study. DEQ suggests a broader definition be used but many of the categories it indicates that JLARC should have considered — sex, physically handicapped, religion — relate to discrimination against individuals and do not make sense with regard to the concept of minority communities expressed in HJR 529.

f. The Report Uses DEQ Data Inconsistently

In examining siting, the report recognizes the problem of demographic shifts and changing census block lines and examines data only on landfills that have been recently sited (p. 53). This rationale is equally applicable to inspections in the periods prior to 1988; however, the Report uses data from the inspections in these time periods extensively (pp. 106-25).

JLARC STAFF RESPONSE:

In analyzing DEQ's monitoring performance, JLARC stratified inspection records in three time periods: (1) Time Period One (1971 to 1983); (2) Time Period Two (1984-1988); and Time Period Three (1989-1994). As shown in the report, there were only minimal differences in inspection outcomes for Time Period One according to the racial composition of the neighborhoods reported for those sites. More important, the report clearly states that *"Racial differences reported in Time Period One may not be reliable because of the uncertainty of the demographics around the site at the time."* Consequently, no conclusions are drawn in this report from observed racial differences in Time Period One."

Moreover, while differences in one inspection outcome — number of inspections conducted — were observed in Time Period Two, all of the report recommendations were based on the substantial variations observed in inspection performance for the more reliable Time Period Three.

g. Many Statements in the Report are Either Subjective or Unsupported by the Evidence Presented

Generally, statistical analysis begins with a hypothesis and such hypothesis is thereafter either confirmed or rejected based on objective testing methods employing generally recognized statistical techniques. Here, this procedure was not followed. Not only was such objective analysis not utilized, but also the statistical analysis in the report appears to be fundamentally flawed. In particular, conclusions were drawn from statistically insignificant results. For example, in Figure 15 (p. 92), the result was presented as being significant at a level of 10 percent; however, Chi Square significance of 10%, meaning that there is a 10% chance the conclusion is erroneous, is not normally definitive in showing differences at this level. Typically, significance in social science is at the 5% or preferably 1% level of significance.

JLARC STAFF RESPONSE:.

Hypothesis testing is not the only legitimate use of statistics. Descriptive statistics which illustrate the distributions of data are generally recognized uses as well. Therefore, because the descriptive statistics in the report (such as medians, ranges or quartiles) were not presented in the format of hypothesis testing, DEQ asserts that the patterns shown should be ignored. This narrow application of statistical analysis leaves itself highly vulnerable to erroneously ignoring patterns which are clearly discernible, and maintains an illusion that there is no evidence of problems in the monitoring process.

The particular example raised by DEQ, regarding a chi-square reported at a 10 percent significance level, further illustrates this problem with DEQ's approach to statistical analysis. Although social science research articles provide many instances in which findings are reported at the 10 percent level of significance, especially when using samples with low numbers of observations, DEQ contends that any statistic that does not have a 5 percent level of significance should be ignored. In this case, DEQ contends that a substantial difference in compliance with groundwater reporting requirements — a rate of 12 percent in minority communities while the rate in non-minority communities is 36 percent — should be conveniently ignored, as though no problem may exist.

h. The Department Does Not Have Adequate Means to Replicate the Statistical Evaluations Conducted by JLARC

DEQ does not have adequate means to replicate the statistical evaluations conducted by JLARC to determine whether the conclusions were appropriately reached. Moreover, without more definitive information on the assumptions made by the authors in structuring their data analysis, such an effort may establish very little.

In the Report, it is stated: "For the purposes of this study, a siting impact was considered disproportionate if the percent of minorities living in the two mile area around the landfill was at least five percentage points higher than the rate of

minorities in the locality which was host to the SWMF" (p. 55). The Report cites no peer-reviewed, scholarly literature or objective statistical manual to support this approach. As a result, an objective reviewer would inquire about the reasoning behind the study's designation of a "disproportionate siting impact." Was this 5% designation based upon previous studies in the literature? Was it a specific, directional hypothesis performed in advance of the actual data analysis?

DEQ had previously cited computational errors and other significant internal inconsistencies in the report, such as instances when the number of cited violations resolved was larger than the total number of violations. The Department still has concerns regarding data bases, methodology and findings in general, and, in particular the assessment of the inspection process. Given the inaccuracies in the Exposure Report and those noted below, DEQ is hesitant to concede the accuracy of the statistical conclusions without further review and specific information about the data analysis itself.

JLARC STAFF RESPONSE:

DEQ can use the same means to replicate the analysis that JLARC staff used in conducting the study. By acquiring geographical mapping software and census block data, DEQ can identify the precise location of each solid waste site in the State and determine the racial composition of the residents who live within specified distances of these sites. JLARC staff are not aware, nor does DEQ specify the nature of the "more definitive information" they need to replicate the analysis.

DEQ's comments on the methods JLARC staff used to examine the issue of disproportionate impact reflect a profound misunderstanding of the study. DEQ's concern appears to be whether the threshold JLARC staff used for this analysis — a five percentage point difference between the proportion of minorities in the neighborhood around the site and the proportion in the locality that conducted the siting — was based on previous studies and was testing a "specific directional hypothesis."

Regarding the first concern, JLARC staff reviewed all of the major studies on environmental racism prior to conducting the research required by House Joint Resolution 529. However, none of these studies had the same research objective as HJR 529. Some of these studies represented case study analyses of neighborhoods surrounding specific hazardous waste sites which were designed to determine if these facilities were located in minority neighborhoods. Others were national quasi-experimental studies in which the "community" was defined as selected census tracts or separate zip code areas in the United States.

None of these studies were designed to determine if the land use decisions of a particular locality resulted — either intentionally or unintentionally — in the placement of solid waste sites in communities that are predominantly or disproportionately minority. Rather, these studies were designed only to address whether the proportion of minorities in areas with hazardous waste sites across the country is significantly different from the proportion of minorities in areas that do not have these sites.

The objective of the JLARC staff analysis was to determine if minorities have been disproportionately impacted by the siting of solid waste facilities in Virginia localities since the 1988 Solid Waste Regulations were passed. As the report notes, to accomplish this JLARC staff not only had to determine if these sites were mostly located in predominantly minority neighborhoods, but JLARC staff also had to determine if they were placed in neighborhoods that had higher concentrations of minorities than could be observed for the locality that conducted the siting. As the literature on environmental racism demonstrates, this is another aspect of potential discrimination in the facility siting process.

The threshold of five percentage points was used as a means for identifying two groups of sites for further analysis. For most of those sites that were considered to be in neighborhoods with a disproportionately high number of minorities, the report shows that the actual magnitude of the differences between the proportion of minorities in these neighborhoods and the proportion in the host locality were substantially higher than five percentage points.

A further lack of understanding by DEQ of JLARC's study approach is demonstrated by the criticism that JLARC staff did not frame the quantitative analysis in terms of hypothesis testing. Because JLARC staff had data on each of the sites in the universe — all sites permitted under the new regulations — there was no meaningful rationale for conducting hypothesis testing. As noted in standard statistics books, the purpose of hypothesis testing is to generally analyze, in probabilistic terms, how strong the sample evidence is against the null hypothesis (Agresti and Finley, 1986). Obviously, when working with population data, there is no sampling error involved thereby weakening the need for hypothesis testing.

According to Hubert M. Blalock (Social Statistics, 1979), the only compelling reason to conduct hypothesis tests when working with population data is when an attempt is made to "make causal inferences from nonexperimental data." This would apply for this report, only if JLARC staff hypothesized that the observed disproportionate impacts were evidence of racial discrimination on the part of local governments that conducted the siting. As the report demonstrates, this approach for making such a broad inference from the statistical data was not used. Rather, JLARC staff relied on the quantitative analysis solely to determine the degree to which minorities live around solid waste sites in proportions that are higher than can be found for the localities that conducted the siting.

The question of whether these siting patterns reflected an intentional bias was dealt with in a separate qualitative analysis of local siting records and structured interviews conducted with county administrators, community action groups, and members of the local governing bodies in the localities that sited the facilities. This key qualitative aspect of JLARC's research is, in fact, the missing element from other national studies of this issue.

i. <u>The Report Bases Its Conclusions on Records That It Has Criticized and Reaches a Conclusion of a Lack of Action or Work From a Lack of Records</u>

The recordkeeping and data management in the solid waste program have been criticized in the Report (<u>see</u> pp. 128-30). However, the Report uses those same records to reach its conclusions. In several instances, the Report uses the lack of records to infer a lack of action or work on the part of program staff. An example is the review of inspection activity between 1971 and 1983 (pp. 109-11). DEQ staff in groundwater, inspections, permitting, and enforcement have worked diligently to supply records since JLARC staff began requesting information in late April 1994

JLARC STAFF RESPONSE:

DEQ's staff contends that the decision by JLARC staff to count as non-inspections those sites for which there were no available records is flawed. DEQ contends that the records could simply be lost. Before conducting this analysis, JLARC staff examined the files which were available in central office and on microfiche. In addition, because staff at the central office informed us that any missing records could be obtained from the regional offices, the study team requested data on any missing files from the regional offices as well.

Although there is no a priori reason to assume that most of the records "lost" by DEQ staff would be for those sites in predominantly minority communities, JLARC staff reexamined this issue by excluding all sites from the analysis for which DEQ staff could not produce inspection records. When this was done, the differences that were observed in the number of inspections between sites in white versus non-white communities actually grew larger.

The remainder of DEQ's comments to the JLARC study are reported on the following pages.

3. **Additional Comments**

a. p. 8 - "a few local governments across the State are beginning to implement recycling and trash incineration programs"

Recycling is mandated by statute (Va. Code § 10.1-1411). More than a few local governments have begun recycling to reduce the amount of waste that is landfilled.

b. p. 19 - "one of the more innovative methods for disposing of solid waste is to incinerate the materials"

Incineration is not an innovative way to reduce solid waste volume. The technique has been employed for decades.

c. p. 90 - Table 8; "Note: This information does not reflect administrative changes..."

This table should also reflect the positive changes that have occurred since the study was implemented. Otherwise, this information is inaccurate and is biased towards the negative. The duties of the Central Staff [i.e. the Office of Waste Resource Management ("OWRM"), and previously the Office of Compliance and Enforcement ("OCE")] has always been defined as indicated above. Although the system is not fully computer automated, for at least the past two years, OWRM (i.e. Central Staff) have been tracking facility compliance status information. Additionally, staff within each region are tracking facility compliance status information.

d. p. 92 - "In only three of the seven regions used by DEQ ..."

As noted, there are only six regions in DEQ, four of which have compliance managers. Of these, three could provide up-to-date status reports on groundwater monitoring.

e. p. 95 - "no one assumed the role of oversight ..."

Facility compliance rates are reviewed in the regional offices. For example, the Tidewater Regional Office reviews facility compliance rates quarterly.

f. p. 95, 96 - "inspection outcomes are not systematically reviewed" "A major function of DEQ's central office..."

The regional offices perform these tasks.

g. p. 102 - "inspectors are not able to consistently conduct inspections ..." p. 108 - "However, because inspection ..." p. 115 - "regular inspections have a lower priority..."

The ability to conduct regular inspections has increased as staffing has increased in the regions. The Roanoke Regional Office, which was fully staffed by the Department of Waste Management as a pilot program, has been able to implement a regular program of monthly inspections for active facilities. The Tidewater Regional Office, which has been able to increase its staff in the last year, now conducts quarterly inspections of active facilities.

h. p. 116 - Table 12

More emphasis needs to be placed on the impacts on inspection rates that training and development of new staff have had in the past two years. Training a competent staff over the past two years has impacted the number of inspections conducted.

p. 124 - "factors that affect how long a facility is out of compliance..."

It should also be noted that poorer counties have a more difficult time complying with the Solid Waste Management Regulations. In this state, poorer counties tend to have a higher minority population. Therefore the length of time to obtain compliance in poorer counties may be associated with the race of the community surrounding the SWMF.

j. p. 126 - "these positions were allocated among enforcement, permit writing, and environmental response and remediation."

The Report does not identify any positions as having been assigned to inspections. As has been previously noted, 25 positions were allocated to compliance and enforcement. Fifteen were compliance positions for solid and hazardous waste (inspectors and their supervisors). In addition some of those positions previously allocated to response and remediation are now compliance positions.

k. p. 126 and Figure 22

The statements and illustrations about the ratio of inspectors per region are misleading. Staff from the Roanoke Regional Office and the Central Office inspect sites in other regions.

l. p. 127 - "neither document addresses how an inspector should determine when a solid waste site that is out-of-compliance should be referred to enforcement."

The Field Operations Guide outlines a procedure to use to obtain compliance. Briefly:

i. Write an NOV giving 15 to 30 days to respond based on the severity of the violation;
ii. No response - second letter, call in for meeting, set deadlines; and
iii. Failure to meet deadlines causes referral to enforcement

The Solid Waste Enforcement Guidance specifies what documents should accompany a referral.

m. p. 135 - Case Description

It is unclear what enforcement case the case study references. DEQ knows of no enforcement action with the described facts. If the case is D.V. Sanford, the description is not accurate. In March of 1994, DEQ enforcement staff requested that compliance staff (not the OAG) conduct further inspections of a number of facilities, including the Sanford site. Inaccuracies such as this cast a cloud of unreliability over the report.

n. P. 149

In 1994, the TRO implemented a twice-per-year inspection program of inactive landfills and a once-per-year program for closed landfills.

o. p. 150 - "closed within 120 days"

The regulations require closure to take place within six months of receiving the last load of waste.

p. p. 154 - Recommendation 9

In response to previous comments, JLARC deleted a recommendation in Chapter IV concerning the use of enforcement specialist to do compliance work. This change was not carried forward to Recommendation No. 9.

q. p. 171

There are additional reasons for siting facilities in central Virginia, including:

i. good transportation access;
ii. cheap land
iii. localities that seek out the economic support
iv. appropriate geology

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