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Solid Waste Management State Plan Update 1993 - 2002

Section III: Statewide Sludge Management Plan Update

State of New Jersey
Department of Environmental Protection and Energy
Division of Solid Waste Management and
Wastewater Facilities Regulation Program

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SOLID WASTE MANAGEMENT STATE PLAN UPDATE: 1993 - 2002

SECTION III: THE STATEWIDE SLUDGE MANAGEMENT PLAN - 1993 UPDATE

Executive Summary

I. INTRODUCTION

This Update (SSMP Update) of the 1987 Statewide Sludge Management Plan embodies several critical policy changes which are designed to result in a sewage treatment infrastructure that is significantly more compatible with its surrounding environment. The changes primarily reflect an increased emphasis on management of sewage sludge through "beneficial uses," such as in agriculture and horticulture, which take advantage of the inherent nutrient content, organic matter and other desirable physical characteristics of sewage sludge. This plan changes New Jersey's sludge management policy from one which relies heavily on out-of-state landfill disposal or in-state incineration, to one which seeks the environmentally sound management of sludge as a resource.

With the end of ocean disposal of sludge as of March 17, 1991, management alternatives were narrowed to beneficial use, incineration, and short-term out-of-state landfilling. A growing consensus among sludge management organizations, developed through several workshops and a formal roundtable in 1991, recommended increased reliance on beneficial use. The Department of Environmental Protection and Energy (DEPE) formalized this strategy in its "Sludge Management Policy Guidelines," published in April 1992, and invited public comment on the Guidelines in a public meeting held in May 1992. The SSMP Update reflects the substance of the Guidelines, and comments provided by a number of organizations and individuals at, and subsequent to, the public meeting.

The SSMP Update also reflects a commitment to ending reliance on shipment of sludge out of state for disposal in landfills. New Jersey currently sends approximately 57% of its sludge out of state for landfill disposal. Out-of-state landfill disposal causes both a burden on the land resources of neighboring states and loss of a potentially useful resource.

Progress toward full implementation of beneficial use and self-sufficiency strategies will require a number of specific actions and programs. The SSMP Update outlines the DEPE's revisions in strategy for supporting progress toward beneficial use, through both revisions in regulatory requirements and establishment of active programs in a variety of areas. Perhaps most important is the continued improvement of sludge quality through pollution prevention and pretreatment. Pollution prevention is ultimately the most cost-effective way to improve sludge quality, as it reduces the need for expensive pollution control measures by preventing the introduction of pollutants at the front end of the industrial/waste-treatment process. It will involve cooperation not only on the part of industries, but individual citizens as well. Other needed actions provided by the SSMP Update are public education on the value of sludge-derived products, development of markets for sludge-derived products, and resolution of concerns raised by the agricultural community.

Generally, the policies for the management of sludge closely mirror the department's solid waste policies as described in the Solid Waste Management State Plan Update: 1993-2002 (1993 State Plan Update) proposed by the DEPE in the New Jersey Register on February 16, 1993. The basic solid waste policy framework of the state shifted in 1990 due to the efforts and guidance of Governor Florio's "Emergency Solid Waste Assessment Task Force." The task force reevaluated the state's solid waste management policies and practices and recommended sweeping changes, focusing on maximizing source reduction, achieving at least a 60% statewide recycling rate by December 31, 1995, developing regional management systems for the residue which is not recycled, and achieving statewide disposal self-sufficiency under a rational management plan. These recommendations were accepted by Governor Florio in November 1990 and served as the foundation of the overall 1993 State Plan Update of which the following document is part.

The 1993 State Plan Update describes New Jersey's current programs and practices for the management of solid waste, sludge and medical waste and sets forth the state's plan for managing those wastes over the next ten years. The development and updating of a statewide plan is a statutory requirement of the New Jersey Solid Waste Management Act. The plan sets forth broad goals, objectives, criteria and standards by which the county and statewide solid waste planning is conducted. In essence, it serves as the backdrop from which the county/state planning process is administered. This broad 1993 planning initiative will supersede the last adopted Municipal and Industrial Solid Waste Plan of 1986, supersede the 1987 Statewide Sludge Management Plan (1987 SSMP), and represent New Jersey's Comprehensive Regulated Medical Waste Management Plan. Specifically, the 1993 State Plan Update will:

- Outline the state's short and long-term goals for each management program and the legislative, regulatory and policy framework necessary to achieve those goals;

- Describe the current status of solid waste, sludge and medical waste management in the state and evaluate the effectiveness of those programs in light of the requirements of the Solid Waste Management Act; and

- Describe how New Jersey's program fits within the national regulatory scheme for the management of solid waste, sludge and medical waste.

The 1993 State Plan Update is divided into three major sections. Section I, which was published in February 1993, sets forth the state's municipal and industrial solid waste management plan update. Section I addresses almost exclusively the management of municipal and industrial solid waste, and provides only marginal references to sludge and medical waste for relevant issues which overlap. Section II, sets forth the state's comprehensive regulated medical waste management plan promulgated in accordance with the requirements of the Comprehensive Regulated Medical Waste Management Act. Section III, which follows, sets forth the state's sludge management plan, which focuses on the development of land-based uses for sludge and sludge-derived products.

Because of the complexity, depth and breadth of the 1993 State Plan Update, the solid waste, sludge and medical waste sections will be adopted in phases. The department published a Notice of Availability for Section I, the Municipal and Industrial Solid Waste Management State Plan Update, in the New Jersey Register on February 16, 1993, marking the beginning of the adoption process. A Notice of Availability for Section II, the 1993 Comprehensive Regulated Medical Waste Management Plan, was published April 19, 1993. Section III, the Statewide Sludge Management Plan Update, will have a Notice of Availability scheduled for September 7, 1993.

Each section of the 1993 State Plan Update begins with an executive summary to provide the reader with a broad-based understanding of the goals and objectives for each regulatory program and a description of the plan designed to meet those goals and objectives. After the executive summaries, the specific goals and objectives, current programs and planning initiatives are described in detail and include all documentation and data. The 1993 State Plan Update includes numerous graphics, tables and charts to describe often complex and complicated information in a manageable fashion.

This Executive Summary to the SSMP Update is designed to orient the reader by providing a concise, general description of 1) the department's objectives, criteria and implementation strategies; and 2) the current sludge system and management practices. The Executive Summary, however, is not intended to be a substitute for the SSMP Update, which sets forth the department's entire regulatory program in detail, including all backup data and information. While the Executive Summary provides a convenient synopsis, the reader must consult the entire SSMP Update to attain a full understanding of the state's sludge management plan.

II. DEPE OBJECTIVES AND CRITERIA

The DEPE will play an active role in working with Domestic Treatment Works (DTWs) to move toward beneficial uses of sludge and increasing state self-sufficiency in sludge management. The following sections describe the objectives, policies and strategies which are being implemented to achieve these goals, through pollution prevention, pretreatment, new planning requirements, public education, and other means.

1. Partnership in Sludge Management Planning and Implementation

While individual sludge generators, or DTWs, have done most of the sludge management planning over the last few decades, this picture is becoming more complex. There will be a need for greater cooperation with municipal and county governments, especially in siting beneficial use applications, and with the general public in understanding and supporting responsible sludge management through beneficial use. The DEPE has established the following guidelines for future action:

a. A cooperative rather than prescriptive approach will be used toward facilitating rather than mandating movement toward beneficial use management. The DEPE's role as a facilitator will involve county and local governments, as well as sludge generators and the farming community when promoting beneficial use initiatives.

b. Encouragement of clear communication among all parties involved through ongoing contact with existing organizations and a general public education program. The department has and will continue to make extensive use of the Statewide Committee for Organics Recycling Education (SCORE) to educate and inform the general public of potential beneficial use sludge management opportunities. In January 1993, the department and SCORE co-sponsored the conference "Sludge Management in New Jersey: Issues and Impacts." Due to the overwhelming success at the conference, a second conference will be held in January 1994.

   The DEPE has and will continue to conduct business openly and provide opportunities for all levels of government, members of the regulated community, environmental groups and the general public to provide input on departmental activities.

   Equally important is the need for a communication network within the department. The department will incorporate the development of this network, as well as external communications, into its comprehensive communications plan which is to be completed in the first quarter of 1994.

c. The department is committed to the use of a flexible policy framework that will be responsive as issues unfold, while not being unnecessarily constraining of creativity and innovation.

d. Continued efforts will be applied to expedite planning and permitting decisions. The DEPE will propose the modification of regulatory requirements based on the size and/or type of the generator so that the degree of oversight reflects the degree of potential environmental impact. Specifically, the DEPE will not require all small generators, defined as DTWs with a permitted flow less than 1 million gallons per day (mgd), to submit detailed sludge management plans (SMPs) unless the DTW, at the time of its New Jersey Pollutant Discharge Elimination System (NJPDES) permit renewal, identifies an out-of-state disposal facility and the NJPDES permit time period contravenes the DEPE's commitment to achieve self-sufficiency of sludge management disposal capacity within the next seven years.

e. The DEPE is developing a general permit package protocol to streamline the approval of limited duration demonstration programs. The DEPE will notice the development of a general permit package with specific data and procedural requirements that must be fulfilled as part of a general permit. The public will have an opportunity to comment on these requirements. Once the DEPE has adopted the general permit package for a specific type of facility or function, an applicant must simply register with the department and follow the established procedures. This will eliminate the lengthy review associated with DEPE permitting and allow for the project to proceed quickly.

f. The department's Communication Team, with assistance from SCORE, will continue to assist in mediation of disputes among organizations involved in sludge management on request.

g. The department will continue to directly provide and assist in locating funding sources for beneficial use projects. One potential source identified is the New Jersey Corporation for Advanced Technology (NJCAT). The mission of NJCAT is to enhance the development and commercialization of technology-based environmental and energy products through assistance to New Jersey businesses that work with such technologies. Through funding assistance of selected projects, NJCAT will provide entrepreneurs with the opportunity to test their budding technologies.

   Another potential funding source is the Solid Waste Services Tax monies. These funds are available to county government to fund household hazardous waste collection programs. These programs are to ensure the proper disposal of household hazardous waste which could otherwise be dumped down the drains and ultimately have an adverse effect on sludge quality.

h. Strong enforcement will be applied, when necessary, to assure that the public health and environment are protected at all times.

2. Domestic Treatment Works/District Planning Process

In 1978, the Solid Waste Management Act was amended to integrate sludge planning requirements with the solid waste planning process which was implemented through "districts" (usually referring to counties). Despite these amendments, sludge planning was not, for the most part, integrated within the district planning process at the county level. Instead, the sludge generators, or DTWs, have carried out sludge management planning as a component of their overall management responsibilities.

The 1987 SSMP required the districts to develop district-wide sludge management plans or delegate planning responsibilities to a (the) sludge generator(s) within the district. Although the district could delegate responsibility for development of a sludge management plan to a sludge generator, the district remained ultimately responsible for the district sludge management plan. N.J.S.A. 13:1E-46(a) delegates the authority for sludge management to the DEPE. Although the DEPE previously identified only two planning options, it is the DEPE's judgment that the overall mandate of the Legislature for the processing or in-state disposal of sewage sludge is best fulfilled by allowing for the modification of the district's responsibilities. Therefore, to provide increased flexibility and efficiency in developing long-term sludge management plans, the DEPE will provide an additional option to the two currently in place.

a. With the adoption of the SSMP Update, the DEPE establishes a third option, which will enable districts to completely delegate responsibility for long-term sludge management planning to all individual generators within the district.

b. Within 180 days of the date of adoption of the SSMP Update, the districts must submit their decision, inclusive of an appropriate resolution, to the DEPE indicating which option they will pursue. Should a district seek to delegate ultimate planning responsibility to DTWs within the district, the DTW's NJPDES permit (which is the permitting mechanism for a DTW's management of its sludge) requires acceptance of these responsibilities.

c. Failure to submit the appropriate resolution to the DEPE will result in the sludge planning responsibilities defaulting to the sludge generators within that district. This process is detailed in Section F. Part VI.

d. Should the district choose to maintain ultimate authority over the sludge planning process, it must submit to the DEPE a district sludge management plan (DSMP) within eighteen months following the adoption of the SSMP Update. In order to ensure timely submittal of DSMPs, the timeframes identified in the SSMP Update for the development of the sludge generator plans may be superseded by the district should it choose to retain ultimate planning responsibilities.

e. Should a district fail to complete and submit the completed DSMP within eighteen months of the adoption of the SSMP Update, sludge planning responsibilities will automatically default to the DTWs within the district, as outlined in Section F. Part VI.

3. Integrated Sludge Management Hierarchy

A key element of the proposed sludge policy is an integrated hierarchy of sludge management options. It is essential that sludge quality be of sufficient quality to implement the DTW's sludge management alternative(s). To drive this choice of alternatives, increased pollution prevention and pretreatment is paramount. This will improve sludge quality to provide generators a wider range of management options from which to select.

The hierarchy, ranging from most preferred to least preferred, is as follows:

a. **Traditional beneficial use** is the utilization of sludge and sludge-derived products (SDP) of suitable quality for beneficial purposes such as for agriculture and land restoration, and as a soil conditioner and organic base to support and advance plant growth.

Beneficial use of sewage sludge is preferred to all other management alternatives because it:

- Utilizes the nutrient value of the organic matter inherent in sludge;
- Allows for the accelerated reclamation of disturbed or barren lands;
- Offers an organic alternative to chemical fertilizers;
- Provides for the ultimate management of the sludge by not requiring the management of a residual such as ash, after processing; and
- When managed properly, has the least cumulative impact on the environment of all management alternatives.

The following are specific beneficial use technologies currently in use in New Jersey. Unlike the hierarchy itself, these are not listed in priority order:

- Land application of liquid and dewatered soil directly into the soil;
- Pelletization to be used as a soil enhancer or fertilizer;
- Composting; and
- Alkaline stabilization to produce a SDP that can be used as a soil enhancer and/or fertilizer.

b. **Out-of-state processing for beneficial use** should continue and be expanded where possible to broaden opportunities for the beneficial use of sludge. The department views sewage sludge being processed for beneficial use out-of-state differently than sewage sludge being disposed out-of-state. The department would expect few, if any, restrictions or prohibitions on out-of-state processing or beneficial use of sewage sludge. The department, however, is aware of current federal and state legislative proposals that seek restrictions in varying degrees on out-of-state processing and beneficial use of sewage sludge. Therefore, the department is requiring DTWs planning to send sewage sludge out-of-state for processing or beneficial use to identify contingency management plans.

c. **High technology beneficial use systems** utilize the organic constituents of sewage sludge as a resource to produce other useful and marketable products. These non-burning systems involve some high efficiency intermediate conversion of the sludge's physical and/or chemical properties to enable subsequent use of the material. Examples of high technology beneficial use systems may include, but are not limited to:

- Gasification/fuel production;
- Production of inert aggregate used to manufacture other products; and
- Other systems that produce an end product suitable for marketing with limited residual requiring disposal.

d.1. **Incineration** is a less preferred method of long-term sludge management due to the fact that it does not take advantage of the nutrient content and other positive physical characteristics of sludge.

d.2. **In-state landfilling** will be permitted only in lined landfills with leachate control systems during emergencies declared by the department as stipulated in Section F. Part 4-V.

e. **Out-of-state disposal** will be accepted on an interim basis only. Long-term plans for out-of-state disposal will not be approved. As a primary policy goal by adopting the SSMP Update, New Jersey will continue to pursue its goal of self-sufficiency in disposal capacity by December 31, 1999.

4. General Program Implementation Strategy

In order to fully implement the beneficial use sludge management policy and realize the state's goal of the environmentally sound management of sewage sludge as a resource, several regulatory mechanisms will be used. They include:

a. **Federal 503 Sludge Regulations:** In February 1993, the USEPA promulgated regulations to protect public health and the environment from any reasonably anticipated adverse effects of certain pollutants that may be present in sewage sludge. The culmination of years of research and expert development, these regulations:

- Established requirements when sewage sludge is land applied for a beneficial purpose;

- Established standards when sewage sludge is disposed of on land by placing it on disposal sites; and

- Established requirements when sewage sludge is incinerated.

The DEPE will adopt the vast majority of these regulations by reference as part of the New Jersey Pollutant Discharge Elimination System (NJPDES) regulations. The adoption is expected to be noticed in the New Jersey Register during the last quarter of 1993. A substantial advantage in adopting the federal criteria will be to advance interstate beneficial use opportunities through the application of uniform technical standards among states. Such a level playing field may contribute greatly to the achievement of both New Jersey's beneficial use and disposal self-sufficiency objectives but only where protection of the environment and the general public's safety can be assured.

b. **Regulatory Requirements:** Utilizing its regulatory oversight and the NJPDES permitting process the DEPE has established the following strategy to implement the beneficial use sludge management policies:

(1) **Generator Sludge Management Plans (SMP)** - These are currently required of generators for new, upgraded or expanded facilities. By continuing to require these facilities to complete and submit a SMP, New Jersey's sludge management capacities will increase to accommodate any increase in sludge production. The DEPE will continue to utilize the standardized 1987 SSMP "Appendix K Forms" (available through Wastewater Facilities Regulation at 609-633-3823) to simplify the DTW development process and the subsequent DEPE review of these plans.

(2) **NJPDES Permits** - The DEPE intends to mirror some of the priorities specified in the 503 program. The DEPE's approach to DTW's NJPDES permits is as follows:

(a) **Class 1 sludge management facilities:** Initial permitting review efforts will concentrate on Class 1 sludge management facilities. Presently, there are 30 Class 1 facilities which generate in excess of 80% of the sludge in the state. For those Class 1 facilities that have not completed a generator sludge management plan and/or are managing their sludge production through out-of-state disposal, a condition will be incorporated into their NJPDES permit upon renewal requiring the completion and submittal of a generator sludge plan. As these facilities are required to submit SMPs, review of these plans will be given priority over non-Class 1 facility plans.

(b) Upgrading and/or Expansion of DTWs: The DEPE has and will continue to require a DTW to submit a complete SMP, inclusive of the requirements contained in the SSMP Update. This requirement is necessary to ensure adequate management capacity for any increase in New Jersey's sludge production.

(c) NJPDES Permit Renewals: All NJPDES permit renewals where the DTW (with a permitted flow equal to or greater than one mgd) identifies an out-of-state disposal facility will be required to submit a complete SMP inclusive of the requirements of this SSMP Update. This requirement is intended to eliminate the exportation of sludge for disposal and ensure the successful achievement of the DEPE's goal of self-sufficiency of disposal capacity by December 31, 1999.

(3) **Out-of-state Contract Management** - Henceforth, DTWs that export sludge for out-of-state disposal will be advised that their NJPDES permit, upon renewal, will include a permit condition requiring a SMP be submitted to the DEPE within a specified timeframe. This SMP must fulfill the conditions of the SSMP Update providing for a detailed evaluation of the alternative sludge management modes considered. The DEPE will utilize this implementation strategy for all DTWs with permitted flow of one mgd or more. For those small generators (less that one mgd), the DEPE will not enforce a uniform planning requirement. These DTWs generate less than three percent of the state's sludge production. A DTW must adhere to the implementation strategy on renewal of its five-year NJPDES permit, however, where the DTW seeks to continue utilizing an out-of-state disposal facility and the permit time period contravenes the DEPE's commitment to achieving self-sufficiency of sludge management disposal capacity by December 31, 1999.

(4) **Privatized Sludge Treatment Facilities** - As costs related to sludge management have increased, more DTWs have or are exploring the privatization of this sludge management. A privatized sludge management facility, while not the generator of the sludge, is subject to the same permitting requirements as any DTW that manages its own sludge operation. While the privatized treatment facility may be on-site at an existing DTW or constructed off-site of the DTW, the DTW's contractual agreements will dictate the permitting process. It is suggested that the DTW contact the department when pursuing a privatized sludge management alternative. Also, the DEPE will work with the private sector to facilitate the development of future sludge management facilities and production capacity.

c. **Non-regulatory Program Activities:** The DEPE is actively participating in several non-regulatory efforts to further the development and implementation of beneficial use sludge management policies. The section on the promotion of beneficial use strategies details the DEPE's efforts.

5. Pollution Prevention in Sludge Management

The DEPE has made pollution prevention a central goal that will strengthen its programs and improve New Jersey's environment. Pollution prevention refers to the reduction of pollutants at their source, through the adoption of industrial and individual behaviors that generate lower pollutant levels. The successful implementation of a comprehensive beneficial use strategy will hinge on producing and maintaining a high quality of sludge, and pollution prevention is an essential prerequisite toward this end. Pollution prevention efforts will include the following:

a. Industrial Pollution Prevention:

(1) Implementation of the Pollution Prevention Act (Act) of 1991 establishes a statewide goal of a 50% reduction over five years in the generation of hazardous substances at the source. Owners and operators of approximately 800 industries at which hazardous substances are used or maintained are required to prepare pollution prevention plans and summaries. The plans for most of the industries are due July 1, 1994.

The Act required the department within 18 months of its enactment to adopt rules and regulations necessary for the implementation of the Act. N.J.A.C. 7:1K, Office of Pollution Prevention; Pollution Prevention Program Rules, were promulgated on February 1, 1993. N.J.A.C. 7:1K has attempted to strike a balance between providing incentives to encourage voluntary implementation of pollution prevention planning techniques and maintaining adequate oversight of the development of the plans.

(2) The Act also funds a technical assistance program within the New Jersey Institute of Technology. The NJIT program initiated a pilot program in cooperation with the Bergen County Utilities Authority (BCUA) to assist seven electroplating companies which discharge into the BCUA in developing pollution prevention strategies. This pilot study will be completed during the summer of 1993.

(3) The Industrial Statewide Stormwater Permitting Program represents a new effort to improve water quality. Although not quantifiable, stormwater runoff is suspected of contributing contaminants to the DTWs. As a result of this nonpoint contribution, the majority of industrial facilities are required to obtain a general permit which will result in the development of a stormwater pollution prevention plan (SPPP). The SPPP will identify potential areas where stormwater may come in contact with industrial activities and a plan to remove or cover these activities.

b. Individual Pollution Prevention:

(1) In a 1977 study sponsored by the BCUA, domestic households were found to

contribute significantly to the contaminants in wastewater. This study will be updated over the next year. These data will attempt to accurately assess households contributions to the wastewater treatment facility.

(2) The DEPE's nonpoint source management and solid waste management programs will seek to involve individuals, local governments and industries in reducing contaminants resulting from careless, unnecessary or illegal handling of hazardous chemicals. The DEPE, in conjunction with the New Jersey Department of Agriculture (NJDOA), State Soil Conservation Districts, Rutgers Cooperative Extension and the US Department of Agriculture, Soil Conservation Service, have produced a new set of nonpoint source pollution brochures, entitled "The Clean Water Information Series." Titles for this series include:

- "New Jersey's Water";
- "Animal Waste";
- "Fertilizers";
- "Motor Oil";
- "Pesticides";
- "Managing Soil Erosion and Sedimentation";
- "Managing Pesticides Around the Home";
- "Managing Fertilizers Around the Home";
- "Maintaining Pesticides Application Equipment Around the Home";
- "Maintaining Fertilizer Application Equipment Around the Home";
- "Managing Agricultural Pesticides";
- "Maintaining Agricultural Pesticides Application Equipment"; and
- "Maintaining Granular and Manure Fertilizer Application Equipment".

These brochures are available through the DEPE's Public Access Center at (609)777-DEPE.

(3) The DEPE, in cooperation with the federally funded New York/New Jersey Harbor Estuary Program, is developing a "Citizens Environmental Handbook." The handbook, which identifies specific actions individuals can take to reduce environmental pollution, will be completed by September 1993. A similar document, the "Consumers Handbook for Reducing Solid Waste," was published by the USEPA in August 1992. This handbook (EPAS30-K-92-003) is available through the Communications Services Branch, Office of Solid Waste, USEPA, 401 M Street, SW, Washington D.C. 20460.

c. Corrosive Water Supplies:

The DEPE has begun to implement federal regulations regarding the reduction of lead and copper levels in drinking water, and consequently in sludge. Monitoring and implementation of corrosion control strategies to prevent leaching of copper and lead from water pipes will occur over the next decade. Additionally, the department is developing a $500,000 technical assistance contract to assist small water systems achieve compliance with the lead and copper rule.

d. Collection of Hazardous Wastes from Households:

Efforts are under way to establish permanent household and commercial small quantity generator hazardous waste facilities within each county. Burlington County has sited and begun construction in June 1993 of New Jersey's first permanent household hazardous waste collection facility. As of June 1993, Atlantic, Mercer, Hudson, Union, Gloucester, Somerset, Cumberland, Hunterdon, Camden, Monmouth, Cape May, Middlesex, Morris, Sussex, Warren and Ocean counties have submitted revised solid waste strategies to the DEPE which commit to serious investigation of developing permanent collection facilities. By September 1993, the DEPE will finalize "A Technical Guidance Document For the Planning and Permitting of Household Hazardous Waste/Small Quantity Generator District Programs To Assist Counties In Project Development." This document will clarify the expedited planning and permitting approach to assist counties in bringing permanent installations on-line.

6. Pretreatment

The DEPE's primary objective is to achieve the highest sludge quality practicable through pollution prevention and pretreatment toward maximum use of traditional beneficial use systems. At the same time, in order to reduce exports and advance self-sufficiency, the DEPE is generally supportive of applications for high technology beneficial use systems for DTWs that currently have lower sludge quality and limited short-term opportunities for traditional beneficial use applications.

The industrial pretreatment program has experienced tremendous success over the past decade. Continued strengthening of the industrial pretreatment requirements is essential to raising the quality of sludge so that maximum utilization of beneficial use options can be achieved. Following are steps being taken to improve industrial pretreatment:

Short-term Strategy for Pretreatment

a. The DEPE has and will continue to utilize the "Guidance Manual on the Development and Implementation of Local Discharge Limitations Under the Pretreatment Program, USEPA 12/87." The Guidance Manual specifies that surface water quality standards, the DTW's sludge quality, worker protection and safety at the DTW, and treatment plant inhibition are factors that must be considered and addressed when developing or re-evaluating local limits.

While a DTW's sludge quality is often found to be the limiting factor in establishing local limits, a DTW employing a high technology beneficial sludge management system may find that one or possibly a combination of the other factors identified above is (are) the limiting factor(s) in establishing local limitations.

b. There are 23 DTWs regulating approximately 1,600 industrial discharges that have been delegated authority over their industrial pretreatment program. These delegated local agencies are required, among other things, to issue permits and set and enforce local limits for industrial discharges into their sewer system.

c. Enforcement of the pretreatment program is being improved by implementation of the Clean Water Enforcement Act (CWEA), which specifies increased reporting requirements. The CWEA requires that significant indirect users report monthly.

d. A training program to assist DTWs in developing appropriate local limits is being finalized. The DEPE will attempt to schedule this training in 1994 to assist delegated and non-delegated DTWs with the development of these limits.

Long-term Strategy for Pretreatment

a. Six additional DTWs will receive delegation of pretreatment programs in the coming years. It is anticipated that North Bergen Sewerage Authority, Landis Sewerage Authority and Cumberland County Sewerage Authority delegations will occur in 1994. The remaining DTWs -- Tri-City Sewerage Authority, Northeast Monmouth Regional Sewerage Authority and Parsippany Troy Hills Sewerage Authority -- will receive delegation after 1994. The delegation of these DTWs will continue the DEPE's efforts of focusing on DTWs whose daily wastewater flow includes at least 10 percent from industrial sources.

b. In November 1992, the DEPE proposed new water quality standards. The USEPA adopted toxic criteria for New Jersey in December 1992. USEPA's adoption requires the DEPE to re-evaluate its surface water standards. It is anticipated the DEPE will adopt some of the federal toxic criteria while also renoticing draft toxics and metals criteria by November 1993. The development of new surface water quality standards may, in some cases, require more stringent pretreatment limits and thereby could have a positive effect on sludge quality.

7. Promotion of Beneficial Use Strategies

In addition to regulatory requirements to increase consideration of beneficial use sludge management alternatives, the DEPE is currently active in the development of a comprehensive communications plan that will promote and support movement toward strategies and markets that maximize beneficial uses.

Short-term Strategy for Promotion of Beneficial Use

a. The DEPE will continue to provide staff for the Statewide Committee for Organics Recycling Education (SCORE), a coalition of major organizations providing educational materials and programs to the public.

   (1) In January 1993, the DEPE and SCORE co-sponsored the conference "Sludge Management in New Jersey: Issues and Impacts." As a result of an overwhelming response, a second conference has been scheduled for January 1994.

   (2) SCORE has developed several fact sheets to inform and educate the general public. These fact sheets are available from SCORE or DEPE:

   - Sludge Fact Sheet Glossary of Key Terms;
   - Policy in a Public Forum - Sludge Management in New Jersey;
   - Beneficial Uses of Sewage Sludge in New Jersey;
   - Composting;
   - Pretreatment; and
   - Land Application.

   (3) SCORE has been involved as a facilitator during the early phases of several beneficial use projects. The committee has met with citizen groups and local officials regarding a land reclamation project in High Point State Park, a potential composting facility in Mine Hill Township and the land application of sludge in Monmouth County.

b. The Association of Environmental Authorities (AEA), in an effort to promote the beneficial uses of sludge, has produced its own videotape titled, "Impacts - Beneficial Uses of Biosolids." This video provides a general discussion of various beneficial use sludge management technologies.

   The DEPE will continue to provide opportunities for public input into the policy-making process. The Sludge Management Policy Guidelines which outlined the basic policy positions detailed in the SSMP Update, were widely distributed in April 1992 and were the subject of a pre-proposal workshop on May 26, 1992. Comments received from the workshop and subsequent written comments have been considered and integrated into the SSMP Update, as appropriate.

c. The DEPE continues to encourage public input and discussion in the finalization of the

SSMP Update.

d. It is the DEPE's position that the public in communities where sludge and SDP are proposed for beneficial use be involved in such issues as early in the process as possible. The DEPE maintains that siting of a sludge management facility is primarily the responsibility of the sludge generator. To assist in addressing local concerns, however, the DEPE will provide staff to work as liaisons with potential host communities of sludge sites.

e. SCORE's activities, AEA's efforts, public input and response to local concerns are elements of the DEPE's communications efforts to promote and educate the general public regarding the beneficial uses of sewage sludge. These efforts will be discussed and expanded in a comprehensive communications plan that will be completed by the end of the first quarter of 1994. This plan will review DEPE's utilization of existing solid waste recycling networks and contracts to promote and educate the general public of these policies. Finally, the plan will also address DEPE's internal communications network.

f. The DEPE will assist in market development through the following strategies:

(1) Efforts have been initiated to revise current state procurement practices to require utilization of sludge or SDP where similar commercial products are currently used. Governor Florio's Executive Order # 91 establishes procurement goals and preferences for recycled products including sludge. Revised procedures, in addition to focusing on recycled products, will target use of sludge and SDP on public land in agricultural and landscaping applications, road construction projects and restoration of disturbed lands. A statewide procurement conference will be held in October 1993 to educate municipalities and counties of procurement procedures that promote use of recycled products and materials.

(2) A significant market for SDP is likely to be in landfill cover applications. As of June 1993, 12 major landfills remained in operation in New Jersey. Each is under regulatory requirements to apply daily, intermediate and final soil cover. The active landfills, as well as the universe of at least 168 landfills that ceased operations after January 1982, are required to submit and implement closure plans that include procedures for final cover. The DEPE has granted regulatory approval for use of SDP as daily cover to the Middlesex County Utilities Authority which operates the Edgeboro Landfill. Additionally, the DEPE has approved the use of SDP as part of the final closure plan for the Belvedere-White Landfill in Warren County.

(3) The DEPE will continue to evaluate enhancement of markets through tax credits, low-interest loans, and other economic strategies.

(4) Research projects are being undertaken to assess potential markets for specific

sludge applications. The DEPE is presently working with Rutgers University in developing research projects that would ascertain how sludge combined with municipal solid waste could be utilized in landscaping. Additionally, the DEPE recently began efforts to establish a research project at the Rancocas State Park where Class A sludge has been land applied on agricultural leased land for over the past six years.

(5) Demonstration projects will be undertaken to test the effectiveness of specific applications. The DEPE will develop and begin utilizing a general permit protocol to streamline the approval of limited duration demonstration projects in 1994.

g. Efforts are under way to work with the agricultural community in resolving liability concerns. In a six-month joint cooperative effort, the DEPE will create an interdepartmental team with the NJDOA and legal representation to review these concerns. These concerns include:

(1) Farmer protection from nuisance suits under the Right-to-Farm Act. Presently, there are no adopted agricultural management practices for sludge and SDP that would afford farmers protection from nuisance suits arising in response to normal farming operations.

(2) The farm community has expressed concerns regarding the effect that the application of sludge and SDP may have on future uses of the land. Specifically, evolving state and federal standards, participation in the government funding programs and potential deed restrictions due to the utilization of sludge or SDP are site liability issues that must be addressed if the farming community is to support the department's beneficial use sludge management policies.

The team will prepare a report documenting the issues, its conclusions and recommendations to the commissioners of DEPE and NJDOA.

Long-term Strategy for Promotion of Beneficial Use

a. Through the implementation of its comprehensive communication plan, the DEPE will continue efforts in the following areas:

(1) The DEPE will continue to support the public education initiatives of the SCORE. The DEPE will assist with the long-term strategy to facilitate SCORE's involvement in emerging issues. This strategy will focus on the timeframe for the state to become self- sufficient in disposal capacity.

(2) Further efforts will be made to continue the consensus-building process in sludge management policy by including the general public and interest groups in the development of DEPE policies and strategies implementing those policies.

(3) A guide will be developed summarizing successful approaches to siting that achieve local acceptance. A target date for completion of this guide is September 1994.

b. Market development efforts will continue, in terms of research, demonstration projects, and economic incentives.

While the DEPE reserves its right to establish sludge quality standards that ensure the protection of the state's environment, it also supports federal leadership in developing markets and uniform standards for sludge and SDPs. Such leadership will provide wider potential distribution of the material and greater market certainty.

c. The DEPE will work with the agricultural community in implementing solutions to obstacles preventing full acceptance of beneficial use.

8. Sludge Quality Standards: Regulatory Approach

In February 1993 the United States Environmental Protection Agency issued 40 CFR 257, 403 and 503, Standards for the Use or Disposal of Sewage Sludge: Final Rules (503 program or regulations). The 503 program identifies "exceptional quality" or EQ sludge as the quality (along with a requisite level of pathogen and vector attraction reduction) where sludge becomes a product of commerce. While pollution prevention and pretreatment are prerequisites to maximizing a DTW's sludge management alternatives, with the promulgation of the 503 regulations, it is anticipated that market development and economics will motivate sludge generators to achieve the EQ standards.

The DEPE will establish standards that protect the environment and public health. While the DEPE standards are reflective of the most current scientific information, it will also reward, through deregulation of material achieving the EQ standards as solid waste, those DTWs that consistently produce sludge meeting the highest standards established.

Short-term Strategy on Standards

a. The DEPE intends to adopt the federal 503 program with minor modifications (those standards identified in the 503 program will be adopted without change). The adoption of the 503 program through the DEPE's NJPDES regulations, are expected to be noticed in the New Jersey Register by December 1993.

b. The DEPE will continue to use the existing Class A and B sludge quality standards until the 503 standards have been adopted.

c. The DEPE Division of Science and Research will continue to conduct research on sludge standards, including surveys of scientific evidence and risk assessments, and expanding the work done on copper, lead, cadmium and pathogens. The DSR's research and review of the USEPA standards, in addition to the standards identified in the New Jersey Agricultural Experiment Station's (NJAES) Agricultural Management Practices (AMP), have generated a number of questions that need to be resolved. The DEPE has initiated discussions with NJAES, the NJDOA and USEPA to continue the evaluation of the 503 standards to ensure they provide the level of protection necessary for New Jersey's environment. Within six months of the adoption of this SSMP Update, the DEPE will conclude this joint preliminary review.

d. With the promulgation of the federal regulations, the DEPE is currently reviewing its monitoring requirements of sludge produced during the wastewater treatment process, and in the production of SDP. With the adoption of the federal 503 program, the DEPE will propose modifications to its monitoring requirements to ensure consistency with the federal program. The DEPE may require additional monitoring based on the unique characteristics of sludge generated in the state.

e. Compliance with sludge standards shall be determined by the quality of the sludge or SDP at the end of the sludge treatment process, not the inflow to that process. The DEPE will allow generators, whose management mode requires the attainment of the EQ sludge to petition the DEPE, to allow a wider range of sludge quality provided the sludge to be blended meets the USEPA ceiling concentrations and where it can be demonstrated that the quality of the final material will not be compromised.

f. Although the department did not adopt N.J.A.C. 7:26D, which included the soil clean-up standards, compatibility with any future clean-up standards will have to be achieved so that material can be land applied in an environmentally sound manner without affecting future uses of these sites. It is important to recognize that the relative mobilities of metals is the primary consideration in whether sludge or SDP can be safely applied to land. Recognizing the speciation of applied metals is important to achieving compatibility between future soil clean-up standards and sludge standards, since metallic pollutants in sewage sludge are bound to an organic matrix which results in less bioavailability and uptake.

Long-term Strategy on Standards

Research on standards will continue, and it is likely that the framework of several classifications, involving different levels of regulation, will continue. At the same time, efforts will continue in case-by-case cooperation with DTWs, to encourage achievement of the highest levels of quality possible.

The DEPE will continue to advocate federal leadership in establishing standards for SDP. Such action will advance interstate beneficial use opportunities through the application of uniform technical SDP standards among states.

9. Regionalization of Programs and Facilities

The Solid Waste Management Act (N.J.S.A. 13:1E-43) encourages regional approaches to sludge management planning, through integration with the solid waste planning process. To implement this statutory guideline, where counties delegate sludge planning to generators, the DEPE will require DTWs to consider regional cooperation in preparing their SMPs.

a. The regionalization analysis will involve the following four requirements:

   (1) All DTWs with permitted wastewater flows of 1 mgd or more must consider the feasibility of regionalizing each component of their sludge management system when preparing their SMP.

   (2) Any new or expanded incineration facilities must be regional in nature. The DEPE's definition of a regional facility is a facility that is in receipt of all or a significant portion of sludge generated by two or more large DTW generators or numerous smaller generators.

   (3) All DTWs with permitted wastewater flows of less than 1 mgd should explore regional opportunities for the treatment, handling and management of their sludge production. While the DEPE views contract management of a DTW's sludge production as a step toward regionalization, it also views these small DTWs as ideal candidates for small-scale beneficial use projects. Where such small-scale systems are impractical, the DEPE strongly supports regional planning, particularly in terms of utilization of regional systems that exist or are planned for composting and other forms of beneficial use.

   (4) Other components of the sludge management system to be considered for regionalization include, but are not limited to, dewatering equipment, beneficial use projects among multiple authorities including selection, purchase of and construction of SDP systems, pollution prevention protocols for assessing industrial discharge production changes, and public education.

b. Procedures for DTWs to follow when initiating a regionalization feasibility analysis include analysis of existing systems, identification of limitations in existing plans/permits, identification of possible regional partners, discussion with potential partners, and analysis of feasibility and appropriateness of regional approaches.

c. In order to promote the beneficial use of sludge, the DEPE requires the DTW to provide documentation of its consideration of various beneficial use sludge management alternative(s). Historically, a summary of this information has been included in the DTW's "Appendix K Forms." A beneficial use analysis is a more comprehensive consideration of the beneficial use alternatives available to the DTW. This analysis can still be summarized in the appropriate "Appendix K Forms"; however, detailed documentation must be available on request by the DEPE. A beneficial use analysis will be required of the following:

(1) Any DTW seeking to increase the size of its incinerator or construct a new incinerator must complete a beneficial use analysis as part of its SMP, exploring alternatives including, but not limited to, the following categories: land application, pelletization, composting, chemical stabilization, or contract management through a beneficial use process.

(2) Any DTW that has a contract(s) for out-of-state disposal (e.g., in landfills) or plans to upgrade/expand and has a permitted wastewater flow of 1 mgd or more is required to submit a generator sludge management plan, inclusive of a beneficial use analysis.

(3) Any DTW that seeks to manage its sludge production through an in-state disposal management alternative must submit to the DEPE for review and approval an explanation of its reasoned rejection of beneficial use sludge management alternatives.

(4) DTWs pursuing beneficial uses need not perform a beneficial use analysis, but will be required to conduct the regionalization analysis.

d. The major DTWs currently exporting sludge for landfill disposal are under JCDs, with the DEPE, USEPA and the federal Department of the Justice requiring that they develop long-term in-state management alternatives. Given that these DTWs are bound by short and long-term plans identified in their JCDs, the DEPE will not require further regionalization analysis. When developing their long-term plans, however, several of the DTWs did formally and/or informally consider various regional opportunities. The DEPE strongly advocates consideration of regionalization opportunities, and is willing, on request, to facilitate each DTW's review of available opportunities.

10. Self-Sufficiency and Interstate Waste/Product Shipment

In order to assess self-sufficiency of New Jersey's management options, the following factors must be considered:

- JCDs for Linden Roselle Sewerage Authority (LRSA), Bergen County Utilities Authority (BCUA), Rahway Valley Sewerage Authority (RVSA), and Joint Meeting of Essex and Union Counties (JMEU) have been modified to abandon long-term plans for incineration. These JCDs now reflect beneficial use sludge management strategies.

- The largest of the former ocean dumping DTWs, Passaic Valley Sewerage Commissioners (PVSC), must continue to improve its pretreatment program in order to obtain a cleaner sludge quality to consider a (or multiple) beneficial use alternative(s).

- There are sufficient markets to utilize all material produced after implementation of all planned and existing beneficial use management alternatives.

The DEPE will utilize the strategies identified in this SSMP Update to expedite movement toward self-sufficiency in disposal capacity for New Jersey's sludge production. These strategies include:

- Enhanced pollution prevention and pretreatment strategies;

- Regionalization analysis; and

- Beneficial use analysis inclusive of economic and environmental evaluation.

Under the broad planning and permitting approval authority, sludge generators will be required to evaluate and maximize regional beneficial use alternatives. It is anticipated that these requirements will eliminate the state's dependency on out-of-state disposal of sludge by December 31, 1999.

To determine what it will take for the state to achieve self-sufficiency in disposal capacity, the department utilized a step-by-step approach. The DEPE estimated that if all DTWs operated at their permitted capacity, approximately 2,554,127 dry pounds per day, or 466,105 dry tons per year (dt/y), of sludge would be produced. It then calculated existing permitted and planned production throughput capacities of all DTWs. (Production throughput capacity is defined as the maximum sludge quantity a DTW will produce if operating at its maximum existing permitted wastewater flow.) Lastly, utilizing the existing JCDs of the major DTWs, (PVSC, JMEU, LRSA and BCUA) exporting sludge and associated project implementation timeframes identified in the respective JCDs, the DEPE is able to project disposal needs for the state. Middlesex County Utilities Authority (MCUA) and RVSA have already implemented their long-term beneficial use sludge management alternatives. MCUA's alkaline stabilization facility production throughout capacity has already been included in the DTW aggregate existing production throughput capacity. RVSA's sludge management strategy utilizes an existing in-state beneficial use facility; therefore there is no additional increase to the state's throughput capacity.

The following summarizes New Jersey's movement to self-sufficiency of disposal capacity:

Sludge Production at DTW Permitted Capacity	466,105 dt/y
Less DTW Aggregate Existing Production Throughput Capacity	- 331,183 dt/y
Subtotal	134,922 dt/y
Less Planned Capacity of DTWs under JCDS	- 196,735 dt/y
Excess Capacity	61,813 dt/y

While an excess capacity is identified, this capacity must be maintained to manage sludge during and after planned and/or seasonal downtimes of the sludge management operations.

a. **Interstate shipment of sludge-derived products** is encouraged by the DEPE as part of the natural development of an extensive and healthy market for sludge products. Interstate shipment of sludge for disposal, however, is a different matter. It is anticipated that federal legislation may restrict or outright ban out-of-state shipment of solid wastes. Presently, the draft legislation does not include sludge. It is the DEPE's opinion, however, that similar pressures from those states receiving sludge for disposal may result in similar proposed restrictions on sludge, or an amendment to the present draft legislation.

   The DEPE has and will continue to support:

   (1) Federal leadership in developing markets and uniform SDP standards. The DEPE has initiated the establishment of a level playing field by moving to adopt the federal 503 standards;

   (2) Uniform planning requirements for all states;

   (3) Federal oversight of rationally based and uniformly applied differential fees;

   (4) Free movement of sludge and SDP to beneficial use sites; and

   (5) Preservation of existing contracts for landfill disposal capacity.

11. Scope of Generator Planning Responsibility

Generator responsibilities have not changed significantly since publication of the 1987 SSMP. As indicated in Section F., every treatment plant is a sludge generator and is responsible for the proper planning and management of its sludge production. In the absence of a district sludge management plan, DTWs have been required to execute SMPs for the quantity of sludge generated by their treatment facility at the permitted flow or at the projected flow, whichever is greater, over a 10-year planning horizon.

While the general responsibilities of the DTW of managing its sludge production have not changed significantly, the DEPE is clearly requiring more from the DTW. The DTW is the focal point for implementation of the state policy. Sections B.4, 6 and 9 of the SSMP Update address specific requirements of the DTW. As indicated in Sections B.1, 5, 6 and 7, the DEPE will also direct its efforts to industrial and household contributions into the DTW.

12. Economic Regulation of Disposal Facilities

The DEPE will continue to monitor and evaluate user costs to ensure the public receives proper and reasonable wastewater services. The DEPE welcomes input regarding the need for, and the nature of, possible future economic regulation of wastewater disposal facilities.

13. Contingency Planning

In the event of an interstate disposal ban, New Jersey would use a variety of mechanisms to ensure continued safe management of sludge. They would include the following:

a. Utilization of back-up contracts currently required of all DTWs using out-of-state disposal facilities. The DEPE will require those DTWs that export sludge for processing into a SDP to enter into formal contractual agreements for 100% of the DTW's sludge production. DTWs must negotiate back-up contracts (or provide contingency sites as a term of their primary contract) in multiple states in the event they are prohibited from utilizing their primary contracts.

b. In addition to existing contracts, in the event of an unanticipated disruption of the interstate movement of sludge and/or the activation of primary contingency contracts, within 45 days of such disruption the DTW must bid and award secondary contingency contracts for any anticipated downtime at the primary contingency contracted facility.

c. Under the Solid Waste Management Act (specifically N.J.S.A. 13:1E-9.5 and regulation at 7:26-6.7), redirection to other in-state facilities with available excess capacity could be utilized for sludges with appropriate quality, to avoid service disruptions.

d. Use of emergency on-site storage permits can be pursued for short-term interruptions under the procedures set forth in Section F. Part 4-VIII.

e. As specified in N.J.S.A. 13:1E-42 and in Section F. Part 4-V, sewage sludge can be temporarily landfilled in lined landfills with leachate control systems only under emergency conditions, as declared by the DEPE, for which no other viable alternative exists. Such emergency landfilling can only be implemented at specified landfills that are lined, have systems for the interception collection and treatment of any and all leachate generated at the facility, as well as ground water monitoring wells and methane gas recovery equipment.

   While the above discussion is intended to address unanticipated disruption of interstate movement of sludge, all DTWs are required to have contingency plans for anticipated downtimes of their sludge management alternatives.

III. STATUS OF CURRENT PROGRAMS

This section summarizes the current status of New Jersey's sludge management programs. It is divided into four sections: overview of data management systems; sludge generation: current and future sludge generation; beneficial use and disposal trends; and a statewide capacity analysis.

1. Overview of Data Management Systems

The DEPE uses different data management systems to track sludge management in New Jersey.

a. **Sludge Quality Assurance Regulations (SQAR)** - SQAR reports are prepared by DTWs on a routine basis to provide analysis on current sludge volume and contaminants, including metals and organic compounds, and management modes utilized. SQAR is the basic database for ensuring DTW compliance with sludge quality standards and regulations.

b. **"EXIST" Database** - The EXIST database provides a major planning tool for the DEPE to project the quantity of sludge anticipated to be generated by the DTW at an efficiency that protects effluent quality. The EXIST database consists of DTW's sludge management volumes derived through the utilization of theoretical algorithmic constants or site-specific mass balance calculations using wastewater flow information.

c. **Contracts Data File** - The contracts data file complements the EXIST information by recording where the sludge is ultimately disposed of or otherwise managed. This file provides the name and duration of commitment of the primary and secondary (if appropriate) management facilities. This file is extremely useful as a tracking mechanism for sludge management in New Jersey.

d. **Data Management System Reform** - In an attempt to generate accurate data that can be used on a real-time basis as compared to the theoretical projections of the EXIST database, the DEPE has identified enhancements and upgrades to the existing databases. Recommendations for enhancements to the current databases include:

    (1) Allowing for improved data entry and retrieval of actual sludge production on a calendar month basis;

    (2) Generation of an Algorithm Comparison Report;

    (3) Expansion to allow the reporting of quantitative information of multiple management sites during a calendar month;

(4) Expansion of the database to allow the tracking of required changes in a DTW's reporting frequency; and

(5) Expansion of the database to allow for the DTW's entry of priority pollutant scans.

It is the DEPE's goal to implement these upgrades in 1994.

2. Sludge Generation: Current and Future Trends

This section provides a series of tables summarizing and analyzing current information on sludge management in New Jersey and projected production trends.

a. **Inventory of Existing Sludge Management** - Volumes of sludge and management modes for all DTWs in the state are indicated, with data current as of August 1993 or as otherwise indicated. Recently the DEPE has reviewed data submitted under SQAR and has noted a significant downward trend in the state's sludge production. Of significant interest is the decrease in PVSC sludge production due to implementation of alternative residuals management strategies for three (3) of its largest customers; Marcal Paper Mills, Inc., Garden State Paper Company, Inc. and Anheuser Busch.

b. **Analysis of Existing Sludge Management Production** - Statewide production of sludge is estimated to be approximately 1.87 million dry pounds per day, or 341,000 dry tons per year (dt/y). According to the DEPE databases, approximately 57% of New Jersey's sludge production, or 193,000 dt/y, is currently exported out-of-state, primarily for landfill disposal.

Another significant aspect of New Jersey sludge production relates to the enormous disparity in material produced by each generator. There are 442 known sludge generators in the state. Per the SQAR database, 103 DTWs, or less than 25% of the total number of DTWs, generate approximately 97% of the state's sludge production. Of the 103 DTWs, one DTW, PVSC, generates 40% of the state's sludge (as of November 1992). The remaining five former ocean dumping DTWs -- MCUA, JMEU, RVSA, LRSA, and BCUA -- account for another 20% of the state's sludge production. While there are other DTWs that produce more sludge than the former ocean dumping DTWs, these DTWs are under JCDs to develop long-term land-based sludge management alternatives and therefore, are critical to New Jersey's movement toward self-sufficiency in disposal capacity.

c. **Projected Sludge Production** - Projected sludge volumes at current design flow capacities are provided. This assumes that all DTWs will at some point reach their design flow limits, and provides an indication of how sludge volume may increase.

3. Beneficial Use and Sludge Disposal Trends

Bans on sludge disposal through landfilling and ocean dumping have resulted in major shifts in sludge management trends. This section provides additional information on current management methods and trends over time. Since 1987, beneficial use alternatives to disposal have increased from approximately 12% to almost 20%, while the state's dependency on incineration has held relatively constant at approximately 20%.

a. **Inventory of Existing Land-based Sludge Management Operations** - Lists are provided of all existing permitted sludge handling and ultimate sludge management operations throughout the state. It is important that planners and sludge generators do not interpret these lists as restrictive, but rather as a starting point when evaluating sludge management alternatives.

b. **Costs of Sludge Management Facilities and Operations** - Results of a limited telephone survey of DTWs on costs of various management methods are provided. The DEPE provides this information only as a quick, unsubstantiated measurement of costs related to sludge management. Again, this information should be used as only a starting point for DTWs when evaluating sludge management alternatives.

c. **Inventory and Trends of Sludge Quality** - Advanced wastewater treatment, while producing a cleaner effluent to meet more stringent effluent limitations, increases a DTW's sludge production. As treatment plant efficiency increases, it is possible that its sludge quality may deteriorate. Information on sludge quality classifications by county, and trends in overall metal loading reductions as well as reductions in heavy metal concentrations at 10 of the largest DTWs, are provided. These reductions are the result of the DTWs' and the DEPE's aggressive pretreatment efforts. These efforts result in a cleaner sludge and thereby may allow for the maximization of beneficial use sludge management alternatives.

   As indicated by the graphs in the SSMP Update, DTWs have shown a reduction, for the most part, in heavy metal concentrations between 1987 and 1992. In addition to these summary graphs, detailed breakout graphs of ten major DTWs over the time period 1987 through 1992 reflect significant reductions in the average values for each metal constituent. Annual mean concentrations for each metal can be compared to New Jersey Class A and Class B sludge quality. The general trend for most heavy metal concentrations is downward for the DTWs represented.

   Also provided are data on the state's current sludge quality. Again, the disparity of sludge generation requires a closer look at individual DTW's sludge quality. While 53% of New Jersey's sludge is currently classified as Class C quality, 76% of this material is generated by PVSC. This statistic highlights the need for advanced pretreatment, where feasible and practical, to allow for the maximization of beneficial use sludge management alternatives.

d. **Sources of Contaminants in Sewage Sludge** - Contrary to popular belief, industrial discharges to DTWs alone do not account for all Class C sludge generated in New Jersey. The DEPE's data indicate that only 16% of the DTWs in New Jersey have industrial users.

4. Statewide Capacity Analysis

The DEPE's fundamental objective is to completely eliminate the exportation of sludge to out-of-state disposal facilities and to be totally self-sufficient in disposal capacity in seven years (by December 31, 1999). The state's primary means of achieving this objective is the implementation of pollution prevention strategies by the industrial community and aggressive pretreatment programs by all DTWs in the state and maximizing existing management capacities. Implementation of these strategies will produce the highest quality sludge possible and thereby allow for the maximization of beneficial use sludge management alternatives. In order to assess the state's disposal capacity, the DEPE has used a step-by-step approach. These figures were presented in the self-sufficiency section of this Executive Summary as well as the Self-Sufficiency and Statewide Capacity Analysis sections of the SSMP Update.

IV. INTERRELATIONSHIP OF STATE AND FEDERAL PROGRAMS

This section describes the history of interactions between state and federal efforts in several key areas relating to sludge management.

1. Termination of Ocean Dumping

Ocean dumping was banned in New Jersey as of March 17, 1991, through legislative initiatives. The federal Ocean Dumping Ban Act of 1988 prohibited ocean disposal of all municipal sewage sludge after December 31, 1991. As a result of the cessation of ocean disposal of sludge, those DTWs that had federal permits for ocean disposal were required to enter into JCDs.

2. Judicial Consent Decrees for Former Ocean Dumping Authorities

The six sewerage authorities (PVSC, MCUA, BCUA, LRSA, JMEU and RVSA), which had been utilizing ocean disposal in the 1980's, were placed under JCDs to ensure termination of ocean dumping and implementation of long-term land-based alternatives. Implementation and enforcement of the JCDs has been a combined federal and state effort, in cooperation with the sewerage authorities. Since the original negotiations, these JCDs have undergone numerous revisions. Currently, five of the six DTWs are planning to implement beneficial use sludge management strategies. The sixth sewerage authority (PVSC) is currently renegotiating its JCD to establish a multiple track JCD that will maximize beneficial use sludge management strategies.

3. Current Grants and Research Initiatives

A summary of current and future research initiatives is provided. Many of the future research efforts are supported through federal funding. The DEPE recently initiated a research project to assess the impact of land applying Class A sludge on state-owned lands.

V. PROGRAMMATIC BACKGROUND

This section provides an update of the historical overview of sludge management previously included in the 1987 SSMP, and an outline of the institutional and legal framework supporting the state's sludge management policies.

VI. SLUDGE MANAGEMENT PLAN IMPLEMENTATION PROCEDURES AND RELATED INFORMATION

Much of the information presented in the original 1987 SSMP has evolved and has been updated, while other information is still valid in its original form. The SSMP Update incorporates this necessary information to create a "stand alone" document. The reader can utilize the SSMP Update as the guidance document in preparing a Sludge Management Plan. The "Appendix K Forms" referenced in this section, as well as all other forms referenced in this SSMP Update, are available on request from DEPE's Wastewater Facilities Regulation Program at (609-633-3823).

This section of the SSMP Update provides the implementation procedures and related information in the same basic format of the 1987 SSMP. This section is comprised of Parts 1 through 6, which generally contain information under the same topics as in the 1987 SSMP.

VII. CONCLUSION

This summary provides an overview of the changes in sludge management policy, which will be formalized with the adoption of the SSMP Update that amends the 1987 SSMP. Consistent with New Jersey's progressive policy directions in other areas of waste management, these changes will emphasize pollution prevention, and expedite movement toward recycling of sewage sludge into beneficial uses and toward the end of out-of-state disposal. The conversion of sludge into beneficial products transforms an undesirable waste into a valuable resource. This approach reduces the negative environmental and social impacts of management through waste disposal, while contributing to agriculture and other industries. It is hoped that the policies established in this SSMP Update will support innovation and initiative among all those involved in sludge issues in working together toward a carefully crafted, environmentally sound statewide sludge management program emphasizing beneficial use and self-sufficiency.

SOLID WASTE MANAGEMENT STATE PLAN UPDATE: 1993 - 2002
SECTION III: STATEWIDE SLUDGE MANAGEMENT PLAN UPDATE

TABLE OF CONTENTS

ATTACHMENT

GLOSSARY

ACTIVATED SLUDGE means residuals from aerated wastewater treatment system which consist largely of organic matter. Activated sludge is used to "seed" the influent lines of aeration tanks to supply micro-organisms to feed on the raw or partially treated sewage, thereby reducing its pollution load on the water body into which the effluent is discharged.

ADDITIONAL DOCUMENTS means those documents which must be submitted along with the district sludge management plan in the submission package as detailed in Part 6 of this SSMP Update.

ADSORPTION means surface bonding.

AEROBIC means in the presence of free oxygen.

AGRICULTURAL CONSERVATION PLAN means a plan, often prepared with the assistance of the USDA/SCS, for the comprehensive management of a given parcel of agricultural land, including such items as, recommended structural erosion and sedimentation controls, crop rotation schedules and tillage schemes which all minimize soil loss and maximize productivity.

ALTERNATIVES DOCUMENT means the component of a sludge management plan which outlines and evaluates possible long-term and contingency sludge management alternatives. The document consists of all "Appendix K Forms" prefaced with an "A".

ALTERNATIVE TECHNOLOGY means any treatment or utilization system which employs techniques which are fully proven for their intended use and which provide for at least one of the state goals for resource recovery and reuse which are outlined in Part 4-VII of this SSMP Update.

ANAEROBIC means in the absence of free oxygen.

APPROPRIATIONS DOCUMENT means the component of a sludge management plan in which sources and amounts of monetary allocations for sludge management planning are specified including an appropriations resolution by the governing body.

AREAWIDE WATER QUALITY MANAGEMENT PLAN means the document prepared according to Section 208 of the federal Clean Water Act which details the sources of water pollution within the designated planning area and designates agencies responsible for planning and implementing facilities to address those pollution sources.

AUTHORIZED REPRESENTATIVE means a person authorized in writing by a principal executive officer or ranking elected official. The written authorization must specify an individual or position and must be submitted to the department.

BIOLOGICAL OXYGEN DEMAND means the amount of oxygen required for biological oxidation of solids.

BUNKER SILO means a structure with low walls, a sloping floor of an impervious material (usually concrete), and a leachate collection system, designed to hold dewatered residuals.

CERTIFICATION means the determination made by the Commissioner to approve, modify or reject, in whole or in part, any sludge management plan, including a detailed statement indicating the reasons for any modification or rejection and outlining the action to be taken pursuant to N.J.A.C. 13:lE-24d).

CLARIFIER means a settling tank used in the treatment of wastewater to settle residuals out of the treatment process.

CLEAN INDUSTRIAL SLUDGE OR RESIDUALS means those residuals which result from industrial processes and which are not defined as hazardous according to the solid waste management rules (N.J.A.C. 7:26-8 et seq.) the federal hazardous waste rules (40 CFR 261) or the Resource Conservation and Recovery Act and regulations promulgated thereunder.

CO-COMPOSTING means the process of composting municipal solid waste together with sewage sludge.

CO-DISPOSAL means the ultimate management of municipal solid waste together with sewage sludge.

CO-INCINERATION means the incineration of municipal solid waste together with sewage sludge.

COMMISSIONER means the Commissioner of the Department of Environmental Protection and Energy.

COMPOSTING means the biological decomposition of dewatered organic residuals under controlled conditions of temperature, pH, oxygen and moisture, by which the volatile fraction, the putrescibility, and the pathogen concentrations in the residuals are reduced.

CONTINGENCY ALTERNATIVE means a sludge management alternative which is planned and implemented to be utilized during periods when the regularly used alternative(s) is not operating due to planned closure. The contingency alternative must be capable of managing all sludge which is produced during such periods.

DELEGATION DOCUMENT means the component of a district sludge management plan in which the lead planning agency for the district is delegated or designated. It consists of a copy of the formal notice and minutes of the meeting(s) held with all district sewage treatment agencies, the formal resolution naming the lead planning agency and all applicable "Appendix K Forms" which are prefaced with a "D".

DEPARTMENT or DEPE means the Department of Environmental Protection and Energy.

DESIGN FLOW means the maximum volume of waste (in millions of gallons per day (MGD)) that a facility is designed to treat properly.

DEWATERING means the process of removing water from sludge, and thereby increasing the percent solids.

DIGESTION means the process by which microorganism act on liquid residuals under controlled temperature, oxygen and pH conditions to reduce the volatile fraction, the putrescibility and the concentration of pathogens in sludge.

DIRECTED SLUDGE GENERATOR means a sludge generator directed by the department to perform long-term sludge management planning in the event of district failure to plan.

DISTRICT SLUDGE MANAGEMENT PLAN means the formalized document developed by a District or its designated or delegated lead planning agency(ies) for submission to the state for certification as mandated in the Solid Waste Management Act. The district sludge management plan is comprised of all "Appendix K Forms" and is divided into four documents: an Inventory and Strategy Document, an Alternatives Document, a Selection Document and an Implementation Document. For the purposes of this plan, it shall also include the sludge management plans prepared by a directed sludge generator(s) in the event of district failure to plan.

DISTRICT SLUDGE TASK FORCE SUBCOMMITTEE means the subcommittee of the District Solid Waste Advisory Council, created by formal resolution to review and comment on each of the components of the district sludge management plan. The subcommittee consists of representatives of various sludge management interest groups as detailed in Part 6 of this SSMP Update.

DIVISION means the Division of Water Resources of the New Jersey Department of Environmental Protection, whose wastewater permitting functions are now the responsibility of the Wastewater Facilities Regulation Program (WFRP).

DOMESTIC SLUDGE means the sludge produced at treatment plants which treat only flows from non-industrial sources (e.g. residential and commercial users).

DOMESTIC SEPTAGE is either liquid or solid material removed from a septic tank, cesspool, portable toilet, Type III marine sanitation device or similar treatment works that receives only domestic sewage. Domestic septage does not include liquid or solid material removed from a septic tank, cesspool or similar treatment device that receives commercial wastewater and does not include grease removed from a grease trap at a restaurant.

EFFLUENT means the treated liquids which are discharged by sewage treatment plants.

EXISTING FLOW means the current volume of waste (in mgd) which a sewage treatment plant properly treats.

FOOD PROCESSING WASTE means residuals generated in canneries or similar industries whose application to the land will benefit crop growth and soil productivity.

FRAC TANK means a large covered tank, usually equipped with mixing and pumping equipment, used to store or mix liquid residuals. Frac tanks are mobile and are roughly box shaped. They are generally placed permanently on site, and are not used to transport residuals when filled.

GRIT AND SCREENINGS means the heavy and bulky components which are removed from the sewage treatment train at either the screens or grit settling chambers in the pretreatment components of a sewage treatment plant. These are removed because they are not treatable and can harm treatment equipment.

HEAVY METAL means metals which are conserved and thereby concentrated in the food chain (e.g. cadmium, lead, chromium, zinc, copper and nickel).

HUMUS means organic matter that has reached a more or less stable, advanced stage of decomposition.

IMPLEMENTATION DOCUMENT means the component of a sludge management plan in which the financial management, responsible parties and implementation schedule for each of the selected alternatives are identified. It consists of all "Appendix K Forms" which are prefaced with an "I".

INFLUENT means the incoming raw sewage flow to a sewage treatment plant.

INITIAL DOCUMENTS means those submissions made prior to submission of the four components of a district sludge management plan as detailed in Part 6 of this SSMP Update.

INNOVATIVE TECHNOLOGY means any treatment or utilization system which employs techniques which are not fully proven for the proposed purpose and which satisfy one of the state goals of resource recovery and reuse which are outlined in Section F. Part 5 of this SSMP Update.

INTERIM PERIOD means the time between adoption of the Statewide Sludge Management Plan Update and implementation of the district (or directed sludge generator) sludge management plan. The interim period, therefore, may be different for each district or directed sludge generator.

INVENTORY & STRATEGY DOCUMENT means the section of a district sludge management plan in which the current sludge management situation and future needs of the district are assessed, and long-term contingency sludge management strategies are stated. This document consists of all "Appendix K Forms" prefaced with "IS".

LAGOON means surface impoundment.

LANDFILL means "sanitary landfill", a land disposal site employing an engineered method of disposal of solid waste in a manner that minimizes environmental hazards, including but not limited to, the spreading of solid waste in thin layers, compacting the waste to the smallest practical volume and applying cover material on a daily or more frequent basis.

LAND APPLICATION means spraying or spreading of sewage sludge onto the land surface; the injection of sewage sludge below the land surface; or the incorporation of sewage sludge into the soil so that the sewage sludge can either condition the soil or fertilize crops or vegetation growth in the soil.

LAND APPLICATION SITE means the agricultural land on which land application occurs.

LAND-BASED ALTERNATIVE means a sludge management alternative which is sited on land as distinguished from ocean disposal. It includes, but is not limited to, land application, incineration and various innovative and alternative modes as detailed in Secton F. Part 4 of this SSMP Update.

LEACHATE means the liquid that has been in contact with solid waste and contains dissolved or suspended materials from that solid waste.

LEAD PLANNING AGENCY (DELEGATED) means the POTW which, by bilateral agreement with the district, is to execute sludge management planning for that district.

LEAD PLANNING AGENCY (DESIGNATED) means the local government unit which, through an evaluation process, is chosen to assume district sludge management planning functions.

LONG-TERM PERIOD means the planning period mandated by the Solid Waste Management Act which requires planning and implementation for a 10-year period.

LONG-TERM SEPTAGE PROJECTION means the quantity of septage produced by the projected unsewered population 10 years from the estimated date of department adoption of the district sludge management plan, based on projections in the applicable water quality management plan.

LONG-TERM SEWAGE FLOW PROJECTION means the permitted maximum daily flow of the sewage treatment plant or the projected sewage flow from the 10-year projected population of the treatment plant's service area (based on projections in the applicable water quality management plan), whichever is greater.

LONG-TERM SLUDGE MANAGEMENT PLAN means a plan for ultimate management of the long-term sludge production projection.

LONG-TERM SLUDGE PROJECTION means the quantity of sludge produced by a treatment plant(s) operating at the long-term sewage flow projection.

MUNICIPAL SLUDGE means sludge produced by treatment plants that treat predominantly domestic sewage, but also treat lesser amount of industrial sewage.

NON-ATTAINMENT AREA means any area in which the national ambient air standards for that area are not being met.

NONHAZARDOUS BULK LIQUIDS means the liquids and associated suspended solids resulting from physical, chemical and/or biological manufacturing or waste treatment processes, which are not defined as a hazardous waste in the "Hazardous Waste Management Regulations" (N.J.A.C. 7:26-6.1 et seq.) and whose application to land would benefit plant growth and soil productivity due to the plant nutrients and organic material it contains.

PATHOGENIC ORGANISMS are disease causing organisms. These include, but are not limited to, certain bacteria, protozoa, viruses and viable helminth ova.

PERMITTED FLOW means a treatment plant's maximum allowable flow (in mgd) as stated in the facility's existing NJPDES permit.

PROCESS TO FURTHER REDUCE PATHOGENS (PFRP) is any pathogen reduction process that meets the criteria for PFRP set forth in Appendix B in 40 CFR 503, including, at a minimum, composting, heat drying, heat treatment, and thermophilic aerobic digestion.

PROCESS TO SIGNIFICANTLY REDUCE PATHOGENS (PSRP) is any pathogen reduction process that meets the criteria for PSRP set forth in Appendix B in 40 CFR 503, including, at a minimum, aerobic digestion, air drying, anaerobic digestion, composting and lime stabilization.

PUBLICLY OWNED TREATMENT WORKS (POTW) means any device or system that is used in the treatment of municipal sewage and is owned by a "state", "municipal" or "county" entity, including sewers, pipes or other conveyances, only if they convey wastewater to a POTW providing treatment

RAW SLUDGE means the undigested and unstabilized residual from a sewage treatment plant.

REFERENCE ID CODE means the code assigned to a sludge or septage management alternative in the alternatives document component of the district or directed sludge generator sludge management plan.

REPRESENTATIVE SAMPLE means a sample of a universe or a whole (e.g. sludge, soil, groundwater) which can be expected to exhibit the average properties of the universe or whole.

ROLL-OFF CONTAINER means an open, rectangular steel box designed for ease of loading and unloading onto truck beds, which may be used in the storage and transportation of dewatered residuals.

SELECTION DOCUMENT means the component of a sludge management plan in which all long-term and contingency sludge management alternatives are selected. It consists of all "Appendix K Forms" which are prefaced with a "S".

SEWAGE means any waste including waste from human households, commercial establishment industries and storm water runoff that are discharged to or otherwise enter a domestic treatment works.

SEWAGE SLUDGE means the solid, semi-solid or liquid residue generated during the treatment of domestic sewage in a treatment works. Sewage sludge includes but is not limited to domestic septage; scum or solids removed in primary, secondary or advanced wastewater treatment processes; and a material derived from sewage sludge. Sewage sludge does not include ash generated during the firing of sewage sludge in a sewage sludge incinerator or grit and screening generated during preliminary treatment of domestic sewage in a treatment works.

SEWERAGE means the sewage entering a domestic treatment works and all parts of the collection and treatment system of that sewage.

SLUDGE-DERIVED PRODUCT or SDP means any material which is produced by the treatment of sewage sludge through various process which cause significant change to the physical and/or chemical characteristics of the original sludge such that it is no longer noxious, putrescent or vector attracting. Sewage sludge shall meet the Class A pathogen requirements in 40 CFR Part 503.32(a) and one of the vector attraction reduction requirements in 503.33(b)(1) through (b)(8) in order to be considered a "sludge-derived product."

SLURRY TANK means a stationary, above or below ground tank, usually made of steel or preformed concrete, designed to hold liquid residuals. These tanks are generally uncovered and conventionally used for storage of manures.

STABILIZATION (as applied to sewage sludge) means the reduction of the volatile and putrescible fraction of sludge with attendant reduction in the numbers of pathogens.

STORAGE PAD means a large, gently sloping surface, constructed of an impervious material (usually concrete), surrounded by a curb, with a drainage system for collection of leachate, designed to hold dewatered residuals.

SUBMISSION PACKAGE means all documents which must be submitted to the department for review; includes both the district sludge management plan and all additional documents.

SURFACE IMPOUNDMENT means a natural topographic depression, man-made excavation, or diked area formed primarily of earthen materials (although it may be lined with man-made materials), which is designed to hold an accumulation of liquid wastes or wastes containing free liquids and which is not an injection well.

SUSPENDED SOLIDS those visible particles in water that can be removed by physical or mechanical means.

TANKER TRAILER means a mobile tank with wheels, generally cylindrical and can be used to transport liquids from one site to another. They may also be used to store liquid residuals.

THERMAL REDUCTION means a process of stabilizing and reducing the volume of residuals through exposure to high temperatures.

WASTE ID means the classification number given to each defined type of land-managed waste as specified in N.J.A.C. 7:26-2.13.

201 PLAN means a facility planning document (prepared according to section 201 of the federal Clean Water Act) which details the most cost effective and environmentally sound projects which should be implemented to eliminate identified sources of water pollution.

GLOSSARY OF ACRONYMS

AEA	-	Association of Environmental Authorities
AMP	-	Agricultural Management Practices for Utilization of Sewage Sludge and SDPs
AQRP	-	Air Quality Regulation Program
BACT	-	Best Available Control Technology
BCUA	-	Bergen County Utilities Authority
BMP	-	Best Management Practice
BOD	-	Biological Oxygen Demand
BPR	-	DEPE Bureau of Pretreatment & Residuals
BPU	-	Board of Public Utilities
CAA	-	Clean Air Act
CEC	-	Cation Exchange Capacity
CFR	-	Code of Federal Regulations
CGA	-	Construction Grants Administration
CWA	-	Clean Water Act
CWEA	-	NJ Clean Water Enforcement Act of 1991
CZM	-	(Federal) Coastal Zone Management (Act)
DEP	-	DEPE - prior to 1992
DEPE	-	New Jersey Department of Environmental Protection & Energy
DMSDS	-	Deepwater Municipal Sludge Dump Site
DOA	-	N.J. Department of Agriculture
DP/D	-	Dry Pounds per Day
DP/Y	-	Dry Pounds per Year
DSCF	-	Dry Standard Cubic Feet
DSMP	-	District Sludge Management Plan
DSR	-	NJDEPE Division of Science and Research
DSWM	-	Division of Solid Waste Management
DT/D	-	Dry Tons per Day
DT/Y	-	Dry Tons per Year
DTW	-	Domestic Treatment Works
DWR	-	Division of Water Resources
EDA	-	Economic Development Authority
FDA	-	U.S. Food and Drug Administration
FmHA	-	Farmers' Home Administration
FWPCA	-	Federal Water Pollution Control Act
GAC	-	General Advisory Committee
GEP	-	Good Engineering Practice
GO's	-	General Obligation Bonds
HWRP	-	Hazardous Waste Regulation Program
IA	-	Improvement Authority
I & A	-	Innovative and Alternative
IDB	-	Industrial Development Bonds
JCD	-	Judicial Consent Decree

JMEU	-	Joint Meeting of Essex and Union Counties
LAER	-	Lowest Achievable Emission Rate
LRSA	-	Linden Roselle Sewerage Authority
MCUA	-	Middlesex County Utility Authority
MGD	-	Million Gallons per Day
MG/KG	-	Milligrams per Kilogram
MOA	-	Memorandum of Agreement
MPRSA	-	Marine Protection, Research, and Sanctuaries Act
MUA	-	Municipal Utility Authority
N.J.A.C.	-	N.J. Administrative Code
N.J.S.A.	-	N.J. Statutes Annotated
NAAQS	-	National Ambient Air Quality Standards
NEPA	-	National Environmental Policy Act
NESHAP	-	National Emission Standards for Hazardous Air Pollutants
NJAES	-	N.J. Agricultural Experiment Station
NJCAT	-	N.J. Corporation for Advanced Technology
NJDOA	-	New Jersey Department of Agriculture
NJIT	-	N.J. Institute of Technology
NJPDES	-	N.J. Pollutant Discharge Elimination System
NOAA	-	National Oceanic and Atmospheric Administration
NPDES	-	National Pollutant Discharge Elimination System
NSPS	-	New Source Performance Standards
PCB	-	Polychlorinated Biphenyl
PFRP	-	Process to Further Reduce Pathogens
POTW	-	Publicly Owned Treatment Works
PPM	-	Parts per Million
PSD	-	Prevention of Significant Deterioration
PSRP	-	Process to Significantly Reduce Pathogens
PVSC	-	Passaic Valley Sewerage Commissioners
RCAP	-	Rural Community Assistance Program
RCRA	-	Resource Conservation and Recovery Act
RFP	-	Request for Proposals
RFQ	-	Request for Qualifications
RSA	-	Regional Sewage Authority
RVSA	-	Rahway Valley Sewage Authority
SA	-	Sewerage or Sewage Authority
SAC	-	Starved Air Combustion
SADC	-	State Agricultural Development Committee
SC	-	Sewage/Sewerage Company/Corporation
SCC	-	Soil Conservation Committee
SCD	-	Soil Conservation District
SCom	-	Sewage Commissions
SCORE	-	Statewide Committee for Organic Recycling Education
SCS	-	Soil Conservation Service

SDP	-	Sludge-Derived Product
SDWA	-	Safe Drinking Water Act
SIP	-	State Implementation Plan
SIU	-	Significant Indirect User
SMP	-	Sludge Management Plan
SOA	-	State-of-the-Art
SPMP	-	Statewide Pretreatment Management Program
SPPP	-	Stormwater Pollution Prevention Plan
SQAR	-	Sludge Quality Assurance Regulations
SSMP	-	Statewide Sludge Management Plan
STP	-	Sewage Treatment Plant
SU(C)	-	Sewer Utility (Company)
SWMA	-	Solid Waste Management Act
SWMD	-	Solid Waste Management District
TP	-	Treatment Plant
TR	-	Thermal Reduction
TSCA	-	Toxic Substances Control Act
TSP	-	Total Suspended Particulate
TSRC	-	Technical Standards & Research Committee
TWA	-	Treatment Works Approval
UA	-	Utility Authority
UC	-	Utility Company
USDA	-	United States Department of Agriculture
USEPA	-	United States Environmental Protection Agency
VAR	-	Vector Attraction Reduction
VOS	-	Volatile Organic Substances
WFRP	-	Wastewater Facilities Regulation Program
WPCA	-	Water Pollution Control Act
WPCP	-	Water Pollution Control Plant
WQPA	-	Water Quality Planning Act
WWTP	-	Waste Water Treatment Plant

LIST OF TABLES

LIST OF TABLES (cont'd.)

LIST OF FIGURES

SOLID WASTE MANAGEMENT STATE PLAN UPDATE 1993-2002
SECTION III: STATEWIDE SLUDGE MANAGEMENT PLAN UPDATE

A. INTRODUCTION

This Statewide Sludge Management Plan Update (SSMP Update) contains the major policy changes and requirements that have occurred since the original 1987 Statewide Sludge Management Plan (1987 SSMP) was adopted in 1987. These changes reflect primarily an increased emphasis on pollution prevention and pretreatment, with beneficial use of sewage sludge as the preferred sludge management option. With the end of ocean disposal of sludge in 1991, immediate management alternatives were narrowed to beneficial use, incineration, and short-term out-of-state landfilling. A growing consensus among organizations involved in sludge management, developed through several workshops and a formal roundtable conference in 1991, recommended increased reliance on beneficial use in the state's sludge management strategy. The Department of Environmental Protection and Energy (referred to hereafter as the DEPE or department) formally endorsed this approach on April 27, 1992 in its Sludge Management Policy Guidelines (Guidelines), which were the subject of a public meeting held on May 26, 1992.

The SSMP Update provides a summary and explanation of the new policies and plans related to sludge management the DEPE is proposing to adopt following public review and comment. The SSMP Update formally incorporates the Guidelines into the sludge management program planning and review process. Additionally, the SSMP Update serves to set forth the implementation strategy of the DEPE. Finally, the SSMP Update serves as a "stand alone" document by incorporating relevant information of the 1987 SSMP as Section F.

The following pages provide an opportunity for public participation in the current direction of New Jersey's sludge management planning. As noted above, most of the policy changes described in the SSMP Update are a result of consensus-building efforts over the past few years with key organizations involved in sludge management throughout the state. The SSMP Update is another step in the process of developing a statewide management strategy that best meets the current sludge management realities in New Jersey. The task is made more complex by the fact that our scientific understanding of environmental impacts is continually evolving, as are the technologies available for sludge management.

An aggressive strategy for maximum reliance on beneficial uses will require full cooperation on the part of authorities, local and county governments, the agricultural community, many other diverse organizations, and the general public. The DEPE recognizes it is essential that these groups actively participate in the full development and implementation of beneficial use strategies, and welcomes input to the SSMP Update. In addition, the DEPE will continue to work actively with key organizations in the implementation of beneficial use strategies. There are a variety of issues that will require attention in terms of legal, liability, and scientific concerns, as well as appropriate uses of sludge and sludge-derived products (SDP) gaining public acceptance. The DEPE will work cooperatively with involved organizations in resolving such issues and continuing the consensus-building effort initiated in 1991. The major shift in state policy toward a system that gives preference to and promotes the environmentally sound management of sludge as a resource, necessitates revision to the 1987 SSMP. The purposes of this SSMP Update are to articulate the revised objectives, criteria, standards and implementation strategies of the state; to detail the current status of the system, including the development of a capacity analysis; to describe the interrelationships of the state's program with federal programs; and to restate the legislative and regulatory framework surrounding sludge management in New Jersey. These sections can be found on the following pages:

B. DEPE OBJECTIVES AND CRITERIA

1. Partnership in Sludge Management Planning and Implementation

Objectives and Criteria: Until the last decade, sludge management planning was almost entirely the responsibility of individual sludge generators, or domestic treatment works (DTWs). Presently, both the state and DTWs participate in a complex regulatory framework which assures careful control of sludge quality and management. In addition, a number of counties have actively participated in sludge management planning and implementation. The move to increase reliance on beneficial uses, primarily non-disposal land-based uses which will be highly visible to the general public, will require even greater cooperation on the part of sludge generators and local, regional and state governmental bodies. There will be a need for cooperation from the general public as well, in supporting land-based uses and participating in pollution prevention.

The DEPE therefore recognizes the need for a highly cooperative stance in future beneficial use and regulatory initiatives. It has established the following principles and criteria to guide departmental action:

a. **Cooperative Rather Than Prescriptive Approach:** The DEPE recognizes the great diversity among sludge generators (in size, urban/rural characteristics, environmental considerations, etc.), and also the complexity and variety of management options. Therefore, the DEPE will seek to cooperate with generators and other relevant organizations in achieving movement toward the environmentally sound management of sludge as a resource. The DEPE will initiate action to encourage cooperation among county and local governmental bodies in supporting local beneficial use initiatives, and will encourage regional cooperation among generators in planning for beneficial uses.

b. **Clear Communication:** Cooperation cannot be achieved without clear and regular communication among all parties. The DEPE will utilize existing organizational channels (specifically, the Association of Environmental Authorities (AEA), Association of Counties, League of Municipalities, County Solid Waste Advisory Councils, State Advisory Council on Solid Waste Management, Statewide Committee for Organic Recycling Education (SCORE), professional organizations relating to sludge transporters and generators, as well as periodic mailings to inform all participants as to the status of sludge management planning and movement toward beneficial uses.

   The DEPE will continue to conduct business openly and provide opportunities for all levels of government, members of the regulated community, other portions of the private sector, environmental groups and other interested parties and the general public to provide input on departmental activities. Continued communication with the general public is also necessary to further promote and cultivate beneficial uses of sewage sludge. As an example of an effective communications media tool, the AEA has developed a three-part video entitled "Impacts - Beneficial Uses of Biosolids." This 28-minute video, available through AEA, describes what treated sludge or "biosolids" are and how they can be reused.

Additionally, the DEPE and SCORE co-sponsored a conference in January 1993 to promote the uses of sewage sludge. This conference provided technical discussions of beneficial use technologies while also providing a general overview of the state's sludge management policies (with emphasis on the SSMP Update). Due to an overwhelming interest, issuance of the federal 40 CFR, Part 503 sludge regulations and the dynamic nature of the issue of sludge, a second conference is planned for January 1994.

c. **Responsive, Flexible Policies:** There are considerable uncertainties as to the markets that will emerge for sludge products, the extent of public support, and the types of beneficial use technologies that will prove most cost-effective. The DEPE recognizes its policies and regulatory framework will have to be responsive to these realities as they unfold. They will also have to be flexible, so as not to unnecessarily constrain creativity and innovative technologies. In refining policies and regulations, the DEPE will continue to work actively with representatives of the various key constituencies.

d. **Expedited Planning and Permitting Decisions:** The DEPE is involved in a comprehensive, multifaceted effort to streamline and improve its overall permitting capabilities. A number of its permit programs have been reorganized. Regulations are being revised to focus the DEPE's resources on watershed permitting. These revisions will attempt to streamline the permit process. This overall effort will improve the sludge permitting process as well. In addition, the DEPE is proposing the modification of regulatory requirements based on the size and/or type of the generator, so that the degree of oversight reflects the degree of potential environmental impact. Specifically, the DEPE will not require all small generators (DTWs with a permitted flow of less than one million gallons per day (mgd)) to submit detailed generator sludge management plans. As specified in Section B.4.b.3, these small generators will not be required to submit a sludge management plan (SMP) unless the DTW, at time of their New Jersey Pollutant Discharge Elimination System (NJPDES) permit renewal, identifies an out-of-state disposal facility and the NJPDES permit time period contravenes the DEPE's commitment to achieve self-sufficiency of sludge management disposal capacity within the next seven years. This modification will allow the DEPE to allocate more time and resources to the 103 DTWs that generate approximately 97% of the sludge in the state, in addition to eventually eliminating the out-of-state disposal of sludge.

The DEPE is also proposing development of "general permit" regulatory programs. Under this strategy, the DEPE will notice the development of a general permit approach which would include specific data and procedural requirements. The general public will have an opportunity to comment on these requirements. Once the DEPE has adopted this general permit package for a specific type of facility or function, an applicant simply must register with the department and follow the general permit provisions. In this way, there is no lengthy review time associated with DEPE permitting and selected sludge management activity can take place quickly toward implementing statewide goals. By December 1993, the department intends to issue general permits for the management of sludges generated by the food processing industry. The department also will develop a general permit for demonstration projects, which is discussed below.

e. **Innovative/Alternative Technologies - Demonstration Projects:** The department acknowledges that the shift in priority from disposal capacity planning to beneficial use management is still in a relatively early phase of development. Additionally, the department continues to receive inquiries on sludge management alternatives that would be considered as innovative or alternative sludge management technologies. Innovative and alternative technologies are discussed in detail in the Section F of this document. As stated in Section F. Part 4-VII, alternatives to conventional treatment and utilization of sludge and innovative designs have been and continue to be, strongly encouraged by the department. The department has and will continue to emphasize the planning, design and construction of cost-effective processes and techniques that maximize the recycling and reclamation of water and nutrients from sludge, while minimizing adverse environmental and public health impacts.

While the department places a high value on the development of alternative/innovative technologies, feedback from the regulated community has been one of frustration. New technologies have been extremely difficult to permit in New Jersey. Those marketing new technologies have indicated DTWs are unwilling to proceed with new technologies until the department has issued a permit for the technology. The result is that new alternative/innovative technologies have not located in New Jersey. The department acknowledges that the present system has proven to be cumbersome and stifling of new technologies. In order to facilitate the evolution of new sludge management technologies, in the near future the department expects to propose the issuance of a limited duration NJPDES general permit approval process for short-term demonstration projects. Under such an approach, the department would approve limited-term demonstration projects simply by public noticing that a general permit has been issued for a demonstration project.

While the department is proposing to allow demonstration projects under the general permit format, the department will require project specific data from the project applicant for the demonstration project. The department will reserve the right to terminate the demonstration at any time due to environmental concerns and/or non-compliance with the preestablished general permit conditions imposed on the operating procedures of the facility. Finally, any demonstration project approval will be conditioned with the requirement for dismantling of the equipment on termination of the demonstration project or on receipt of a full (or modification thereof) NJPDES permit.

To help facilitate such innovative activity, the department will develop a general permit package to streamline the approval of limited duration demonstration programs. Due to the immediate need to move forward with demonstration projects, the department will complete and begin utilizing the general permit package on a uniform basis in 1994.

f. **Mediation of Disputes:** Where there are disputes among generators, or between generators and local governmental bodies, the DEPE's communications team with assistance from SCORE, will be available to mediate disputes on request.

g. **Financial Assistance:** The DEPE will seek to provide indirect assistance by identifying potential sources of funding or loans from USEPA or elsewhere, for generators that are moving toward beneficial uses as their sludge management approach.

In the State of the State '93 Message, Governor Florio announced a seven-point plan "Creating Tomorrow's Jobs" through the New Jersey Corporation for Advanced Technology (NJCAT). The mission of NJCAT is to enhance the development and commercialization of technology-based environmental and energy products through assistance to New Jersey businesses that work in such technologies. Through funding assistance of selected projects, NJCAT will provide entrepreneurs with the opportunity to test their budding technologies toward future commercial applications. The Governor's proposed program has already drawn support and active formative participation from major corporations and academic institutions in the state. Although still in its infancy, the NJCAT could invest in and underwrite needed research or provide project development funding to initiate new technologies. For further information, the reader should contact the department.

The department will also continue to make Solid Waste Services Tax monies available to county governments to fund household hazardous waste collection programs. These programs remove substantial quantities of household hazardous wastes from the solid waste stream for proper disposal. Otherwise, the wastes could be dumped down drains into municipal wastewater treatment systems and therefore, ultimately have an adverse effect on sludge quality.

2. Domestic Treatment Works/District Planning Process

Objectives and Criteria: In 1978, in response to increased concerns of the effects ocean disposal of sludge had on coastal water quality, the Legislature found the interests of the citizens of New Jersey would best be served through an integration of sludge management with the regional solid waste planning and management process and thereby amended the Solid Waste Management Act (SWMA). The 1978 amendments required that sludge management planning information must be provided to the DEPE by each of the solid waste management districts (districts), which consisted of the twenty-one counties and the Hackensack Meadowlands Development Commission (HMDC). Among the types of information to be provided, according to N.J.S.A. 13:1E-45, were:

- An inventory of sources, composition and quantity of sludge presently generated;
- Projections as to amounts and composition of sludge anticipated over a ten-year period;
- An analysis of present options for sludge disposal;
- A statement as to sludge disposal strategy within the district; and
- A site plan for facilities which could be used for sludge management.

The 1978 amendments also included a provision (N.J.S.A. 13:1E-46) for development of a statewide sludge strategy as part of the statewide solid waste management plan. The strategy was to guide the management of all sludge generated within the state. In September 1982, an advisory task force was created to provide input from key constituencies into the development of a comprehensive statewide sludge management strategy.

It must be stressed that despite the statutory provisions noted above, sludge management planning was not, for the most part, integrated within the district planning process at the county level. In addition, the SSMP was not adopted until 1987. When adopted, the 1987 SSMP provided a formal framework to guide districts in sludge management planning. A provision was also made for the districts, as a second option, to delegate planning activities to a selected agency or DTW, while retaining ultimate responsibility for submission of the District Sludge Management Plan (DSMP).

Specific timeframes for the development and submittal of district plans were to be established under specific sludge regulations. The DEPE did not promulgate sludge regulations for many reasons. The 1987 SSMP designated as an "interim" period the time between the adoption of the 1987 SSMP and operation of the management alternatives selected by the DSMP which was to be approved by the DEPE. During this interim period, the 1987 SSMP indicated that district responsibilities for sludge management planning in no way relieved the sludge generator of responsibility for proper planning and management of their sludge as required under the NJPDES. Finally, until the DSMP is implemented, individual sludge generators were required to pursue planning and implementation of sludge management projects as needed to meet the terms of their NJPDES permits.

As a result, sludge generators essentially have maintained sludge planning and management responsibilities throughout the past fifteen years. Upgrades, as well as expansions to the wastewater treatment facilities and construction of new facilities, serve as a catalyst for requiring the DTWs to submit sludge generator plans. Sewer service areas have expanded past district boundaries. Furthermore, the costs of providing wastewater services (including sludge management) have become a major expenditure of local government budgets and thereby represent a very volatile and politically complex issue.

Implementation Strategy: In recognition of the dilemma framed above, it is the position of the DEPE that the planning approach needs to be as flexible as possible. Therefore, with the SSMP Update, the DEPE incorporates another planning option. The SWMA at N.J.S.A. 13:1E-46(a) delegates the authority for sludge management to the DEPE. It is the DEPE's judgement that the overall mandate of the Legislature to provide for processing or in-state disposal of sludge is best fulfilled by allowing the districts to delegate planning responsibilities to the generators of sludge within their district. Therefore, under this interpretation of the SWMA, a third option provides for transfer of the entire responsibility for sludge management to DTWs at the initiative of each individual district.

The third planning option will require a district, when the district so desires, to delegate to all DTWs in the district absolute and ultimate planning responsibility, by resolution, for that portion of the district's sludge and/or septage generated by the DTW. Section F. Part 6 outlines the required evaluation process a district is to follow when delegating sludge planning authority outside the governmental structure of the district to a DTW, while retaining ultimate planning responsibility. The evaluation presented is to serve as a model format for districts in pursuing delegation of planning responsibilities, if the district desires to delegate to DTWs within its boundaries. If the district chooses to delegate all responsibility, DTWs are required to submit their Sludge Management Plans (SMP) directly to the DEPE, with a copy to the district where the generator is located, as well as the district where the sludge management alternatives are located, to make the district aware of the plans being developed.

It is the DEPE's interpretation of the 1978 Amendments, that a district desiring to delegate these planning responsibilities has legitimate authority to require a DTW to plan for the management of its sludge. Furthermore, as stated previously, the requirement for management of a DTW's sludge production is part of its NJPDES operating permit. Therefore, if the district seeks to delegate sludge planning requirements to a DTW within the district, the DTW's NJPDES permit requires acceptance of these responsibilities. The DEPE will resolve any conflicts arising from a district's delegation of sludge planning responsibilities.

There has been no change in the DEPE's policy on septage management. As published in Section F, there are two management alternatives available for septage; discharge into a sewage treatment plant and land application. It remains departmental policy to encourage management of septage through a sewage treatment plant. Given that septage is, or may be, generated beyond a DTW sewer area, the district shall be accountable for all septage generated within the district's boundaries. The district must negotiate with properly equipped DTWs to receive all septage generated in the district. This does not relieve DTWs of the responsibility to plan for the management of all septage generated within their service area.

As of 1992, the DEPE estimates approximately 57% of all sludge generated in New Jersey is exported for management (primarily landfilling) at out-of-state facilities. Sludge management may soon be guided by federal legislation that would regulate the interstate movement of various waste materials. Therefore, it is essential that New Jersey move forward with the implementation of expanded beneficial use programs, as well as alternative in-state management operations. This will require a carefully integrated long-term planning effort, which will in turn require a clear delineation of the institutions responsible for long-term planning.

While in most cases, a shift in planning responsibility at this point in time from generators to county governments would likely be inefficient and counterproductive, this option remains available to districts. One district, Burlington, has assumed sludge planning responsibility and developed plans to integrate the long-term management of sludge and solid waste. Additional counties have also played at least a limited role in sludge planning and may have future plans in this area. Based on the recent history of sludge planning, and the requirements of solid waste statutes, the DEPE advocates a flexible approach utilizing all three options: district responsibility, ultimate district responsibility with delegation to DTWs of actual plan development, or district delegation of ultimate responsibility to DTWs. Within 180 days following the adoption of the SSMP Update, districts must submit their decisions, inclusive of the appropriate district resolution, to the DEPE to indicate which planning option they will pursue.

The DEPE emphasizes the importance of sludge management planning responsibilities, and the need for cooperation between the district and DTWs to successfully manage any sludge management operation within the district. In the event of disagreements between the districts and DTWs, the DEPE will act as a facilitator in negotiations and will make the final determination as to the designation of the planning responsibilities. In the event a district fails to select a planning option within the timetable of 180 days following adoption of the SSMP Update, planning responsibility will automatically default to the DTWs within the county, as outlined Section F. Part 6.

Those districts that choose to assume full responsibility for preparation of SMPs or to delegate plan preparation while maintaining oversight and ultimate responsibility, must submit completed plans to the DEPE within 18 months following the adoption of the SSMP Update. While a district may choose to retain planning authority, at no time is the sludge generator relieved of its responsibility to manage its daily production. A district retaining planning authority may require a more timely submittal of generator SMPs than identified in Section B.4.b. in order to comply with the 18-month requirement identified above.

District plans are subject to the requirements identified in this update and the relevant procedures established in Section F. Part 6. Additionally, districts choosing to retain planning responsibilities must comply with the Administrative Procedures Act (APA) when developing and adopting a DSMP. Particular attention should be paid to the public participation requirements established under the APA. If completed plans are not received in this period, the planning will again default to the DTWs in the county, as outlined in Section F. Part 6 concerning district failure to complete plans.

In districts in which there is delegation of planning responsibility to the DTWs, or in the event of district failure, the DTWs will continue to prepare SMPs when applying for permits for new construction, upgrades and expansions of treatment facilities, as has been the practice in the past. This would constitute a "no change" scenario with respect to existing and historical planning practice. As specified in Section B.9, DTWs will be required to perform regionalization and beneficial use analyses, in some cases, as part of their SMPs.

The DEPE acknowledges that most DTWs have adequately managed their sludge within the requirements of the law and have complied with the planning requirements outlined in Section F. The general public would be best served by allowing the current planning process to continue and not adding another level of governmental review to DTW sludge planning requirements. The regional multi-county nature of many DTW service areas further emphasizes the logic of continuing with DTW planning responsibility. However, flexibility should be provided to integrate county governments into the planning process, where counties do desire to play a role.

3. Integrated Sludge Management Hierarchy

Objectives and Criteria: Given its industrialized nature, population density and geographical and climatical constraints, New Jersey will continue to look to a variety of environmentally sound management alternatives to effectively and efficiently manage its waste streams. The legislative findings (N.J.S.A. 13:1E-43) noted that solid waste and sludge are inherently compatible, that the recycling of solid waste and the processing of sludge are complementary and that state programs should seek to provide for a comprehensive regional approach to the proper disposal or utilization of solid waste and sludge. The characteristics and methods of collection of these waste streams, however, warrant the development of separate management hierarchies.

Each component of the sludge management hierarchy outlined below has a role as a part of the state's overall strategy. Each component may not fit into the present implementation plans of each DTW. However, the DEPE intends to pursue a very active role and precipitate the DTW's exploration and evaluation of sludge management alternatives through its broad planning and permitting authorities. Such a strategy is necessary to continue the state's movement toward the environmentally sound management of sludge as a resource rather than reliance on sludge disposal.

It is essential that sludge quality be of sufficient quality necessary to implement the DTW's sludge management alternative(s). To drive this choice of alternatives, pollution prevention strategies and pretreatment programs are a prerequisite to the selection of any sludge management alternative. An increased emphasis has been placed on pollution prevention by applying principles such as modifying industrial processes, household chemical use and disposal practices. Pollution prevention will improve both the quality of discharges to wastewater treatment facilities and the quality of sludge produced. Industrial pretreatment programs must be expanded where necessary and be strictly enforced.

The federal 503 sludge regulations identify exceptional quality or "EQ" sludge (also referred to by the United States Environmental Protection Agency (USEPA) as "clean" sludge) as the quality (along with a requisite level of pathogen and vector attraction reduction) where sludge becomes a product of commerce. Regulatory oversight of an EQ sludge is limited to the reporting requirements outlined in the 503 regulations and the requirements placed on any fertilizer and/or soil amendment. With the acceptance of the 503 regulations, New Jersey's qualitative goal is to have all sludge produced meet EQ sludge quality standards. It is anticipated that market development and economics will motivate sludge generators to achieve the EQ standards. However, the DEPE recognizes sludge quality may be influenced by industrial contributions, aggressive water supply systems, non-point source pollution and household hazardous waste disposal practices. Given the multitude of these potential pollutant sources, the potential impacts on the user community could be significant if measures are taken to reduce these sources. In view of the currently evolving sludge management alternatives, the DEPE maintains, therefore, that a DTW's chosen sludge management alternative ultimately becomes a determinant of its sludge quality. Therefore, the DEPE proposes to continue its current policy requiring a DTW to achieve a sludge quality necessary to implement its chosen sludge management alternative. This policy is further discussed in Section B.6.

The hierarchy of sludge management alternatives in descending order is as follows:

a. **Traditional Beneficial Use:** The utilization of sludge and SDPs of suitable quality for beneficial purposes, such as for agriculture and land restoration, and as soil conditioner and organic base to support and advance plant growth, is the state's preferred sludge management alternative.

   Beneficial use of sewage sludge is preferred to other management alternatives because it:

   - Utilizes the nutrient value of the organic matter inherent in sludge. The organic matter improves soil structure and quality in addition to improving plant growth;

   - Allows for the accelerated reclamation of disturbed or barren lands by facilitating the ability of plants to acquire nutrients, attain water due to increased soil water holding capacity and penetrate the soil. Establishment of vegetation then reduces soil erosion from the site;

   - Offers an organic alternative to chemical fertilizers, which are suspected of contributing to the state's non-point source pollution problems;

   - Provides for the ultimate management of the material and does not require management of a residual after processing;

   - When managed properly, has minimal impact on the state's air quality; and

- When managed properly, has the least cost to the total environment (cumulative impacts to the air, water, soil and infrastructure of the state).

The following are specific beneficial use technologies currently in use in New Jersey. Unlike the hierarchy itself, these are not listed in any priority order. In addition, other beneficial use technologies, which exist elsewhere or are evolving, may be implemented in New Jersey in the future such as:

- Land application of liquid and dewatered sludges directly to soil;

- Pelletization to create a SDP that can be used as a soil enhancer, fertilizer or for other purposes;

- Composting of sludge or mixtures of sludge and solid waste to produce a SDP that can be used as a soil enhancer, fertilizer, landfill cover, or for other purposes; and

- Alkaline stabilization to produce a SDP that can be used as a soil enhancer, fertilizer, landfill cover or for other purposes.

b. **Out-of-state Processing for Beneficial Use:** Use of sludge beneficially at a permitted out-of-state facility should continue and such use should be expanded where possible to broaden opportunities for beneficial use. The DEPE views sewage sludge being processed for beneficial use out-of-state differently than sewage sludge being disposed of out-of-state. The DEPE would expect few, if any, restrictions or prohibitions on out-of-state processing and beneficial use of sewage sludge. The DEPE, however, is aware of current federal and state legislative proposals that seek restrictions in varying degrees on out-of-state processing and beneficial use of sewage sludge. Therefore, the DEPE is requiring DTWs planning to send sewage sludge out-of-state for processing or beneficial use to identify contingency management plans. Contingency planning is discussed in Section B.13.

c. **High Technology Beneficial Use Systems:** Systems that utilize the organic constituents of sewage sludge as a resource to produce other useful and marketable products are defined as high technology beneficial use systems. All high technology beneficial use systems are non-burning systems that involve some high efficiency intermediate conversion of the sludge's physical and/or chemical properties to enable subsequent use of the material. This conversion process must account for the majority of the mass and energy of the waste. Further, residual by-products requiring disposal must be less than the products to be marketed. Specific technologies will be evaluated on a case-by-case basis by the DEPE for designation as high technology beneficial use systems.

From historical experience, high technology beneficial use systems may include, but are not limited to:

- Gasification/fuel production;

- Production of inert aggregate used to manufacture other products; and

- Other systems that otherwise produce an end product suitable for marketing with relatively limited residual requiring disposal.

d.(1) **Incineration:** Incineration is a less preferred method of long-term sludge management, due to the fact that it does not take advantage of the inherent nutrient value and other beneficial characteristics of sludge. Incineration currently represents a mode of management for approximately 20% of New Jersey sludge.

d.(2) **In-state Landfilling:** In-state landfilling may be approved at a lined landfill with a leachate control system on an emergency basis and under the terms of an administrative consent order as stipulated in Section F. Part 4-V, until new management programs consistent with this hierarchy are implemented.

e. **Out-of-state Disposal:** Out-of-state disposal will be accepted only on an interim basis. As a primary public policy goal, New Jersey will continue to pursue self-sufficiency in its sludge disposal capacity by December 31, 1999. Long-term plans for out-of-state sludge disposal will not be approved.

4. <u>General Program Implementation Strategy</u>

Objectives and Criteria: The full implementation of the state's goal of environmentally sound management of sewage sludge as a resource will require regulatory, institutional and attitudinal changes. Broad cooperation among many organizations and institutions will be required to achieve these changes. The overall implementation framework, as currently conceptualized by the DEPE, can be divided into immediate/short-term action plans and long-term action plans, and regulatory and non-regulatory actions. Immediate/short-term plans are initiatives being undertaken at present or within the first year following proposal of the SSMP Update, and long-term plans refer to initiatives expected to be undertaken beyond this time period.

Immediate/Short-term Action Plan:

a. **Federal 503 Sludge Regulations:** On February 19, 1993 the USEPA promulgated regulations to protect public health and the environment from any reasonably anticipated adverse effects of certain pollutants that may be present in sewage sludge. Published under Federal Register 40 CFR Part 257, et al., Standards for the Use or Disposal of Sewage Sludge; Final Rule (referred hereafter as the 503 regulations), the regulations:

   (1) Establish requirements when sewage sludge (which includes SDP) is applied to the land for a beneficial purpose (including sewage sludge that is sold or given away for use in home gardens);

   (2) Establish standards when sewage sludge is disposed of on land by placing it on surface disposal sites; and

   (3) Establish requirements when sewage sludge is incinerated.

   It is the department's intent to move swiftly to adopt the vast majority of the 503 regulations by reference in the NJPDES regulations. The adoption of the 503 regulations will be noticed in the <u>New Jersey Register</u> during the last quarter of 1993. Additionally, the department will propose, where necessary, a modification to existing DTW NJPDES permits incorporating the standards and requirements of the 503 regulations. Finally, the notice will specify and preserve New Jersey's right to examine, research and repropose more stringent sludge standards if deemed necessary, based on the DEPE's scientific assessment. Sludge standards are discussed in detail in Section B.8; "Sludge Quality Standards: Regulatory Approach."

b. **Regulatory Requirements:** The new regulatory requirements for a beneficial use and regionalization analysis, specified in the SSMP Update, are already being incorporated into generator plans and plan modifications, DSMPs, and permit renewals. Reviews of generator plans and permits will continue to be conducted under the regulatory framework established by the SSMP Update and the NJPDES program, with input from the DEPE's Division of Solid Waste Management pertaining to reviews of the beneficial use and regionalization analysis. Following is a brief description of each of these regulatory mechanisms, and additional regulatory requirements adopted within the SSMP Update:

   (1) **Sludge Generator Plans:** Pursuant to the Section F., every treatment plant must plan for the legal management of sludge generated by the treatment plant. The establishment of a new, upgraded or expanded DTW requires the submittal of a SMP. The DEPE will continue to utilize the

standardized planning forms, which historically have been and will continue to be referred to as "Appendix K Forms" (available through the Wastewater Facilities Regulation Program), to simplify the DTW development process and the subsequent DEPE review of these plans.

(2) **NJPDES Permits:** The DEPE will utilize existing regulatory oversight programs (such as NJPDES, air and solid waste permitting and permit renewal, and sludge management plan amendment review) to implement its sludge management policy. As the DEPE neither has the resources nor the desire to review permits prior to their expiration, the following approach has been initiated to implement this policy. This strategy mirrors USEPA's priorities specified in the 503 regulations. The DEPE emphasizes its willingness to work with DTWs that voluntarily initiate consideration of this policy prior to the expiration of their NJPDES permits.

(a) Class 1 Sludge Management Facilities: Similar to USEPA's implementation strategy for the 503 regulations, the DEPE will concentrate its permitting review efforts initially on Class 1 sludge management facilities. Class 1 facilities are defined as any Publicly Owned Treatment Works (POTW) required to have an approved pretreatment program or a POTW whose sludge use or disposal practices have the potential to adversely affect public health or the environment. The USEPA definition allows the state to expand the definition of Class 1 facilities based on state-specific concerns. Presently, there are thirty (30) Class 1 facilities (Table 1) in the state (USEPA considers all sludge incinerators as Class 1 facilities).

There are an additional eight (8) DTW operated land application/beneficial use facilities. By federal definition, these will be considered Class 1 sludge management facilities. It should be noted that a DTW may have more than one plant. However, although issued separate NJPDES permits, for the purposes of this section, the DEPE will focus on the entire DTW and not the individual plants.

For those DTW's considered Class 1 sludge management facilities that have not completed a generator sludge management plan and/or are managing their sludge production through out-of-state disposal, a condition will be added on renewal of the DTW's NJPDES permit that will require the DTW to submit a generator sludge plan. This condition will include a compliance schedule subject to enforcement actions in the event of non-compliance.

TABLE 1

CLASS 1 SLUDGE MANAGEMENT FACILITIES

Bayshore Regional Sewerage Authority **	Rahway Valley Sewerage Authority
Bergen County Utilities Authority	Rockaway Valley Regional Sewerage Authority
Camden County Municipal Utilities Authority **	Somerset-Raritan Valley Sewerage Authority **
Ewing-Lawrence Sewerage Authority	Stony Brook Regional Sewerage Authority **
Gloucester County Utilities Authority **	City of Trenton
Township of Hamilton	Two Bridges Sewerage Authority **
Hanover Sewerage Authority	West New York Municipal Utilities Authority
Joint Meeting of Essex & Union Counties	Township of Wayne **
Linden-Roselle Sewerage Authority	Parsippany Troy Hills Sewage Utility **+
Middlesex County Utilities Authority	Atlantic County Utility Authority **
Township of Morris	Tri City SA +
Mount Holly Sewerage Authority	Northeast Monmouth RSA +
Northwest Bergen County Utilities Authority **	Cumberland County UA +
Ocean County Utilities Authority	North Bergen SA +
Passaic Valley Sewerage Commissioners	Landis SA +

OTHER DTW OPERATED LAND APPLICATION/BENEFICIAL USE FACILITIES

Buena Boro MUA	Sussex County MUA
Cape May County MUA	Pembertown Township MUA
Middletown Township SA	Readington-Lebanon SA
Pennsville SA	Musconetong SA

** Incinerators
+ To receive delegation of pretreatment program

(b) Upgrading and/or Expansion of DTW: In 1987, it was the DEPE's position that there was adequate capacity within all management alternatives then available for the DTWs to manage the state's entire existing sludge production. However, as sludge management alternatives have been determined to be unacceptable (ocean dumping) and undesirable (in-state and/or out-of-state landfilling) there is a deficiency in available long-term capacity in line with the hierarchy set forth in B.3. above. As DTW's undergo voluntary/mandatory expansion and/or upgrading of wastewater treatment facilities, the DEPE has and will continue to require individual generators to execute SMPs for the projected quality and quantity of the sludge generated by the DTW. This requirement is necessary to ensure adequate capacity (see Section B.10.; "Self-Sufficiency") for any increase in New Jersey's sludge production.

(c) NJPDES Permit Renewals: All NJPDES permit renewals where the DTW (with a permitted flow equal to or greater than 1 mgd) identifies an out-of-state sludge management alternative (excluding facilities that process the material for beneficial use), will be required to submit a SMP. This procedure will be applied in order to facilitate the review of current out-of-state disposal practices and evaluation of in-state management opportunities, as well as out-of-state beneficial use alternatives. The NJPDES permit renewals of these facilities shall contain a specific permit condition requiring compliance with the provisions of the SSMP Update. This permit condition will be accompanied by a compliance schedule for the development and submission of a SMP. Failure to comply with the permit condition within the specified timeframe will be subject to the initiation of formal enforcement action.

(3) **Out-of-state Contract Management:** Contract management of sludge is defined as a management alternative entered into by the sludge generator with a DTW and/or sludge processor for the disposal and/or beneficial use of the sludge produced by the DTW. Contracts with out-of-state facilities for sludge management may vary in frequency of sludge removal and length of commitment. Many DTWs will have multiple contracts at one time to ensure the removal of sludge from the DTW as well as several different contract periods during a specific permit's life.

New Jersey recognizes a hierarchy of sludge management strategies whereby long-term SMPs identifying out-of-state disposal shall not be approved. Furthermore, the DEPE has publicly expressed support for national initiatives as part of the Resource Conservation and Recovery Act reauthorization to regulate, under a rationally based and uniformly applied federal program, the interstate shipment of solid waste provided existing contracts for disposal capacity are not curtailed through legislative enactments. It is the DEPE's position, that DTWs with existing contracts for out-of-state management should be entitled to unencumbered utilization of that facility for the term of the contract. The department will similarly support this same policy position should future attention focus upon restricting the interstate movement and disposal of sludge.

As such, the DEPE will monitor those DTWs utilizing out-of-state disposal (Table 2) and seek to work cooperatively in implementing appropriate in-state management and/or beneficial use options. Henceforth, DTWs that export sludge for out-of-state disposal will be advised their NJPDES permit, on renewal, will include a permit condition requiring a SMP be submitted to the DEPE which provides a detailed evaluation of alternative sludge management modes consistent with the hierarchy outlined in Section B.3.

The DEPE will utilize the above implementation strategy for all DTWs with a permitted flow of one mgd or more. For those DTWs with a permitted flow of less than one mgd (approximately 339 generators that collectively account for less than three percent of the state's sludge production) the department's policy is:

- The DEPE is willing to work cooperatively in identifying appropriate beneficial use and/or in-state management options.

- The DEPE will not enforce a uniform requirement for all small quantity generators to submit detailed SMPs. However, a DTW must adhere to the above implementation strategy on renewal of their five-year NJPDES permit where the DTW seeks to continue utilizing an out-of-state disposal facility and the permit time period contravenes the DEPE's commitment to achieving self-sufficiency of sludge management disposal capacity within the next seven years.

TABLE 2

DOMESTIC TREATMENT WORKS UTILIZING OUT-OF-STATE DISPOSAL
(As of August 1993)

Bergen County
Bergen County UA [1]

Burlington County [2]
Occidental Chemical Group
US Army Ft Dix Training Center
Medford Lakes Borough STP
Riverton
Burlington Twp. STP LaGorce
Burlington Twp. Central Ave. STP
New Lisbon State School
North Burlington Co. Regional H.S.
Pemberton Twp. H.S. #1 STP
McGuire AFB
Wrightstown AFB
Florence Twp. STP
Mount Holly STP

Burlington County (cont'd.)
Palmyra STP
Burlington City STP
Bordentown City - Blacks Creek
Moorestown Twp. STP
Bordentown Youth Corrections
Hanover Mobile Home Park
Spartan Village Mobile Home
Mobile Estates of Southhampton
Kings Grant Sewerage Corp STP
Fieldsboro STP
Best Western Hotel
Tabernacle Twp. Middle School

Camden County
Camden County Municipal UA [3]

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[1] Under existing Judicial Consent Decree that requires the identification of a long-term management alternative and includes compliance schedules.

[2] Burlington County's DSMP identifies all DTWs in county. Burlington County has received funding to construct a composting facility.

[3] Camden County has received funding for the construction of a composting facility. Part of the sludge production is already beneficially used via an agreement with the City of Philadelphia for composting.

TABLE 2 (cont'd.)

Cape May County
Lower Twp. STP

Essex County
Passaic Valley SC [1]

Hudson County
Hudson County Meadowview Hosp. [4]

Hunterdon County
Milford Sewer Utility STP [4]
NJDHS/Hagadorn Geriatric Center [4]

Mercer County
Ewing Lawrence SA [5]
Hamilton Twp. - Independence [5]
Hightstown Boro [6]

Monmouth County
Allentown WPCP [6]
Ocean Twp. Sewerage Authority [6]
Neptune Twp. STP #2 Old Corlie
Long Branch SA

Salem County
Carney Point [6]

Sussex County
Great Gorge's Resort Hotel [4]

Union County
Essex-Union Jt. Mtg.
Linden-Roselle SA [1]

(4) **Privatized Sludge Treatment Facilities:** Historically, the vast majority of the state's sludge production not landfilled in-state or ocean-dumped, has been managed through the DTW directly or through contract management (usually with another DTW). As sludge management costs have escalated, an increasing number of DTWs are considering privatization of the sludge management portion of the treatment system. Additionally, with the end of in-state landfilling and ocean-dumping of sludge, private industry has expressed interest in constructing privatized sludge management facilities within the state.

A privatized sludge management facility, while not the generator of the sludge, is subject to the same DEPE permitting requirements as any DTW that manages its own sludge operation. There are essentially two different types of privatized management facilities. They are:

(a) Privatized Sludge Management Facility On-site at an Existing DTW: This type of operation will be addressed through permitting as outlined in Section F. Part IV. In general, this would entail modification of the DTW's NJPDES permit, issuance of a Treatment Works Approval

[4] Less than one mgd facility.

[5] Under agreement with Mercer County Improvement Authority, which has received federal funding for the construction of a sludge processing facility.

[6] Already under a compliance schedule for an in-state sludge management alternative.

(TWA) and all appropriate air quality permits for the privatized operation of a facility at the site of an existing treatment works. A DTW could also request approval to accept customer sludges, which would probably require construction of receiving equipment. The facility's TWA may be issued to the DTW or owner of the sludge management facility depending on the contractual agreement between the two parties.

(b) Privatized Sludge Management Facility Constructed Off-site of the DTW: This type of facility could be built to service a single or multiple DTWs sludge production. Traditional beneficial use systems (land application, composting, pathogen reduction/pelletization and alkaline stabilization facilities) will be permitted under the NJPDES program. As indicated in Section B.3.c., high technology beneficial use systems will be evaluated on a case-by-case basis at which time the appropriate lead permitting program shall be identified.

While the DEPE recognizes and encourages the interest in the private sector to establish privatized sludge management facilities and provide for the ultimate management of a DTW's sludge production; the DTW is ultimately responsible for the development of a long-term sludge management plan. Use of a privatized off-site sludge management facility will possibly require the DTW to modify its NJPDES permit.

The DEPE has included privatized sludge management facilities in this planning document to clarify generic regulatory requirements. As opportunities for new beneficial use technologies are explored, it is suggested that the private sector contact the DEPE's Office of Permit Information and Assistance within Environmental Regulation, when attempting to ascertain the needed permits/resolutions for a specific project.

In summary, the DEPE's approach to each of the above regulatory categories clearly focuses primary attention on those DTW's that manage their sludge at out-of-state disposal facilities. The top priority DTWs that are Class 1 sludge management facilities, generate more than 80% of the sludge in the state. Additionally, by requiring planning submittals from those DTWs upgrading and/or expanding their facilities, this strategy will ensure future sludge production is managed in accordance with the SSMP Update. Furthermore, inserting a planning condition in NJPDES permits on renewal will, again, move the remaining DTWs toward compliance with the SSMP Update. Lastly, the DEPE acknowledges that the majority of the DTW's generating less than three percent of the state's sludge production manage their sludge through contracts. These DTWs should not be required to submit comprehensive SMPs unless the DTW continues to identify out-of-state disposal beyond the DEPE's commitment to achieving self-sufficiency of sludge management disposal capacity by

December 31, 1999.

c. **Non-regulatory Program Activities:** The DEPE is playing an active role in several non-regulatory areas. As described in the Section B.7.; "Promotion of Beneficial Use Strategies," the DEPE is involved in conducting public education on beneficial uses, in cooperation with the many organizations represented in the SCORE. It is also investigating strategies for resolving obstacles to beneficial use, such as the liability concerns of farmers, and is working with individual DTWs to assist them in giving consideration to beneficial use technologies. The DEPE is exploring market assessments to provide a clearer picture of beneficial use strategies that could be most successful in the long-term. It will also play a role in facilitating cooperation and institutional coordination among the many organizations that will be involved in implementing beneficial use goals.

5. Pollution Prevention in Sludge Management

Objectives and Criteria: Pollution prevention refers to the reduction of pollutants at their source through the adoption of industrial processes and/or individual behaviors that generate lower pollutant levels. Pollution prevention measures must be adopted by industries, authorities and the general public to improve sludge quality and make possible the maximum utilization of beneficial use management options. Such measures include formal pollution prevention programs directed toward industries, and educational programs to raise awareness of what individuals can do to reduce pollutants that can impair sludge quality.

Short-term Implementation Strategy: Recognizing the importance of pollution prevention, the DEPE is actively pursuing several types of programs to address pollution prevention objectives:

a. **Industrial Pollution Prevention:**

(1) **Pollution Prevention Program:** The Pollution Prevention Act (Act) of 1991 required the department to reexamine its media-specific permitting strategy. Historically, the department's major environmental regulatory efforts, the air pollution, water pollution and hazardous waste management programs, as directed and mandated under federal and state law, focused on controlling and managing discharges of hazardous substances through permit systems and the installation of pollution control technologies.

The Act was designed to prevent pollution by reducing the use and generation of hazardous substances at certain industrial facilities. The Act established a statewide goal of a fifty (50) percent reduction over five years in the generation of hazardous substances at the source. Owners and operators of approximately 800 industries at which hazardous substances are used or maintained are required to prepare pollution prevention plans (plans) and pollution prevention plan summaries. The plans for most of the industries will be due July 1, 1994, with a smaller number due July 1, 1996.

Within 18 months of its enactment, the Act required the department to adopt rules and regulations necessary for the implementation of the Act. On February 1, 1993, the department adopted N.J.A.C. 7:1K (Office of Pollution Prevention; Pollution Prevention Program Rules). With the promulgation of N.J.A.C. 7:1K, the department has tried to strike a balance between providing incentives to encourage voluntary implementation of pollution prevention planning techniques and maintaining adequate oversight of the development of the plans.

In attempting to maintain this balance, the department, after considerable deliberation, decided not to use its statutory authority to have plans submitted and to allow plans to remain on-site. In addition, the department limited its enforcement authorities to administrative and not substantive issues. The department's plan oversight will be administered by conducting many site visits during the initial years of the program. This decision provides an excellent example of the DEPE's cooperative and flexible attitude in implementing new policy and programs.

It is anticipated that pollution prevention economics will provide the incentive for industry to achieve the Act's goal of a 50% reduction over five years in the use, discharge and generation of hazardous substances. It is extremely difficult (as well as premature) to determine the extent the Act will result in reduced contaminants of concern with regard to sludge quality. However, discussions with the Office of Pollution Prevention and the NJPDES program have been initiated to establish a communications network between the DEPE, DTW and the private sector. Of note, is the Office of Pollution Prevention's upcoming publication of a guidance document that will walk the reader through the pollution prevention planning process with an eye to applying the process in a way that makes sense for the operations of individual companies.

(2) **Technical Assistance:** The Act also funds a technical assistance program at the New Jersey Institute of Technology (NJIT). The NJIT program has initiated a pilot program in cooperation with the Bergen County Utilities Authority (BCUA), to assist seven electroplating industries discharging into BCUA in developing pollution prevention strategies. The pilot program, which will be completed during the summer of 1993, should provide an indication of the usefulness of pollution prevention approaches in reducing contaminant discharges into municipal sewers. Information on this study,

when completed, will be disseminated by the DEPE. The DEPE will also play an active role in publicizing and encouraging use of the technical assistance program among dischargers that impact on sludge quality.

(3) **Industrial Statewide Stormwater Permitting Program:** This program represents a new effort to improve water quality while saving industry money and resources. The public has long recognized the environmental damage that can result when rainwater falls on the open containers and exposed materials of an industrial site. Rainwater runoff tainted by this contact often drains into nearly waterways and represents a significant component of water pollution. Rainwater runoff from New Jersey's more industrialized urban areas however often does not drain directly into a waterway. Rather, this runoff empties into a combined sewer that flows through a DTW. While a significant rain event likely results in the bypassing of the DTW, a lesser amount of rain can generate a very concentrated runoff for the DTW to process. Again, while not presently quantifiable, this type of rain event likely contributes to the contaminants found in a DTW's sludge production.

As a result of this non-point source contribution, the majority of facilities will be required to obtain a general permit that will require the development of pollution prevention plans and source reduction strategies. This stormwater pollution prevention plan (SPPP) will include an inventory of the facility that identifies potential areas where stormwater may come into contact with industrial activities, and a plan to remove or cover those activities. Implementation of the SPPP will usually take the form of elimination of contact using simple and cost-effective best management practices such as covering with a tarp, building a shed or roof or covering a loading area. The general permit will allow the DEPE to streamline its approach, which will prevent pollution without overly burdensome regulation.

A small number of the facilities will be required to submit a stormwater industrial individual permit. These requirements will be established on a case-by-case basis. Given the sampling data required and the length of time necessary to obtain this data, the individual permit application process is lengthy and complex. The Stormwater Permitting Program will be available to assist permittees in this process.

b. **Individual Pollution Prevention:** In terms of the role of the general public, individuals contribute to increased levels of contaminants in sludge whenever they pour hazardous household chemicals, such as solvents, cleaning products and paints, into sinks and drains. In addition, as mentioned above, many of these pollutants are carried by rainfalls directly into sewers, and, in the case of cities with combined sanitary and storm sewers, are likely to end up in the sludge.

(1) **Compilation of Data on Household Contaminants:** In a 1977 study, sponsored by the BCUA, domestic households contributed over half of the total of mercury and nickel found in the wastewater, and more than 20% of cadmium, copper, lead and zinc. The Princeton University Center for Energy and Environmental Studies will update this study over the next year. It appears on the basis of this and other studies, that hazardous chemicals from households and commercial establishments may contribute a large portion of the contaminants affecting sludge. Additional efforts will be made to accurately assess the extent of household contributions, and determine the contaminants of greatest concern. This information will be made widely available to DTWs.

(2) **Non-point Source Pollution Program:** The DEPE has had an active non-point source pollution education program ongoing for several years. The program focuses on proper ways to handle motor oil, household chemicals, pet waste and other potential pollutants. The department, in conjunction with the New Jersey Department of Agriculture (NJDOA), State Soil Conservation Districts, Rutgers Cooperative Extension and the U.S. Department of Agriculture, Soil Conservation Service (SCS) has produced a new set of non-point source pollution brochures entitled "The Clean Water Information Series". The titles for this series are:

- "New Jersey's Water";
- "Animal Waste";
- "Fertilizers";
- "Motor Oil";
- "Pesticides";
- "Managing Soil Erosion and Sedimentation";
- "Managing Pesticides Around the Home";
- "Managing Fertilizers Around the Home";
- "Maintaining Pesticides Application Equipment Around the Home";
- "Maintaining Fertilizer Application Equipment Around the Home";
- "Managing Agricultural Pesticides";
- "Maintaining Agricultural Pesticides Application Equipment"; and
- "Maintaining Granular and Manure Fertilizer Application Equipment".

These brochures are available through the DEPE's, Public Access Center at (609)777-DEPE.

Additional general non-point source pollution materials available through the DEPE include:

- "The Clean Water Book: A Guide to Reducing Water Pollution in

Your Home and Neighborhood" - A 24-page illustrated booklet that describes how individuals can reduce non-point pollution;

- "Non-point Source Pollution: Don't DRAIN Into Our Resources" - A full-color brochure on non-point pollution; and

- "Toxins in the Home" - A description of common household hazardous chemicals and proper ways to dispose of or recycle them.

An activity guide for teachers, entitled "Beneath the Shell: A Teacher's Guide to Non-point Source Pollution and its Potential Impact on New Jersey Shellfish" also has been distributed to teachers, in conjunction with teacher training workshops.

In addition to the above educational efforts, the non-point source program is focusing on several other areas. An interdepartmental task force is being created to coordinate programs involved in various ways with non-point source pollution control. Coordination has begun with the State Soil Conservation Committee, the NJDOA and other agencies to more effectively control non-point sources. The DEPE has noticed an interested party review, proposing to plan, permit and evaluate related environmental issues utilizing a comprehensive watershed approach. Such preliminary watershed evaluations have been initiated with the Great Swamp, Barnegat Bay and the Navesink River. These geographic initiatives are expected to lead eventually to statewide watershed management approaches. The DEPE is exploring the use of Water Quality Management Plans for implementing regional non-point control practices.

(3) **Citizens Handbooks:** The DEPE, in cooperation with the federally funded New York/New Jersey Harbor Estuary Program, has authorized development of a comprehensive "Citizens Environmental Handbook". The handbook, to be completed by September 1993, will identify specific actions individuals can take to reduce environmental pollution, including non-point source pollution, which can have an impact on sludge quality.

In August 1992, the USEPA published a similar document entitled "The Consumer's Handbook for Reducing Solid Waste". This publication describes how the general public can reduce our solid waste by making environmentally aware decisions about everyday things like shopping and lawn care. This handbook (USEPAS30-K-92-003) is available through:

Communications Services Branch
Office of Solid Waste - USEPA
401 M Street, SW
Washington, DC 20460

c. **Corrosive Water Supplies:** It is suspected that in at least some cases DTW's have been unable to reach their sludge quality goals because of corrosive (acidic) drinking water supplies which cause lead and copper to be leached into the wastewater stream. Recent federal legislation has required assessment and correction of potable water systems to reach more stringent standards for lead and copper as measured at the tap. As of January 1, 1992, water suppliers are required to monitor levels of lead and copper at the tap for specified periods. Based on this information and scientific studies, the DEPE is required to designate the conditions that result in optimal corrosion control by July 1, 1998. If water suppliers are still not able to meet the new standards for copper and lead, further treatment of water sources and lead service connection replacement may be required.

As a result of this program, it is expected that levels of lead and copper will drop for some domestic treatment works, with corresponding improvements in sludge quality for these facilities. In addition to implementing the provisions of the federal lead and copper rules, the DEPE will seek voluntary cooperation from local drinking water suppliers in reducing levels of corrosion in areas where studies demonstrate sludge quality is being negatively affected. The DEPE will act to facilitate negotiations between DTWs and water suppliers in such cases.

d. **Collection of Hazardous Wastes from Households:** To address the problem of household hazardous waste disposal, an informational program has been developed by the DEPE on the proper disposal of toxic substances within homes and commercial establishments. In addition, Governor Florio's Emergency Solid Waste Assessment Task Force recommended establishment of permanent household hazardous waste and small quantity generator collection facilities. The DEPE has worked with counties through the solid waste planning process to advance the development of permanent facilities. Burlington County has selected a permanent collection site and used a USEPA grant to develop associated engineering designs and site plans. The Burlington facility began construction in June 1993 and will be New Jersey's first permanent collection site. As of June 1993, Atlantic, Mercer, Hudson, Union, Gloucester, Somerset, Cumberland, Hunterdon, Camden, Monmonth, Cape May, Middlesex, Morris, Sussex, Warren and Ocean counties have submitted revised solid waste strategies to the DEPE which commit to serious investigation of developing permanent collection facilities. In April 1993, the DEPE released a draft guidance document for county household hazardous waste coordinator review entitled, "A Technical Guidance Document For Planning and Permitting of Household Hazardous Waste/Small Quantity Generator District Programs To Assist Counties In Project Development." This document is expected to be finalized by the end of September 1993 and will clarify the expedited planning and permitting approach the DEPE will use to assist counties in bringing permanent installations on-line. Sewage sludge generators are also encouraged to actively participate in educational efforts as to the proper disposal of household hazardous wastes.

Long-term Implementation Strategy:

a. **Industrial Pollution Prevention:** In accordance with the Pollution Prevention Act, the approximately 800 industries covered by the Act must develop comprehensive plans for reducing pollutant discharges by 1994. As funding allows, the NJIT Technical Assistance Program (TAP) will work actively with industries, on request, in the development and implementation of pollution prevention plans. The DEPE Office of Pollution Prevention and the NJPDES Permitting Program will work to develop a more open and accessible communication network between the DEPE, DTWs and private industry to identify the contaminants adversely affecting sludge quality.

b. **Individual Pollution Prevention:** With regard to non-point source pollution, the DEPE will consider the promulgation of regulations and model local ordinances that will restrict activities contributing to non-point source problems. Focus areas may include wellhead protection, stormwater management, and management of household hazardous waste. The DEPE will continue to investigate regional non-point source problems, on a watershed-by-watershed basis, focusing initially on the coastal region primarily. Public education and citizen involvement will continue to be the major focus for these efforts.

c. **Corrosive Water Supplies:** New Jersey's timetable for compliance with new federal lead and copper regulations require that monitoring be conducted through the period January 1992 to July 1994. This will be followed by studies of optimal corrosion control strategies, with finalization of optimal strategies to be completed by July 1998. Table 3 lists the projected timetable for large systems that serve more than 50,000 people (the timetable for smaller systems starts somewhat later). If studies show that copper and lead will continue to be significant problems in sludge quality, a task force of water suppliers and sludge generators will be convened to propose solutions, and, if necessary, additional legislation will be recommended by the DEPE to resolve the problems. Additionally, the department is developing a $500,000 technical assistance contract to help small water systems achieve compliance with the lead and copper rule.

d. **Collection of Hazardous Wastes From Households and Small Quantity Generators:** The DEPE will continue to work actively with sludge generators to develop effective educational materials and programs that inform local residents of the need to reduce non-point source pollution and to properly dispose of household hazardous chemicals.

Household hazardous waste and small quantity generator collection/disposal programs will be established and expanded. This will include the development of permanent countywide and/or regional collection sites throughout the state, and will require coordinated and cooperative efforts between the sewerage authority and the appropriate county solid waste management officials.

TABLE 3

CORROSIVE WATER SUPPLIES STRATEGY

IMPLEMENTATION DATE	ACTIVITY
January 1992	Begin monitoring of copper and lead at tap
July 1994	Complete corrosion control studies
January 1995	DEPE designates optimal corrosion control
January 1997	Install corrosion control
January 1998	Complete follow-up monitoring
July 1998	DEPE establishes maximum allowable levels that can occur at the tap

6. Pretreatment

Objectives and Criteria: Industries are required by law to pretreat waste discharges into public sewer systems so the level of contaminants discharged does not exceed specified limits. Pretreatment represents a second tier of effort in reducing the level of contaminants in wastewater, following pollution prevention initiatives at the front end of the process. Although the DEPE's policies emphasize removal of industrial contaminants prior to the introduction into a sewer system, there are more and more examples where, in spite of pretreatment efforts, a DTW's sludge quality precludes them from pursuing traditional beneficial use sludge management alternatives. The DEPE is aware of several DTWs that can account for most, if not all of their the industrial dischargers, but still can not produce and consistently maintain a land-appliable sludge quality. Some of these DTWs have already initiated steps to control aggressive water systems and known non-point pollution sources. The department's primary objective through pollution prevention and advanced pretreatment is to achieve the highest sludge quality practicable to allow maximum use of traditional beneficial use systems. At the same time, in order to reduce exports and advance self-sufficiency, the DEPE is generally supportive of applications for high technology beneficial use systems for DTWs that currently have lower sludge quality and limited short-term opportunities for traditional beneficial use applications.

The department's pretreatment program has historically experienced tremendous success in reducing discharges to DTWs as discussed in Section C.3(d). The department's pretreatment program utilizes the "Guidance Manual on Development and Implementation of Local Discharge Limitations Under the Pretreatment Program, USEPA 12/87" (Guidance Manual) in developing and reviewing industrial local discharge limits. The Guidance Manual specifies that surface water quality standards, the DTW's sludge quality, worker protection and safety at the DTW, and treatment plant inhibition are factors that must be considered and addressed when developing or re-evaluating local limits. While the DTW's sludge quality is often found to be the limiting factor in establishing such limitations, a DTW employing a high technology beneficial use sludge management alternative may find that one, or any combination of the following factors; surface water quality standards, worker protection and safety, and protection against treatment plant inhibition is (are) the limiting factor(s) in establishing local limitations.

The DEPE has and will continue to utilize this approach to local limit development. While sludge quality criteria may not always be limiting factors in developing local limitations, this approach will ensure a sludge quality compatible with the DTW's sludge management alternative. Also, it will ensure protection of worker health and safety, compliance with water quality standards and guard against treatment plant inhibition. Lastly, the development of technologically based, defensible local limits may cause industry to focus its resources on pollution prevention strategies that may be more economically achievable.

Short-term Implementation Strategy: At present, 23 DTWs have been delegated authority by the DEPE over their industrial pretreatment program (Table 4). The delegated local agencies are required to, among other things, issue permits and set and enforce local limits for industrial discharges into their sewer system. The DEPE reviews DTW annual report submissions and conducts annual on-site audits at delegated local agencies to ensure that pretreatment programs are being administered appropriately. The delegated DTWs regulate approximately 1600 industrial discharges, which represent most of the industrial users in the state. A much smaller number of industrial discharges are within service areas of DTWs that do not have delegated authority to operate pretreatment programs. As the significant industrial dischargers in the non-delegated areas are regulated by the DEPE directly, the DEPE will continue to issue and enforce these permits.

a. **Improvements in Pretreatment Program:** The DEPE will continue to carefully oversee the pretreatment protocols developed and implemented by delegated authorities and require all practicable improvements to advance pretreatment goals. The recent passage of the Clean Water Enforcement Act (CWEA) resulted in increased reporting requirements in the pretreatment program.

TABLE 4

DOMESTIC TREATMENT WORKS WITH DELEGATED PRETREATMENT PROGRAMS

(As of August 1993)

Bayshore Regional Sewerage Authority	Northwest Bergen County Utilities Authority
Bergen County Utilities Authority	Ocean County Utilities Authority
Camden County Municipal Utilities Authority	Passaic Valley Sewerage Authority
Ewing-Lawrence Sewerage Authority	Rahway Valley Sewerage Authority
Gloucester County Utilities Authority	Rockaway Valley Regional Sewerage Auth.
Township of Hamilton	Somerset-Raritan Valley Sewerage Authority
Hanover Sewerage Authority	Stony Brook Regional Sewerage Authority
Joint Meeting of Essex & Union Counties	City of Trenton
Linden-Roselle Sewerage Authority	Two Bridges Sewerage Authority
Middlesex County Utilities Authority	West New York Municipal Utilities Authority
Township of Morris	Township of Wayne
Mount Holly Sewerage Authority	

Prior to the CWEA, delegated agencies tailored the reporting frequency to the permitted facility, with a range of semi-annual to monthly reporting. The CWEA now requires that significant indirect users (SIUs) report monthly. The CWEA also broadened the enforcement powers of delegated agencies, as well as increased the number of hazardous pollutants for which local limits may need to be developed. While the CWEA strengthens some of the inspection requirements, the mandate that delegated agencies complete annual inspections of SIUs was already in place. Similarly, the CWEA formally mandates that delegated agencies perform an inflow and outflow analysis of the treatment plant annually. This mandate strengthens existing requirements that were already in place. In addition, new language has been developed by the DEPE for inclusion in permits which will more clearly specify the responsibilities of delegated local agencies in program implementation and enforcement. These changes will generally facilitate more effective enforcement of pretreatment program requirements by the DTWs.

b. **Training:** Many of the delegated DTWs will be undergoing reevaluation of local pretreatment limits in the near future due to new regulatory requirements (40 CFR 122.21, under new Pollutant Discharge Elimination System requirements) from the USEPA. The former ocean dumping DTWs are required to establish or reevaluate local limits, under the terms of their JCDs or other regulatory requirements. While a training program to help DTWs develop appropriate local limits has been developed, scheduling conflicts and lack of sufficient participants have prevented this training from occurring. The DEPE will attempt to sponsor this training again in 1994 to assist both delegated and non-delegated local agencies develop such limitations. The new limits will reflect new sludge quality standards as well as new water quality standards and measures to protect the facility and workers.

Long-term Implementation Strategy:

a. **Additional Delegations:** It is expected that delegation of pretreatment programs will be awarded to at least six additional authorities in the coming years. Three of these delegations (to the authorities of North Bergen, Landis, and the Cumberland County Sewerage Authority) will occur within the next year. The other DTWs to receive delegation over the next few years are likely to be Tri City SA, Northeast Monmouth RSA, and Parsippany Troy Hills SA. These additional six authorities meet the delegation criteria of having significant industrial discharges that affect their flow and a total design flow of at least five million gallons per day. (Of the 442 DTWs in New Jersey, 42 have flows greater than five million gallons per day, and 14 have more than 10% industrial flows. Delegation to a total of 29 of these DTWs thus represents most of the DTWs that meet the delegation criteria.) Such delegation to large DTWs allows for the local authority to ensure reliability in operation of the wastewater treatment facility and to provide a consistent and fair approach to local industry affected by the pretreatment regulations. This contributes to a more effective pretreatment program and improved sludge quality.

b. **Surface Water Quality Standards:** The federal Clean Water Act, as amended by the Water Quality Act of 1987, requires states to adopt numeric criteria to protect the uses of their waters from all toxic pollutants. While the department sought to propose its surface water quality standards on November 2, 1992, USEPA adopted toxic criteria for New Jersey on December 22, 1992. USEPA's adoption requires the DEPE to re-evaluate its surface water standards. It is anticipated that the department will adopt some of the federal toxic criteria while also renoticing its toxics and metals criteria by November 1993.

   The development of new surface water quality standards pertaining to toxic contaminants may also have a positive effect on sludge quality, as these standards will require more stringent pretreatment limits for some parameters, and new limits for other previously unregulated parameters. Increased restrictions on industries discharging these pollutants will result in lower levels of the pollutants in wastewater. However, it must also be remembered that higher levels of treatment by DTWs may be required to meet water quality standards. Higher levels of treatment allow greater capture of pollutants, thereby increasing contaminants in sludge.

7. Promotion of Beneficial Use Strategies

Objectives and Criteria: The primary objective of the state's new sludge management policy is to encourage and facilitate management of sludge through beneficial uses. The state will actively support movement toward strategies and markets that maximize beneficial uses of sludge, through a comprehensive communications plan. The state's efforts will be directed along three lines: a) public education and public involvement; b) market development, and c) resolving particular concerns raised by the agricultural community as impediments to beneficial uses.

Short-term Implementation Strategy:

a. **Statewide Committee for Organics Recycling Education:** The DEPE will continue to provide staffing assistance for the Statewide Committee for Organics Recycling Education (SCORE), which is a coalition of representatives from key organizations involved in sludge management. As of November 1992, SCORE charter membership includes representatives from: Association of New Jersey Environmental Commissions, AEA, Chemical Industries Council, Clean Sludge Coalition, Compost Management, Inc., Cook College-Rutgers University, DEPE, Land Resources Recycling Management, League of Municipalities, League of Women Voters, NJDOA, New Jersey Farm Bureau and the USEPA. Most of these organizations were involved in the Sludge Management Policy Working Group, convened by the DEPE for a consensus-building effort in February 1991. SCORE has met regularly since April, 1991 in an effort to cooperatively develop programs and materials to promote public acceptance of beneficial uses. The committee meets in a different county each month, and invites local organizations to participate in the discussion portion of its meetings, as a way of gaining a greater awareness of regional issues. The DEPE strongly encourages public participation and input through SCORE. Some of the primary activities of SCORE are as follows:

   (1) In January 1993, the DEPE and SCORE co-sponsored the conference "Sludge Management in New Jersey: Issues and Impact." This conference, attended by over 150 people, presented concurrent sessions regarding sludge management in New Jersey, current practices and technologies, public skepticism toward sludge use, and environmental issues and impacts. The conference concluded with a town meeting of panelists and conference attendees. The town meeting was structured to provide an opportunity for direct dialogue regarding sludge policy and practice in New Jersey. Due to an overwhelming initial response, a second conference is planned for January 1994.

   (2) SCORE has also developed several fact sheets to educate the general public. The fact sheets, available through SCORE or the DEPE, include:

- Sludge Fact Sheet Glossary of Key Terms;

- Policy in a Public Forum - Sludge Management in New Jersey;

- Beneficial Uses of Sewage Sludge in New Jersey;

- Composting;

- Pretreatment; and

- Land Application.

(3) SCORE has been involved as a facilitator during early phases of proposed beneficial use projects in order to provide information and answers to the concerns of host community citizens. The committees have met with citizen groups and local officials regarding the following beneficial use projects:

- Land reclamation project in High Point State Park;

- Potential composting facility in Mine Hill Township; and

- Land application of sludge in Monmouth County.

b. **The Association of Environmental Authorities (AEA):** In an independent effort, the AEA has produced the videotape "Impact - Beneficial Uses of Biosolids." This video was developed to further assist municipal governments in educating their communities. Briefly, the video provides a general discussion of various beneficial use sludge management technologies. For more information, please contact AEA directly.

c. **Public Input:** The DEPE will continue to provide opportunities for public input into the policy-making process. The "Sludge Management Policy Guidelines," which outlined the basic policy positions detailed in the SSMP Update, was widely distributed in April 1992, and was the subject of a pre-proposal workshop on May 26, 1992. Comments received from the workshop, and subsequent written comments, have been considered and integrated into the SSMP Update as appropriate. Following publication of the SSMP Update, the DEPE will initiate a formal hearing and public comment period. In addition, the DEPE will seek active input on an informal basis from key constituencies in particular technical areas.

The DEPE also continues to establish a stronger communication network by routinely participating in public inquires, meetings and debates specifically relating to sludge applications and/or development of sludge projects. The

DEPE attends the Passaic Valley Sewerage Commissioner's (PVSC) Citizen Advisory Committee meetings, whose purpose is to explore beneficial use technologies for PVSC's long-term sludge management alternative. Additionally, the DEPE has participated in town discussions on sludge applications in; Upper Freehold Township, Middlesex, Cumberland and Burlington Counties.

d. **Response To Local Concerns:** Siting of sludge facilities and application sites in the past has often been accompanied by local opposition. It is the DEPE's position that the public needs to be involved in such issues as early in the process as possible. The DEPE maintains that siting of a sludge management facility is primarily the responsibility of the sludge generator. However, to assist in addressing local concerns, the DEPE will provide a staff person to work as a liaison with potential host communities of sludge sites. The liaison will most likely operate as part of the community outreach subcommittee of the SCORE to provide information, arrange meetings as needed, and interface with local leaders to ensure that questions are being answered as they arise. Such efforts will minimize planning disruptions resulting from lack of understanding of the issues and not being able to contribute ideas or to convey concerns which often frustrate local citizens.

e. **Finalization of a Comprehensive Communications Plan**: SCORE activities, AEA's efforts, public input and response to local concerns are elements of the DEPE's communications efforts to promote and educate the general public regarding the beneficial uses of sewage sludge. These elements must be incorporated into a comprehensive communications plan that will allow the department to maximize its efforts with the implementation of the state's beneficial use sludge management policy. This comprehensive communications plan is currently under development and shall be completed by the end of the first quarter of 1994. It will incorporate strategies for public information, education, public participation, involvement of key interest groups, and strategies for resolving obstacles to public and agricultural acceptance of sludge products.

Of equal importance will be plans for an internal communications structure, so that all offices within the DEPE will be fully aware and accessible to resolve public issues with the new beneficial use policies. As described in the historical section of this document, an effort in the early 1980's to direct sludge to land application, as opposed to landfills, met with widespread and extreme public opposition. In order to gain public support and confidence for the current beneficial use initiative, the DEPE will continue to develop and expand an active public communications and relations strategy. The department is exploring utilizing solid waste recycling networks to promote and educate the general public of these policies. Additionally, during the Fall of 1992 the DEPE awarded a contract for a statewide marketing/public relations program focusing on recycled-product purchasing, the development of markets, and the recycling of non-traditional materials such as used oil, batteries, grass clippings and tires. The DEPE is considering expanding the scope of services of this public relations recycling contract to include sludge and SDP.

f. **Market Development:**

(1) **Procurement Practices:** Efforts have been initiated to revise current state procurement practices and specific bid documents to stimulate markets for the use of sludge and SDPs. Governor Florio's Executive Order # 91 establishes procurement goals and preferences for recycled products including sludge. Revised procedures will target use of sludge and SDPs on public land in agricultural and landscaping applications (in place of inorganic soil amendment applications), road construction projects (vegetative stabilization of berms), restoration of disturbed areas (quarries and contaminated sites), and in other suitable uses.

State government will take the lead role in this area and establish education programs and distribute revised procurement procedures and documents to the county and municipal level. A statewide procurement conference will be held in October 1993 to educate municipalities and counties of procurement procedures that promote the utilization of compost and other soil amendments where an agency is responsible for the maintenance of public lands. Through this conference, the state will begin utilizing the combined purchasing powers of the public sector to develop future markets for recycled materials/products.

(2) **Use as Landfill Cover:** A significant market for SDP is likely to be in landfill cover applications. As of June 1993, twelve (12) major landfills of regional significance remained in operation, most of which with substantial long-term solid waste disposal capacity. Each is under regulatory requirements to apply daily, intermediate and final soil cover. These cover requirements represent a significant potential market for SDPs both in terms of daily cover needs of the 12 operating facilities noted above, as well as the universe of at least 168 landfills that ceased operations after January 1982 and are required to submit and implement closure plans that include procedures for final cover.

To date, the most significant regulatory approval granted for the use of SDP as daily cover is with the Middlesex County Utilities Authority (MCUA) which operates the Edgeboro Landfill. The MCUA has constructed an alkaline stabilization facility which produces a high quality SDP. In a December 16, 1991 permit modification, the department approved the use of at least six inches and a maximum of 12 inches per day of alkaline stabilization SDP for use as daily cover at Edgeboro. In addition, as part of the final closure plan for the Bellvidere-White Landfill in Warren County, the department authorized the use of stabilized SDP produced by Agorganic, Inc., for a soil blend to produce final landfill cover through a December 15, 1992 approval. Finally, as part of its long-term sludge management plans, the Bergen County Utilities Authority has petitioned the department to approve the use of a chemically stabilized SDP for final cover applications at the Kingsland Park landfill, as well as other closed facilities located within Hackensack Meadowlands Development Commission's jurisdiction.

(3) **Economic Incentives:** To complement public sector efforts to stimulate markets for sludge and SDP, economic incentive programs must be developed to expand private sector involvement. The following are concepts the DEPE is continuing to evaluate:

- Low-interest loans to sludge processors or applicators;
- Tax credits for investment in equipment needed for creating or applying sludge products; and
- Exemption from state sales and other taxes for the use of sludge and SDPs.

(4) **Research Projects:** The DEPE will also undertake research projects in market assessment and development. For example, the DEPE is presently working in cooperation with Rutgers University in developing plans for research projects that would ascertain how sludge composted with municipal solid waste could be utilized in landscaping, land reclamation and forestry. In addition, in October 1992, the department began efforts to establish a research project at the Rancocas State Park where Class A/B sludge has been land applied over the past 6 years on agricultural leased land. Research will focus on a detailed evaluation of soil samples to determine cumulative metal loading from sludge application in comparison to analytical results of similar analysis performed at a site where commercial fertilizer has been applied. Further, the department has been evaluating other opportunities for research projects on state-owned lands. Further discussion of all research efforts can be found in Section D.3.

(5) **Demonstration Projects:** Where possible, the DEPE will facilitate the development of demonstration projects that support the expansion of existing markets or the creation of new ones. As noted in Section B.1.e, the DEPE anticipates the development of a general permit in 1994, and a published general permit package to streamline the approval of limited duration demonstration projects. Special efforts have been and will continue to be made to assist such projects in preparing applications, and

providing information about resources that would be of assistance. In February 1993, the department approved a demonstration project at the Burlington County landfill. This demonstration project involved the utilization of sludge compost as landfill cover. It was determined that this material, when mixed with varying amounts of sand, performed similarly to topsoil as daily and/or immediate cover on the landfill. Another example of a demonstration project currently under consideration is the use of SDPs in container-produced ornamental plants.

g. **Resolving Agricultural Issues:** The DEPE is exploring strategies to reduce liability concerns within the agricultural community. These liability concerns include potential nuisance suits from local residents and potential incidents of soil and/or water contamination.

(1) **Nuisance Suits:** The Right-To-Farm Act (N.J.S.A. 4:1C-1) established "as a policy of the state the protection of commercial farm operations from nuisance actions, where recognized methods and techniques of agricultural production are applied, ..." Additionally, the Right-To-Farm Act (Act) established the State Agriculture Development Committee (SADC). Per the Act, the SADC shall study, develop, review and recommend to the appropriate state departments and agencies a program of agricultural management practices. The SADC defined "Agricultural Management Practices" (AMP) as practices either formally set forth in current published New Jersey Agricultural Experiment Station (NJAES) recommendations or practices that represent the best collective professional judgement and opinion of the appropriate facility of the NJAES (N.J.A.C. 2:76-2.2). In March 1993, NJAES forwarded to the NJDOA for the SADC's consideration the "Agricultural Management Practices for the Utilization of Sewage Sludge and Sludge Products." Given the technical discrepancies in the sludge quality standards contained in the AMPs, the federal 503 sludge regulations (which the DEPE intends to adopt) and the DEPE's own research efforts, the DEPE's Division of Science and Research has assembled a work group consisting of the DEPE, NJDOA, NJAES and USEPA to review and evaluate these discrepancies. The initial goal of this work group is to ensure the AMP's are complementary with the 503 regulations to maximize beneficial use opportunities, while providing farmers with a needed level of comfort that the use of sludge and SDP will improve crop yield and not adversely affect their land. A report of work group findings and recommendations will be completed within six (6) months of the adoption of this SSMP Update.

(2) **Site Liability:** The agricultural community also has expressed concerns regarding site liability. Although existing sludge and SDP quality criteria for land/application were developed to be protective, it is anticipated that the aggressive improvement of sludge quality through pollution prevention

and pretreatment will further lessen the likelihood of site liability issues.

While these actions will reduce the potential for application of poor quality sludge and SDP, long-term liability concerns must still be addressed. These concerns include:

(a) **Future Changes in Federal and State Standards and Regulations;** The regulated sludge management community has repeatedly expressed reservations in utilizing sludge and SDP due to the potential implications with the federal 503 regulations and the development of state-specific regulations. These reservations were strongly articulated at the first meeting of the USEPA's Sludge Information Sharing Group in April 1993. Farmers now using or considering use of sludge and SDP, as well as the banking industry, want to know how these and future changes to federal and state regulations will affect the use of land (either for continued agricultural purposes or potential sale of the land for non-agricultural use) and whether they will be accountable for future standards provided they have adhered to current application rates and procedures.

(b) **Deed Restrictions;** The farming community has concerns that the use of sludge and SDP may result in future deed restrictions, thereby limiting the farmers' ability to utilize their land as they so choose.

(c) **Farm Preservation Program/Green Acres Funding;** Farms that used sludge and/or SDP previously may participate in the Farmland Preservation Program. However, a farm actively enrolled in the Farmland Preservation Program and/or receiving funding under the Green Acres Program is prohibited from utilizing sludge and/or SDP. These prohibitions are another liability issue that must be resolved if the farming community is to fully participate in the state's beneficial use sludge management policies.

(d) **Food Processor Ban;** Over the last decade, the food processing industry has not accepted products grown on sludge amended soils. The ban imposed by the food processors contributes to the liability concerns on use of sludge and SDP on farmland.

The DEPE is confident the Right-To-Farm issues will be resolved within a short timeframe given the issuance of the federal 503 regulations and the DEPE's intention to adopt the federal standards with only minor deviation. However, to ensure that the farming community's long-term liability concerns are addressed, the DEPE will work with NJDOA and NJAES in developing a joint report to address these issues. This report will include, at a minimum:

- Recommended revisions to the current Right-to-Farm Act, if necessary, to ensure farmers protection from nuisance suits;

- Development of model contracts that would place liability on the generators and/or processors of sludge products rather than the farmer, provided the farmer's application is consistent with the recommended application rates and management practices;

- Review of the DEPE's sludge quality monitoring requirements and procedures. Initial discussions have begun with the NJDOA to jointly conduct an application of sludge products on farmland. The soil tests would be done concurrently by the two departments to demonstrate the reliability of testing and monitoring requirements;

- In cooperation with the soil conservation districts, review of their involvement in the monitoring of the agricultural use of sludge and SDPs; and

- A revisitation of the food processor ban on accepting products from sludge-amended soils.

The DEPE will work with legal and agricultural representatives to fully address and resolve liability issues. The DEPE would like to formally create an interdepartmental team to address each of the concerns identified. This team will document its conclusions and recommendations in a joint report to the Commissioners of the DEPE and NJDOA for their review and comment. This report shall be completed within six months of the adoption of the SSMP Update.

Long-term Implementation Strategy:

a. Public Education and Public Involvement

(1) **Statewide Committee for Organics Recycling Education:** The SCORE will continue to be a cooperative educational effort the DEPE will fully support. SCORE will be utilized by the DEPE to get the message out throughout New Jersey. Development of other informational fact sheets will address odors, risk assessment and management, other sludge management alternatives including, but not limited to, chemical fixation and high technology beneficial uses. Finally, the DEPE anticipates SCORE's active involvement in addressing emerging sludge management issues throughout New Jersey.

(2) **Public Input:** The DEPE continues to emphasize a consensus building approach in refining sludge management policies. While the 1991 Sludge

Management Policy Working Group (working group) provided input to many of the policies found within the SSMP Update, the working group or a similar heterogeneous assemblage of interested public and private concerns may be reconvened following the publication of the SSMP Update to address the multitude of questions/issues raised in the issuance and adoption of the 503 regulations.

(3) **Response To Local Concerns:** Based on the DEPE's experience in working with communities in which there is controversy over sludge product application sites, a guide summarizing successful approaches will be prepared. It will suggest how authorities and local, county and state agencies can work together to enhance public understanding and support of beneficial use applications. It will also incorporate successful examples elsewhere in the country. A target date for completion on this guide is September 1994.

b. **Market Development:** Depending on the results of investigation of various alternative market strategies over the next year, subsequent efforts will involve implementation of the selected approaches. The DEPE will continue to explore new markets for high quality SDPs and promote demonstration projects in key areas. A particular focus will be on use of high quality sludge and SDPs on state-owned land.

c. **Resolution of Liability Concerns:** Once the DEPE, in cooperation with its legal staff and the agricultural community, has identified the appropriate strategy for handling liability concerns, it will take the necessary steps to institutionalize the selected solutions. Depending on the nature of the solutions, this may require active support for legislation, development of contractual forms, or other measures. The DEPE will work with the NJDOA in disseminating information about the approach taken, so the farming community is assured the issue has been satisfactorily resolved.

8. Sludge Quality Standards: Regulatory Approach

The DEPE expects to propose regulations incorporating the sludge quality standards recently adopted by USEPA at 40 CFR Part 503 (503 regulations). Although the DEPE will continue independently to evaluate scientific evidence and technological advances to ensure that sludge quality reflects state-of-the-art technology, at this point, the DEPE has determined that the federal 503 regulations accurately reflect current scientific findings as to the sludge quality necessary to protect the environment and public health. The DEPE further expects to propose regulations to reduce regulatory oversight of SDP that meets sludge quality requirements established under the federal 503 regulations, as an incentive to improve sludge quality. The DEPE's promulgation of regulations to incorporate the federal 503 regulations into the state sludge permitting process may also necessitate modifications to existing New Jersey statutes and regulations to ensure consistency with the proposed regulations.

Short-term Implementation Strategy:

a. **Current Sludge Standards:** As noted, the DEPE intends to promulgate regulations incorporating the federal Part 503 regulations pertaining to sludge use and disposal. However, until the new regulations are formally adopted, the DEPE will continue to utilize the existing Class A, B and C categories for determining appropriate beneficial uses and regulatory requirements, as outlined in the 1987 SSMP. Five of the current sludge metal concentration limits were developed to evaluate New Jersey sludges in relation to safe metals loadings established by USEPA. Class A standards were designed to allow for agricultural application at typical agronomic rates for 40 years before reaching safe metals loading limits; Class B standards allow for such application for 20 years to reach the same total loadings of a Class A application. Class A and B limits were calculated using application rates that would provide necessary nitrogen fertilization for corn (given an assumed sludge nitrogen concentration). Class C includes all sludges with metals and/or organic compounds in excess of Class B criteria, but below hazardous criteria established by the USEPA. Class C sludges are authorized for beneficial use applications as well, but generally on a far more limited quantity and duration basis, depending on the unique characteristics of an individual site. For the readers' reference, the existing sludge quality criteria (Class A and B) for land application can be found below.

b. **DEPE Research on Standards:** During 1991, the DEPE Division of Science and Research (DSR) initiated an intensive effort to review current scientific evidence and risk assessments for four sludge contaminants of concern -- cadmium, copper, lead and pathogens.

SLUDGE QUALITY CRITERIA AS OF AUGUST 1993		
METALS (ppm, dry-weight basis)	CLASS A	CLASS B
Arsenic	10	10
Cadmium	20	40
Chromium	1000	1000
Copper	600	1200
Lead	2400	4800

SLUDGE QUALITY CRITERIA (cont'd.)		
METALS (ppm, dry-weight basis)	CLASS A	CLASS B
Mercury	10	10
Nickel	625	1250
Zinc	1200	2400

The intent of this effort was to respond to the working group's recommendation that standards be developed for a high-quality sludge requiring minimal regulation.

The DSR assembled a peer review committee of regional and national experts in the field, and several working groups to conduct the research. The five working groups focused on the following topics: a survey of federal and state technical standards; sludge sampling, testing and analytical issues; fate and transport of sludge contaminants; risk assessment; and interim standards. To support the overall effort, an extensive literature survey was conducted to ascertain the latest scientific data relating to the target contaminants. A survey was also done of sludge management practices and standards in other states and countries. Based on this research and subsequent input from the peer review committee, recommendations were prepared for consideration by the DEPE on standards for cadmium, copper, lead and pathogens. These particular contaminants were selected because of the considerable scientific evidence available for the risk assessment analysis and the potential public health impacts. The peer review committee recently released a second draft of its findings. With the promulgation of the 503 program, this group may be reconvened to assist the DEPE with its on-going evaluation.

c. **Response to Federal Standards:** The Water Quality Act of 1987 directed USEPA to formally identify toxic pollutants in sludge that may adversely affect public health or the environment, establish numerical limits for each of these pollutants, and specify management practices. The USEPA published 40 CFR Parts 257, 403 and 503 "Standards For the Use of Disposal of Sewage Sludge; Final Rules" (hereafter identified as the 503 program or regulations) on February 19, 1993. The 503 regulations were developed following extensive research and scientific analysis by the USEPA and outside technical experts, which assisted USEPA. These collective efforts resulted in comprehensive regulations that will protect human health and the environment while simultaneously establishing criteria to treat high quality sludge as a product in commerce to advance beneficial use across the United States. For these primary reasons, the DEPE is proposing to adopt the 503 regulations with relatively minor modifications. As noted above, DSR has concerns with some of the risk analyses that USEPA used to establish the 503 standards. Furthermore, DSR's research and review of the lead, cadmium and copper standards, in addition to those standards identified in the NJAES AMPs, have generated a number of questions that should be addressed. As mentioned above, the DSR has initiated discussions with NJAES, NJDOA and USEPA to continue the evaluation of these standards to ensure they provide the level of protection necessary for New Jersey's environment. Despite adoption of the 503 regulations, New Jersey reserves the right to continue its risk analysis and may issue more stringent standards if there is sufficient scientific evidence to support this need. Review of sludge standards is a ongoing activity that is influenced by scientific and technological developments and changes. The DEPE shall conclude its joint preliminary review within six months of the adoption of this SSMP Update.

A substantial advantage in adopting the federal criteria will be to advance interstate beneficial use opportunities through the application of uniform technical standards between states. Such a level playing field may contribute greatly to the achievement of both New Jersey's beneficial use and disposal self-sufficiency objectives; but only where protection of the environment and general public safety can be assured.

d. **Quality Monitoring and Assessment:** The DEPE currently requires monitoring of sludge quality both during the generation of sludge in the wastewater treatment process and in the processing of sludge products. Reporting requirements on sewage sludge are established at the last phase of sludge treatment at the DTW immediately preceding ultimate management and include:

(1) Monthly reports of basic sludge information including physical characteristics, pathogen reduction, sludge volume, and ultimate sludge management sites;

(2) A report on concentrations of the ten metals of concern, nitrogen, oil and grease, phenols, phosphorus, calcium, magnesium, potassium, cyanide, fluoride, and chloride; aldrin, chlordane, dieldrin, DDT, heptachlor, lindane, PCB's, toxaphene, benzene, carbon tetrachloride, chloroform, methylene chloride, tetrachloroethylene, trichloroethylene, vinyl chloride, benzidine, benzo(a)pyrene, Bis(2-ethylhexyl)phthalate, hexachlorobenzene, hexachlorobutadiene, and N-nitrosodimethylamine. These are required on a monthly basis for DTWs with a permitted wastewater flow of five million gallons per day or greater or whose flow consists of more than 10% industrial wastewater (categories 4 and 5), and less often for smaller DTWs on a graduated basis. Testing is done on composite samples made up of six or more samples collected each day, during a seven-day period for the larger DTWs and fewer samples for the smaller DTWs; and

(3) A full priority pollutant scan of 125 contaminants which is done annually for DTWs with a permitted wastewater flow of one mgd or more (categories 3, 4 and 5), and every five years for smaller DTWs. (See Section C. for greater detail on New Jersey's data reporting system and sludge generation, management and quality trends.)

For quality assurance during the processing of sludge into a product for beneficial use, in addition to the sludge testing described above, the DEPE requires sampling of each cured product pile (or equivalent if the process does not use curing piles) created during the test month, with composites prepared of all of these samples. The number of months during which testing must occur depends on the size of the facility. Facilities that process less than 25 dry tons per week test during two months of the year (April and October), while facilities that process over 100 dry tons per week must test monthly. The monitoring protocol requires testing of moisture content, pH, weight per cubic yard, nitrogen, phosphorus, potassium, cadmium, copper, lead, nickel and zinc. Additionally, all additives (e.g. bulking agents, chemical agents, etc.) to a SDP processing system must meet DEPE Class B sludge quality criteria or an appropriate quality specified under the Part 503 regulations.

The DEPE is reviewing New Jersey's monitoring guidelines for compatibility with the 503 regulations. On conclusion of its review, the DEPE will revise monitoring requirements as appropriate to reflect the goal recommended by several of the working groups to reduce regulation for the highest quality sludge products. The DEPE welcomes input from the regulated community on strategies for refining product testing to reduce regulation and to ensure high consumer confidence in the consistency and quality of the product.

e. **Policy on Sludge Quality:** Compliance with standards shall be determined by the quality of the sludge or SDP at the end of the sludge treatment process, not the inflow to that process. This shall not be construed to relieve individual generators of their responsibility to have all generated sludges analyzed in accordance with the Sludge Quality Assurance Regulations (SQAR)(N.J.A.C. 7:14-4). All generators are also required to maintain a sludge quality compatible with the chosen method of sludge management and to report those instances where applicable sludge quality criteria are exceeded, as outlined in SQAR.

In order to evaluate the suitability of a particular DTW's sludge for a specific management mode before time, money and effort have been invested, it shall be the responsibility of the sludge management operation and generator to assure that all sludge accepted for processing is compatible with the sludge quality limitations imposed on their management mode.

Additionally, for beneficial use activities, pursuant to 40 CFR Part 503.13, pollutants in Table 1 of 40 CFR Part 503.13. Therefore, only those individual sludges below the ceiling concentrations shall be considered suitable for receipt at management sites permitted to apply sludge to the land.

In general, the department will not allow the blending of sludges not suitable for beneficial use for the purpose of achieving beneficial use standards. However, generators whose management mode requires the attainment of the pollutant concentrations in Table 3 of 40 CFR Part 503.13, may petition the department to allow a wider range of sludge quality where it can be demonstrated that the sludge to be blended meets the ceiling concentrations for the pollutants in Table 1 of 40 CFR Part 503.13 and where it can be demonstrated the quality of the final material will not be compromised. Compatibility for blending, though not for the purpose of determining compliance with standards, may be determined by using the mean and median reported sludge concentrations for the previous twelve months of sludge data. Written department approval is only required where the median or mean sludge concentration for a customer sludge exceeds the sludge quality criteria imposed for that management mode. Thus, all management operations are required to maintain twelve-month moving mean and median concentrations for all sludge sources accepted. Petitions to allow blending shall follow the format for "Generic Sludge Quality Determinations" in Section F. Part 4-I and be technically justified. Petitions to accept blending can be generator specific or allow for processing of residuals within specified ranges. This policy rewards generators of "higher quality" sludge by allowing them free access to compatible sludge management operations.

Consistent with 40 CFR Part 503.10, the department will not accept the mixing of sludges with non-process oriented materials (e.g. materials added solely for the purpose of dilution that do not aid in processing to achieve pathogen or vector attraction reduction) for the purpose of reducing pollutant concentrations. Furthermore, acceptance of customer sludges for blending shall not be a defense for exceeding any sludge quality limitation in the blended sludge. Thus, a more cooperative relationship between generators and management operations must be fostered.

All non-domestic sludge generators must continue to obtain "Generic Sludge Quality Determinations" pursuant to Section F. Part 4-I.

The criteria outlined below generally define the suitability of sludges for beneficial use. However, as previously indicated, the department may not restrict review of individual sludges to these criteria alone, but will consider the overall quantity and quality, including compounds for which limits do not exist, and exercise technical discretion in applying these criteria. In addition, there may be times when a beneficial use program can be successfully developed for sludges that do not meet the ceiling concentrations. For example, these sludges may be times when a beneficial use program can be successfully developed for sludges that do not meet the ceiling concentrations. For example, these sludges may be considered for one-time landfill reclamation programs at approved sites through the coordinated regulation of the DSWM and the WFRP (see Section F. Part 4-II for additional information on landfill reclamation) or for management via high technology beneficial use systems.

USEPA SLUDGE QUALITY STANDARDS

TABLE 1 OF 40 CFR Part 503.13	
Ceiling Concentration	
POLLUTANT	CEILING CONCENTRATION (mg/kg)[1]
Arsenic	75
Cadmium	85
Chromium	3000
Copper	4300
Lead	840
Mercury	57
Molybdenum	75
Nickel	420
Selenium	100
Zinc	7500

[1] Dry-weight basis

TABLE 3 OF 40 CFR Part 503.13	
Pollutant Concentration	
POLLUTANT	MONTHLY AVERAGE CONCENTRATIONS (mg/kg)[1]
Arsenic	41
Cadmium	39
Chromium	1200
Copper	1500
Lead	300
Mercury	17
Molybdenum	18
Nickel	420
Selenium	36
Zinc	2800

[1] Dry-weight basis

f. **Compatibility with Soil Clean-up Standards:** The Cleanup Standards for Contaminated Sites (N.J.A.C. 7:26D) were proposed in the New Jersey Register on February 3, 1992. While the DEPE did not adopt N.J.A.C. 7:26D, which included the soil cleanup standards, it is important to emphasize that this rule was intended to address the cleaning up of waste sites that were contaminated by any intentional or unintentional act or omission resulting in a discharge of a hazardous substance, constituent, waste or pollutant into the waters or onto the lands of the state. These discharges did not include discharges pursuant to and in compliance with a valid state or federal permit. Therefore, while this section addresses the issue of compatibility with sludge standards, the reader should recognize that the application of sludge at a site or facility that is in compliance with departmental permit would have been exempt from the requirements identified in N.J.A.C. 7:26D. In this context, the relative mobilities of metals are a primary consideration in whether sludges and SDP can be safely applied to the land. Recognizing the speciation of applied metals is important in achieving compatibility between future soil clean-up standards and sludge standards, since metallic pollutants in sewage sludge are bound to an organic matrix resulting in less bioavailability and uptake. Notwithstanding the above, if particular sites are mismanaged contrary to DEPE permits, remedial action must be taken to ensure protection of human health and the environment.

Long-term Implementation Strategy: Sludge quality standards will receive ongoing evaluation to ensure their continued appropriateness. Revisions to existing standards may be undertaken, as appropriate, in light of subsequent reviews by USEPA and the DEPE's DSR. In general, the regulatory framework will continue to provide several categories of sludge quality that can be used for specific beneficial uses, under corresponding regulatory requirements.

DTWs are encouraged to continually upgrade sludge quality to the extent technologically and economically feasible, in order to move toward sludge products that can be widely used with minimal regulation. A continued focus on case-by-case management to achieve the highest sludge quality feasible will advance New Jersey's sludge quality goals, maximize the availability of markets for sludge and SDPs, and ensure appropriate consideration of local circumstances.

9. Regionalization of Programs and Facilities

Objectives and Criteria: As noted in Section 3; "Integrated Sludge Management Hierarchy," the 1978 amendments to the SWMA N.J.S.A. (13:1E-43) state;

"State programs which seek to provide for the comprehensive approaches to the proper disposal or utilization of solid waste or sludge must be regional in nature; and that the interests of the citizens of this state would be best served through an integration of sludge management with the regional solid waste planning and management process (emphasis added)."

Over the last fifteen years, many DTWs, in fact, have reviewed and addressed their wastewater treatment and sludge management needs through regionalizing their service areas. This practice is consistent with the 1978 amendments and the DEPE's philosophy that solid waste/sludge planning is not an isolated activity done by each district/DTW. Furthermore, the DEPE, as the agency charged with the responsibility to implement the legislative intent of the 1978 amendments, will, henceforth, require DTWs to review their regionalization opportunities in a manner consistent with the SSMP Update. It is the DEPE's position that the increased cost of treating wastewater and the related capital expenditure to manage a facility's sludge production, require prudent consideration of regional solutions in managing sludge flows. Regionalization may produce economies of scale, thereby providing more cost-effective solutions, and may also result in facilities better equipped and staffed to address potential problems.

The DEPE is also requiring DTWs to consider regionalization of components of the overall sludge management process. This could include exploration of joint ventures to address pollution prevention or particular aspects of the treatment or disposal process. Furthermore, regionalization is not necessarily intended to increase the size of the treatment facility. The DEPE recognizes that larger facilities (either incineration or beneficial use processing facilities) may, in fact, create other environmental concerns, in addition to the pitfalls of relying on only one process, at one facility, to manage all of a DTW's sludge. However, of equal concern to the DEPE is that 339 of the 442 DTWs have permitted wastewater flows less than 1 million gallons a day. It is neither economically nor environmentally sound for each DTW to address its own sludge management without giving regionalization opportunities (possibly through contract management strategies) due consideration.

Cooperative efforts among DTWs have the potential to more efficiently address the environmental needs of the region and thereby determine whether a particular mode of sludge management is absolutely necessary before proceeding with a massive capital expenditure. The DEPE is willing to assist, where possible, in the development of regional cooperative efforts to facilitate the most environmentally sound, cost-effective alternatives for the entire state.

Concerns have been raised, in initial public comment on this issue, that regional approaches may not always be preferable to localized approaches. For example, local land application of liquid sludge has been a satisfactory management option in some areas of the state. The DEPE is in agreement that regionalization should be evaluated on a case-by-case basis, depending on the DTW's particular situation. However, new or expanded incineration facilities must always be viewed in a regional context.

Short-term Implementation Strategy:

a. **Regionalization Analysis:** As noted above, the DEPE will use existing planning and permitting programs to require consideration of regional opportunities. The DEPE's approach to regionalization can be summarized in four categories.

   (1) **General:** All DTWs with permitted wastewater flows of 1 mgd or more must consider the feasibility of regionalizing each component of their sludge management systems when preparing sludge management plans in advance of new construction, expansions or facility upgrades. As noted

earlier in Section B.4.c, those DTW's that continue to utilize out-of-state disposal facilities to manage their sludge production will be required to submit a SMP, inclusive of a regional analysis, within timeframes established in the renewal of their NJPDES permit.

(2) **Incinerators:** Since incineration does not utilize the nutrient value of sludge and requires significant capital investment, the DEPE will not consider permitting new facilities, facility expansions or replacements unless the project is regional in nature. The DEPE's definition of a regional facility, is a facility that is in receipt of all or a significant portion of the sludge generated by two or more large DTW generators or numerous smaller generators. In addition to a required regional scope, DTWs must demonstrate that beneficial use management practices were or will be instituted to the maximum extent possible.

(3) **Other DTWs:** All DTWs with permitted wastewater flows less than 1 mgd should explore regional opportunities for the treatment, handling and management of their sludge production.

While the DEPE views contract management of a DTW's sludge production as a step toward regionalization, it also views these small DTWs as ideal candidates for small-scale beneficial use projects. Where such small-scale systems are impractical, the DEPE strongly supports regional planning, particularly in terms of utilization of existing or planned regional systems for composting and other forms of beneficial use.

(4) **Other Plan Components:** Opportunities for regionalization of other sludge management components and equipment will be reviewed on a case-by-case basis. These components include, but are not limited to:

- Dewatering equipment;
- Planned storage capacity;
- Beneficial use projects among multiple authorities including selection, purchase and construction of SDP systems;
- Pollution prevention protocols for assessing industrial discharger production changes and educational programs to alter inappropriate uses of sewer systems for toxic substance disposal by homeowners and commercial establishments; and
- Two or more authorities developing bid specifications to procure transportation and processing services by contract vendors for beneficial use systems.

DEPE will act as a catalyst or facilitator, on request, to bring authorities together, clarify state policies and requirements, and guide the negotiation process.

b. **Procedures for DTWs to Follow in Regionalization Feasibility Analysis:** The basic process DTWs should employ at this time to advance regionalization on their own entails the following steps:

(1) Analysis of existing sludge systems and future plans, e.g. pollution prevention practices being applied, effectiveness of pretreatment programs, sludge generation trends, existing and planned capacity, etc.;

(2) Identification of current limitations or deficiencies in existing plans/permits;

(3) Identification of potential regional partners that can satisfy DTW program deficiencies and assist in meeting future needs;

(4) Contact and meet with candidate partners toward negotiating regional arrangements; and

(5) Receptiveness to other DTWs seeking to discuss regionalization options.

When submitting "Appendix K Forms", as specified in Section B.4, the DEPE will require the DTW with a permitted wastewater flow of 1 mgd or more to provide documentation of its consideration of regional opportunities. The DEPE has developed an additional form to be submitted with the "Appendix K Forms" (see Regionalization Analysis form A-4 in Section F.) in order to guide the DTW through the regionalization analysis. The level of regionalization analysis will be dependent on the unique circumstances surrounding each DTW, such as size, location, current management mode, existing sludge quality, enforcement orders, etc.

c. **Beneficial Use Analysis:** In order to promote the beneficial use of sewage sludge, the DEPE requires the DTW to provide documentation of its consideration of various beneficial use sludge management alternatives. Historically, a summary of this information has been included in the DTW's "Appendix K Forms." A beneficial use analysis is a more comprehensive consideration of the beneficial use alternatives available to the DTW. This analysis can be still summarized on the appropriate "Appendix K Forms."

Regionalization opportunities must be considered prior to the beneficial use costs analysis, since such consideration will be a determinant of the DTW's sludge management cost. For those DTWs with a permitted flow of 1 mgd or more that utilize out-of-state disposal facilities, a condition will be added to the

DTW's NJPDES permit on renewal, requiring the investigation of regional opportunities and the related costs and associated environmental impacts of each sludge management alternative considered. This permit condition will include a compliance schedule to ensure timely completion and submittal of the beneficial use analysis. Again, the scope of the beneficial use analysis is dependent on the management alternative to be implemented. The requirements of the beneficial use analysis can be separated into three categories:

(1) **Incineration:** Any DTW seeking to develop a new incinerator or increase the size of its existing incinerator is required to submit an evaluation that provides economic and environmental consideration of enhanced pollution prevention and beneficial use alternatives, including, but not limited to, all alternatives listed below:

- Land application;
- Pathogen Reduction/Pelletization;
- Composting;
- Alkaline stabilization; and
- Contract management of sludge production by another DTW or private enterprise through composting, pathogen reduction/pelletization, land application, alkaline stabilization or other beneficial use process.

It is required that the DTW utilize "Appendix K Forms" as an initial framework when preparing the analysis. Use of "Appendix K Forms" provides a summarizing mechanism for reporting this type of information. The DEPE will continue to utilize these forms as originally intended and will also focus its review on the costs reported (Forms A-1a-d) and their associated environmental impacts.

(a) **Informational Needs of the Economic Analysis:** On the DEPE's request, the DTW will provide detailed documentation of those costs presented in Forms A-1a-d. This documentation will be inclusive of all capital and operating direct and indirect costs.

It should be noted that economic considerations alone will not be sufficient to eliminate beneficial use from consideration, due to its long-term environmental attractiveness.

(b) **Environmental Considerations:** When qualitatively evaluating each alternative, the DTW must consider environmental impacts such as air quality, long-term ecological compatibility, health effects, potential odors, infrastructure impacts and costs and any other specific environmental considerations relating to the specific alternative being considered. This general evaluation should discuss the various impacts each considered alternative may have on the environment and the community as well as recommend the management alternative to be accepted. Once the DTW selects a management alternative, the DTW will be required to complete a comprehensive environmental assessment as specified under regulations pertinent to the project.

(2) **Contract Management:** As stated earlier, it is not the DEPE's intent to require a costly beneficial use analysis of all DTWs that manage their sludge production through contracts with other DTWs or sludge processors. The DEPE also is not encouraging all DTWs to develop their own processing and/or disposal capabilities to manage their sludge production. It is, however, contrary to the DEPE's self-sufficiency position to allow these DTW's to continue contracting for the out-of-state disposal. As such, while not requiring a full beneficial use analysis, the DTW currently utilizing out-of-state disposal or plans to upgrade/expand and has a permitted flow of 1 mgd or less, will be required to submit a generator sludge management plan. Furthermore, should the DTW select an in-state disposal management alternative, an explanation of their reasoned rejection of beneficial use sludge management alternatives must be submitted to DEPE for review and approval.

(3) **Beneficial Use:** Clearly, the DEPE does not want to present any additional obstacles to the DTW seeking to implement a beneficial use sludge management alternative. However, these DTWs also should consider regional opportunities to more effectively and efficiently manage their sludge production. The DEPE will work individually with these DTWs to ensure all potential regional opportunities are addressed.

d. **Exceptions to Regionalization Analysis Requirements:** As discussed below in Section B.10, the major DTWs that export sludge for disposal are under JCDs that require the development of long-term management or in-state disposal alternatives. Given that these DTW's are bound to the short and long-term plans identified in their JCDs, the DEPE will not require further regionalization analysis. However, when developing their long-term plans, several of the DTWs did both formally and informally consider various regional opportunities. The DEPE strongly encourages regionalization and is willing, on request, to facilitate each DTW's review of available opportunities.

Long-term Implementation Strategy: If appropriate, based on a DTW sludge management alternative, the short-term implementation strategy detailed above will be inserted in all new NJPDES permits and renewals. The DEPE suggests all

DTWs initiate a self-examination of their sludge management operations to determine how, when and where this policy redirection may impact the DTW.

10. Self-sufficiency and Interstate Waste/Product Shipment

Objectives and Criteria: It should be made clear, before the following discussion on self-sufficiency and interstate waste product shipment, that the DEPE views self-sufficiency in terms only of disposal capacity. In determining the state's self-sufficiency of disposal capacity, the DEPE calculated existing permitted and planned throughput capacities of all sludge management operations. Once this aggregate number was determined, the difference between it and the estimated total sludge production generated by all DTWs in New Jersey operating at permitted flow capacity highlights the surplus or deficit in the state's disposal capacity.

As a result of the cessation of ocean dumping of sewage sludge by New Jersey generators in March 1991, our state has become a short-term exporter of sludge. Currently, approximately 57% of the sludge produced in New Jersey is managed out-of-state in permitted out-of-state landfills. Out-of-state landfill disposal is only acceptable for short-term processing pending the development of long-term beneficial use and/or in-state disposal capacity. At present, the major DTWs that export sludge for disposal (Linden Roselle Sewerage Authority (LRSA), Bergen County Utilities Authority (BCUA), Joint Meeting of Essex and Union Counties (JMEU) and Passaic Valley Sewerage Commissioners (PVSC)) are under binding JCD schedules the DEPE and USEPA have approved (Table 17) for the development of beneficial use or in-state disposal systems. New Jersey remains committed to achieving self-sufficiency of disposal capacity within the next seven years.

In order to assess the achievement of New Jersey's self-sufficiency sludge management goals, the following factors must be considered:

a. JCDs for LRSA, BCUA, and JMEU have been modified to abandon long-term plans for incineration. These JCDs now reflect beneficial use sludge management strategies.

b. The largest of the former ocean dumping DTWs, PVSC, must improve pretreatment in order to obtain a cleaner sludge quality to consider a (or multiple) beneficial use alternative(s). Preliminary market assessments have acknowledged sufficient in-state beneficial use markets to utilize approximately 77% of the PVSC projected sludge production at maximum permitted DTW flow assuming "clean" sludge. Clean sludge can be achieved through pollution prevention efforts and application of a more aggressive industrial pretreatment program. The pretreatment program must be further implemented by the PVSC with the guidance and assistance of the DEPE.

c. There are sufficient markets to utilize all material produced after implementation of all planned and existing beneficial use management alternatives. The DEPE has received numerous assurances from various sludge processing companies that there are sufficient markets within the state for the distribution of all land-appliable sludges. This claim is consistent with the information provided in the DEPE's "White Paper on the Beneficial Use of Sewage Sludge", which identified available farm acreage as well as public lands, golf courses, etc. While the DEPE is not advocating applying sewage sludge to all farms in the state, the White Paper clearly demonstrates there are sufficient markets for the distribution of all land-appliable sludges. Furthermore, it is DEPE's position that SDPs are products of commerce that can be nationally as well as internationally distributed.

Given the current legislative climate in the United States Congress and repeated attempts to ban and/or restrict solid waste flow through unrestricted importation fees (the DEPE strongly opposes each of these legislative remedies), it is essential that the DEPE acknowledge a statewide integrated sludge management plan. A diversified set of sludge management alternatives is necessary to obtain state disposal self-sufficiency as quickly as possible. The DEPE recognizes that sludge incinerators currently manage approximately 20% of the sludge produced in New Jersey. In the short-term, existing incinerators must be utilized as a sludge management alternative to achieve self-sufficiency in the quickest timeframe possible. As stated earlier, it is the DEPE's position that incineration does not utilize the nutrient value of sludge and therefore, the department will not consider additional incinerator projects that are not regional in nature and are not supported by a comprehensive analysis of the beneficial use management alternatives as outlined in Section B.9.

Short-term Implementation Strategy: The DEPE will implement strategies articulated in Sections B.4 and B.9 that shall expedite the movement toward self-sufficiency in disposal capacity for New Jersey's sludge production. These include:

- Enhanced pollution prevention and pretreatment strategies;

- Beneficial use environmental and economic evaluation; and

- Regionalization analysis.

Under the DEPE's broad planning and permitting approval authorities, sludge generators will be required to evaluate and maximize regional beneficial use alternatives. It is anticipated that through these requirements, the DEPE will eliminate the state's dependency on out-of-state disposal of sludge within the next seven years.

a. Management Capacities: As noted in Section C.4, "Statewide Capacity

Analysis"; it is estimated that if all DTWs operated at their permitted capacity, approximately 2,554,127 dry pounds per day (dp/d) or 466,105 dry tons per year (dt/y) of sludge would be produced.

Although the production volume referenced above is theoretical projection of all DTWs' sludge production, the DEPE uses this figure throughout Section C.4. While 466,105 dt/y would be produced at permitted capacity, total permitted throughput capacity for all composting, alternative management and incineration management modes equals 316,273 dt/y. Additionally, the DEPE estimates that 9,940 dt/y of sludge is managed through land application and has established a goal to increase land application of sludge by at least fifty percent within the seven years to approximately 14,910 dt/y. Therefore, total current sludge management throughput capacity is equal to 331,183 dt/y. The following capacity analysis calculations assume long-term management capabilities will be developed for the noted DTWs to satisfy, at a minimum, the quantities of sludges projected to be produced based on permitted wastewater treatment flows (see Table 7). These projections are not drawn from or intended to provide a basis for individual DTW systems planning and design efforts.

(1) **Judicial Consent Decrees (JCD):** As noted above and discussed further in Section D.2, in the late 1980's, DTW's that managed their sludge production through ocean disposal were required by state (N.J.S.A. 58:10A-42) and the federal law (as a condition of their ocean disposal permit) to identify long-term land-based sludge management plans. Six DTWs (LRSA, BCUA, RVSA, JMEU, PVSC and MCUA), which account for over fifty percent of the sludge produced in New Jersey, entered into JCDs with the USEPA, the federal Department of Justice and the DEPE. The DTWs, with the exception of MCUA, identified incineration at four locations (with RVSA to incinerate at JMEU) as their initial land-based long-term management alternatives. Over the past few years, DTWs have reevaluated their long-term sludge management plans.

    As a result of the DTWs' reevaluation, tremendous inroads have been made to move New Jersey toward beneficial uses of the state's sludge production. In fact, MCAU and RVSA have already implemented long-term beneficial use sludge management plans resulting in the JCDs for these authorities being terminated. Given that these beneficial use plans have been implemented, their sludge management capacities have already been included in the DTW aggregate production throughput. Again, as referenced in Step C of the Statewide Capacity Analysis, the following DTWs have modified their JCDs to reflect creation of new beneficial use sludge management capacity.

GENERATOR	MANAGEMENT MODE	PLANNED CAPACITY
BCUA	Alkaline Stabilization	21,900 dt/y
JMEU	Thermal Drying/Pelletization	9,855 dt/y
LRSA	Composting	4,380 dt/y
		36,135 dt/y

Additionally, although used in the analysis presented herein, the composting capacity allotted to LRSA may not be developed pending discussions among the parties to LRSA's JCD. LRSA has proposed an alternative long-term sludge management plan of contract beneficial use.

Furthermore, PVSC, the largest DTW in the state, is reevaluating its plan to implement land-based long-term incineration. The PVSC established a Citizens Advisory Committee (CAC) to reevaluate its alternatives. The CAC's final report indicated that "beneficial use represents a feasible long-term alternative for a majority of PVSC sludge. It is recommended that PVSC consider a beneficial use program with up to 340 dt/d of capacity." Using Table 7 data, the DEPE projects PVSC planned management capacity for sludge production at maximum permitted wastewater treatment plant flow equals 160,600 dt/y. The recommended beneficial use program of 340 dt/d (or 124,100 dt/y) represents approximately 77% percent of the projected sludge production. The remaining 23% (or approximately 36,500 dt/y) will have to be managed through either additional beneficial use alternatives or in-state disposal. Combining BCUA, JMEU, LRSA and PVSC planned capacities will result in an increase of 196,735 dt/y management capacity within New Jersey.

The following summarizes New Jersey's movement to self-sufficiency of disposal capacity:

Sludge Production at DTW Permitted Capacity	466,105 dt/y
Less DTW Aggregate Existing Production Throughput [Composting, Alternative Management, Incineration and Land Application]	- 331,183 dt/y
Subtotal	134,922 dt/y
Less Planned Capacity of DTWs' Under JCDs	- 196,735 dt/y
Projected Excess Capacity	61,813 dt/y

While the above numbers indicate an excess capacity, this capacity must be maintained to manage sludge during and after planned and/or seasonal downtimes of sludge management operations.

It should be emphasized that PVSC's sludge quantity is based on November 1992 data. The PVSC continues to experience a dramatic decrease in this sludge production. Current SQAR data indicates sludge production below 300 dt/d.

The DEPE acknowledges that 34,055 dt/y of residuals (ash) from existing incinerators must be managed. Ash from sludge incineration must be managed per solid waste management regulations. Therefore, the DEPE has not included these quantities in its statewide sludge capacity analysis.

b. **Interstate Waste/Product Shipment**: In addressing interstate shipment of sludge, the DEPE continues to be actively involved in the national debate currently surrounding the general issue of interstate waste shipment. The DEPE continues to support national initiatives as part of the reauthorization of the Resource Conservation and Recovery Act (RCRA). Also, as previously stated, the DEPE supports:

- The federal government providing leadership in developing markets and uniform standards for SDPs;

- Uniform planning requirements for all 50 states being administered by the USEPA to allow for maximization of beneficial use management;

- Minimum national standards for the operations of disposal facilities to ensure appropriate environmental protection;

- The requirement that states have USEPA approved state plans prior to imposing rationally based and uniformly applied differential fees;

- Opposition to bans or unrestricted differential fees by receiving states because they do not support the USEPA or the DEPE's policies promoting beneficial use sludge management alternatives;

- Existing contracts for disposal capacity should not be curtailed through legislative enactments; and

- Continued interstate movement of sludge and SDP to beneficial use sites in order to maintain the free market system of commerce and to maximize opportunities for the marketing of sludge and SDPs.

While the above addresses the movement of sludge and SDP, it should be made clear that the DEPE still defines sewage sludge as a solid waste and that the transporters of sewage sludge are therefore, subject to the requirements of the Solid Waste Utilities Control Act, N.J.S.A. 48:13A-1 et seq., and the SWMA, N.J.S.A. 13:1E-1 et seq., specifically, but not limited to, registration, certification and licensing, including A-901 compliance and waste flow regulations found at N.J.A.C. 7:26-6.

11. Scope of Generator Planning Responsibility

Generator responsibilities have not changed significantly since the publishing of the 1987 SSMP. As indicated in the Section F., every treatment plant is a sludge generator and is responsible for the proper planning and management of its sludge production. Furthermore, in the absence of a district sludge management plan, DTWs are required to execute sludge management plans for the quantity of sludge generated by their treatment facility at the permitted flow or at the projected flow, whichever is greater, over a 10-year planning horizon.

While the general responsibilities have not changed, the DEPE is clearly requiring more of the DTW. The DTW is the focal point for implemention of the DEPE's policies. Sections B.4, 6 and 9 address specific requirements of the DTW. While the DTW is responsible for implementing DEPE's policies, the DEPE will also focus its energy on the front end of this process and what is discharged to the DTW. As indicated in Sections B.1, 5, 6, and 7, the DEPE will also direct its efforts to industrial and household contributions into the DTW. Lastly, although the DTW is responsible for compliance with the DEPE's policies and regulations, the general public must be knowledgeable, educated and an active participant to successfully implement the DEPE's new sludge management policies.

12. Economic Regulation of Disposal Facilities

Although New Jersey has economic regulation of the solid waste industry and the power utilities, such regulation of the wastewater disposal industry has never been promulgated. The DEPE acknowledges that the cost of treating a community's wastewater and the management of the resulting sludge production has dramatically increased as discharge limitations become more stringent. Furthermore, the DEPE is genuinely concerned with the costs associated with the management of this material and the community's ability to pay for these services. Cost, however, is only one concern. The DEPE has also required consideration of regional opportunities in an attempt to minimize these costs. At this time, the DEPE is reluctant to place another burden and potential cost on the DTWs in New Jersey. However, user costs will continue to be monitored and evaluated to ensure the public receives proper and reasonable wastewater services. The DEPE welcomes input regarding future economic regulation of wastewater disposal facilities during the public notification process for the SSMP Update.

13. Contingency Planning

Objectives and Criteria: As a matter of public policy, New Jersey strongly opposes bans or other unreasonable restrictions on interstate shipment of sludge. However, in the event such a situation arises, New Jersey must be prepared to respond definitively to a potential public health emergency.

The need for contingency planning will be most critical until DTWs develop and implement their beneficial use management alternatives and in-state disposal facilities currently under consideration. Given the state will remain vulnerable to bans on interstate shipment until it achieves self-sufficiency in disposal capacity, it is imperative that DTWs identify implementation schedules for beneficial use alternatives and/or in-state disposal options.

Should DTWs experience interstate shipment bans prior to implementing their long-term alternatives, the DEPE's response, in priority order, would be as follows:

a. **Back-up Contracts:** With the exception of those DTW's under a JCD, those that export sludge for disposal are required to formally enter contractual agreements to accommodate 100% of their sludge volume in-state. The activation of these back-up contracts would be New Jersey's first response to an emergency. Back-up contracts should be developed in a manner consistent with the hierarchy of management alternatives in Section B.3.

   Those DTWs that export sludge for beneficial use will be required to enter into formal contractual contingency agreements for beneficial use or in-state disposal of 100% of their sludge volume. The DEPE will require these DTWs to negotiate formal back-up contracts (or to provide for contingency sites as a term of their primary contract) with other out-of-state beneficial use or in-state disposal facilities. Additionally, it is required that these other beneficial use facilities be located in multiple states and able to accomodate 100% of the DTW's sludge volume to provide the DTW options should it be prohibited from utilizing its primary contracts in a particular jurisdiction.

   In light of the current political and legislative climate regarding export of sludge to other states, the DEPE must consider additional approaches to ensure uninterrupted management of sludge generated in New Jersey. All New Jersey sludge generators exporting sludge for out-of-state management or disposal will be required to add the following secondary approaches to their contingency plans.

b. **New Short-term Contracts:** Within 45 days of an unanticipated disruption on the interstate movement of sludge for beneficial use or disposal, and/or the activation of primary contingency contracts, the DTW must bid and award secondary contingency or backup contracts (if none currently exist) for the any anticipated operational downtime at the primary contingency contracted facility. Such arrangements will be kept to the shortest possible duration;

c. **In-state Redirection:** Under the Solid Waste Management Act, specifically N.J.S.A. 13:1E-9.5 and N.J.S.A. 7:26-6.7, any available excess capacity at current permitted and operating sludge incinerators could be utilized for sludges of appropriate quality to avoid service disruptions;

d. **On-site Storage:** Planned on-site storage can be pursued for short-term interruptions of service. In addition, under the procedures set forth in Section F. Part 4-VIII, on-site storage is further allowed under controlled and permitted situations under emergency conditions (DTWs are currently required to provide a contingency for maximum anticipated down-time, which is usually in dedicated on-site storage structures); and

e. **In-state Landfilling:** The DEPE, as an approach of last resort, and only on an emergency basis, would consider the direction of dewatered sludge to existing lined in-state landfills. As specified in N.J.S.A. 13:1E-42, and in Section F. Part 4-V, sewage sludge can be temporarily landfilled only under emergency conditions for which the DEPE agrees no other viable alternative exists. Such emergency landfilling can only occur under the terms of an administrative consent order, at specified lined landfills that have systems for the interception, collection and treatment of any and all leachate generated at the facility, as well as ground water monitoring wells and methane gas recovery equipment.

The DEPE, as part of its on-going planning and permitting process, will be reviewing all out-of-state arrangements on a case-by-case basis to ensure that appropriate contingency plans are in place.

While, the above discussion is intended to address unanticipated disruptions on interstate movement of sludge, all DTWs are required as specified in Section F. to have contingency plans (e.g., storage, or preferably back-up management contracts) for anticipated downtimes of their selected sludge management alternatives.

C. STATUS OF CURRENT PROGRAM

Since promulgation of New Jersey's 1987 SSMP, tremendous changes have taken place in the development and implementation of the statewide sludge management system. The primary emphasis of sludge management policy has shifted away from reliance on end-of-the-pipe disposal management strategies to pollution prevention and pretreatment. Federal and state governments have publicly expressed a preference for beneficial use management alternatives. In addition, the general public has objected to the wastewater industry's dependency on disposal technologies and failure to explore all management alternatives. While the general public has also expressed concerns regarding sitings and operations of various beneficial use facilities, there is general consensus that a review of present management strategies is necessary, with emphasis on the consideration of potential beneficial use management alternatives. New Jersey currently exports for out-of-state disposal about 57% of the sludge generated in the state. The majority of this material is generated by five DTWs that managed their sludge production through ocean disposal prior to March 17, 1991. Over the last 18 months, four of the five DTWs (JMEU, BCUA, RVSA, LRSA) have modified their JCDs to abandon incineration for various beneficial use management alternatives. The fifth former ocean-dumping DTW, PVSC, is presently studying if it can (and if so, to what extent) implement beneficial use management alternatives in lieu of its previously identified management alternative-incineration.

The following chapter briefly summarizes the current status of New Jersey's sludge management program. The chapter is divided into four sections. The first section provides an overview of the department's data management systems. The second describes sludge generation detailing current and future trends. The third analyzes beneficial use and disposal trends over time. The last section utilizes the information presented in the previous sections in providing a statewide capacity analysis. This information is the basis for achievement of New Jersey's new sludge management policy objective of statewide self-sufficiency in disposal capacity in the next seven years.

1. Overview of Data Management Systems

a. **Sludge Quality Assurance Regulations:** Existing sludge sampling and reporting procedures are governed by the Sludge Quality Assurance Regulations (SQAR), N.J.A.C. 7:14-4. The SQAR were originally adopted and became effective on October 18, 1979. The rules were promulgated for the following purposes:

(1) To determine the degree of chemical contamination, including metals and organic compounds present in sludge produced by domestic and industrial treatment works;

(2) To establish a data system providing information for a program to reduce

the discharge of toxic levels of pollutants into the waters of the state; and

(3) To establish a data system providing information for environmentally sound sludge management.

The rules required the routine analysis and reporting on all sludge produced by domestic and industrial treatment works, but did not detail specific procedures for sludge sample preparation or analysis. However, since 1984 the DEPE has performed extensive reviews of most data submitted by DTWs. These reviews uncovered problems that contributed to sample bias, including analytical methods, sampling procedures and reporting errors.

In order to reduce problems associated with sample bias and in anticipation of adoption of the federal regulations on the management of sewage sludge, SQAR was readopted with amendments in April 1989. The amendments increased the number of constituents to be analyzed and standardized analytical methods, as well as sludge sampling procedures.

For the purposes of determining the frequency of sampling and analysis for submission of all required sludge reports and for determining proper sampling procedures, SQAR divides DTWs into categories on the basis of permitted daily flow. Table 5 defines the sampling and reporting requirements for these categories, one through five, as noted in SQAR. The catagories relationship to DTW flow is defined in Table 5A.

From a sludge production standpoint, the SQAR database includes reporting of the average quantity of sludge generated and removed from the DTW on a calendar-month basis.

Historically, SQAR quantity data has been utilized by the DEPE to assess DTW compliance with provisions of the respective NJPDES permit and to facilitate site-specific planning. It is used by the DEPE as a tool to measure how a DTW is operating. Furthermore, it allows the DEPE to determine DTW sludge quality while also assuring that DTW sludge quality is consistent with the sludge management mode utilized by the DTW.

b. **"EXIST" Database:** The DEPE has utilized its EXIST database as a primary planning tool to project the quantity of sludge anticipated to be generated by the DTW at an efficiency that protects effluent quality. The EXIST database consists of DTW sludge management volumes derived primarily through the utilization of theoretical sludge production algorithmic constants (Table 6). As noted in Table 6, these constants were drawn from engineering design manuals and scientific research findings and were used to establish a baseline for developing statewide planning figures. Over the last five years, these general algorithmic constants have shown a tendency to overestimate sludge production at a DTW. The DEPE has replaced the general algorithmic constants on a case-by-case basis with actual mass balance calculations based on site-specific considerations as data becomes available. While the DEPE acknowledges that many DTWs sludge production was overstated, it is important to note that the primary purpose of the EXIST database was intended to be utilized as a general planning tool.

TABLE 5

SLUDGE QUALITY ASSURANCE REGULATIONS REQUIREMENTS

	CATEGORY				
SAMPLING FOR pH AND TOTAL SOLIDS	**1**	**2**	**3**	**4**	**5**
DTW report avg. of the values obtained from analyses performed on four samples of equal volume of sludge generated by DTW spaced one week apart during reporting period as specified below.	X	X			
DTW report avg. of the values obtained from analyses performed on equal volume samples of sludge generated by DTW collected every working day during the reporting period as specified below.			X	X	X
COMPOSITE SAMPLES FOR QUALITY CHARACTERISTICS					
DTWs form a composite using five samples of equal volumes collected one day apart during the reporting period as specified below.	X	X			
DTWs form a composite using seven samples of equal volumes collected one day apart during the reporting period. Each sample to consist of six or more samples collected over the 24-hour period.			X	X	X
REPORTING REQUIREMENTS					
DTWs prepare a Domestic Wastewater Sludge Report every calendar month.	X	X	X	X	X
DTWs prepare a Metals and Selected Chemical Parameters Report and a Toxic Organic Compounds Report each reporting period.	X	X	X	X	X
REPORTING PERIOD					
Month of January	X				
Months of January and July		X			
Months of January, April, July and October			X		
Monthly				X	X

A full priority pollutant scan on the domestic wastewater sludge produced at the DTW for the priority pollutants listed in Appendix C of the SQAR is also required as specified in the SQAR.

TABLE 5A

DOMESTIC TREATMENT WORKS CATEGORIES

CATEGORY	FLOW PARAMETERS
1	Domestic treatment works with a permitted daily flow of 0.0999 mgd or less.
2	Domestic treatment works with a permitted daily flow from 0.1 to 0.999 mgd.
3	Domestic treatment works with a permitted daily flow from 1.0 to 4.999 mgd. It should be noted that Category 3 shall additionally include any category 1 or 2 domestic treatment works that has obtained the department's written determination of residual quality suitability. However, for the purposes of this update, these domestic treatment works were indicated as either Category 1 or 2.
4	Domestic treatment works with a permitted daily flow equal to or greater than 5.0 mgd.
5	Domestic treatment works with a flow to which more than 10 percent of the permitted daily flow or the permitted daily mass loading of BOD, COD or Suspended Solids is contributed by SIUs. This category encompasses DTWs that have considerable industrial discharges in recognition of the need for more comprehensive sampling and data reporting.

While acknowledging some of the problems the DEPE has experienced with its sludge monitoring databases, it is also necessary to recognize the variability of sludge production. Sludge production is the by-product of the DTW's treatment of its effluent. A DTW does not produce sludge at a constant rate.

The quantity of sludge managed varies due to a DTW's operational efficiency, seasonal flow fluctuations, storage capacity and size, as well as the management alternative utilized (a DTW that contracts for the beneficial use and/or disposal of its sludge may remove sludge from its facility daily, weekly, monthly, etc.). These fluctuations in the quantity of sludge produced and removed from the DTW may result in under or over-estimation of the state's annual sludge production. These variables clearly illustrate the limitations of the DEPE's databases and highlight the need for enhancements to the existing on-line system where actual sludge quantity generation submitted monthly by the DTWs is recorded and tabulated by the department for use in statewide planning.

TABLE 6

ALGORITHMIC CONSTANTS USED FOR TYPICAL SLUDGE QUANTITIES
(Dry pounds/mgd)

Primary Sedimentation	1250
Trickling Filter	475
Activated Sludge	2250
Imhoff Tank	690
Primary Sedimentation with Trickling Filter	1725
Primary Sedimentation with Activated Sludge	2340
Septic System	810
Activated Sludge with Trickling Filter	2725
Chemical Precipitation	3300
Primary Sedimentation with Activated Sludge and Separate Digestion	1400

References: 1) Sludge Composting and Utilization:
Statewide Applicability for New Jersey; Bolan, Nieswand and Singley, Rutgers University, NJALS Project No. 03543, p. 14.
2) Wastewater Engineering:
Collection, Treatment, Disposal (first edition);
Metcalf and Eddy, McGraw Hill Inc., p.581.

NOTE: This table supersedes 1987 SSMP Table 3-6.

c. **Contracts Data File:** The DEPE also maintains a contracts data file that identifies how each DTW manages its sludge production. This data file complements the EXIST information, which estimates sludge production by recording where sludge is ultimately disposed of or otherwise managed. The file provides the name of the primary management site and a secondary facility that may be used in addition to the primary site or is identified as a back-up facility. It also provides the duration of commitment between generator and receiving site in some cases. This file is extremely useful as a tracking tool of how sludge moves within the state and out-of-state, in addition to tracking capacities committed to specific generators. Furthermore, this file provides a mechanism for the department to further facilitate regionalization considerations.

d. **Data Management System Reform:** The DEPE has begun to utilize its SQAR database to verify the accuracy of its EXIST database. In its attempt to generate accurate data, which can be used on a real-time basis as compared to working only theoretical projections, the department has identified several problems and inconsistencies with its existing databases. In October 1991, the NJPDES permitting program identified enhancements and upgrades to the existing databases. Recommendations for enhancements to the current databases included:

- Allowing for improved data entry and retrieval of actual sludge production on a calendar month basis;
- Use and comparison of consistent measurement units (dry pounds/day or dry tons/day);
- Generation of an algorithm comparison report;
- Expansion to allow the reporting of quantitative information on multiple sludge management sites during a given month;
- Expansion to allow for the tracking of required changes in DTW reporting frequency; and
- Expansion to allow for DTW entry of priority pollutant scans.

The above enhancements represent a sampling of the department's continuous efforts to refine its databases. Given the current budget constraints, it is uncertain when these enhancements/upgrades will be completed. However, it is the DEPE's goal to implement these enhancements in 1994. It is the department's goal to upgrade its databases to be user friendly, conversant with other department databases and able to generate real-time data that will provide the department, regulated community and the general public with the most accurate information possible.

2. Sludge Generation: Current and Future Trends

As environmental regulations have required DTWs to upgrade the treatment of their effluent and DTWs have sought to increase their permitted wastewater flow, sludge production has increased. In order to comply with the department's self-sufficiency goal for disposal capacity, an accurate assessment of the state's current and future sludge production is necessary.

The SSMP Update provides a mechanism for the DEPE to update management and production inventories presented in the 1987 SSMP. All tables provided herein (except where specifically noted) supersede the tables/charts provided originally in the 1987 SSMP.

a. **Inventory of Existing Sludge Management:** The 1987 SSMP provided an inventory by county of each DTW's NJPDES permit number, their existing and design wastewater flow, the volume of sludge (presented in dry pounds/day (dp/d)) derived largely through use of the algorithms presented in Table 6) and the management mode utilized for their sludge production. This information was included in the 1987 SSMP to assist the districts in managing sludge production. While the department has identified an alternative planning process beyond district-wide planning, the Inventory of Existing Sludge Management Modes, presented as Table 7, is fundamental to identifying the magnitude of existing sludge management needs on a statewide basis. DTWs and districts can use this information to determine their long-term planning needs. While extensive, encompassing 22 pages of this SSMP Update, Table 7 is included to identify, by county: each sludge generator; existing and design wastewater flow; existing management mode in the categories of short and/or long-term on-site sludge management capacity, incineration, land application and out-of-state disposal. Table 7 is useful in providing a comprehensive categorization of DTW sludge management alternatives, however, the primary categories have not been sufficiently defined to be used in the capacity analysis section of the SSMP Update. For example, the land application category includes land application of sludges, advanced alkaline stabilization, pathogen reduction/pelletization and composting. This table is provided for informational purposes and is utilized by the DEPE to determine how much sludge a DTW should be generating. It also serves as a foundation for other summary tables provided throughout Section C.

   Quantities and management modes used in Table 7 are based on sludge production effective August 1993 to provide the most current data available for this SSMP Update. Some tables and graphs in this section are based on November 1992 data unless otherwise specified. Recently, the DEPE has reviewed data submitted under SQAR and has noted a significant downward trend in the state's sludge production. This decrease in sludge production can be attributed to the state's economy (there appears to be a correlation between industrial production and the quantity of sludge produced by some DTWs) and the decrease of the PVSC's sludge production due to reductions in discharges from two of its largest customers; Garden State Paper Company, Inc., and Marcal Paper Mills, Inc. Additionally, Anheuser Busch is also preparing to implement an alternative residuals management strategy that will have a definite impact on the quantity of sludge produced at the PVSC and may have an impact on sludge quality as well.

   When reviewing these tables the reader should be cognizant of the following parameters used to categorize sludges and treatment facilities:

(1) Sludge management is categorized by county as determined by physical location of the DTW and not by the source of sewage. Many DTWs serve wide areas that cross county/district boundaries. For example, RVSA is located in Middlesex County but serves primarily Union County residents. This illustrates the complexities and difficulties that would exist if the department sought to implement district-wide planning without identifying an alternative planning process.

(2) Facilities classified as long-term on-site are those whose sludge remains on-site for an extended period of time while being further processed to reduce the volume or to change the characteristics of the sludge. Reed beds and facultative lagoons are primary management alternatives included under this classification. Sludge lagoons are not an acceptable method of ultimate sludge management and are subject to closure.

(3) Sludge generators that own and operate an incinerator are distinguished from those generators that are customers to incinerators.

(4) As noted above, land application includes composting, advanced alkaline stabilization and other beneficial use technologies and does not distinguish between those generators that own and operate beneficial use systems and those that are customers of those systems.

(5) As noted earlier, the sludge management volumes were derived either from actual mass balance calculations performed as part of the generator SMP submissions where actual information is available, or were derived using theoretical algorithms (Table 6) of the existing flows at the DTW based on the treatment processes at each plant. Where existing flows exceed plant design, the sludge production at design was used (it was assumed that flows in excess of design would be receiving less treatment). An asterisk (*) indicates those volumes provided through actual site specific data rather than theoretical algorithms.

(6) The undetermined management mode includes small DTWs that remove sludge infrequently (often less than once a year).

Table 8, derived from the facility-by-facility Inventory of Existing Sludge Management Modes (Table 7), is also provided as a summary of county and state sludge production and management modes.

Figure 1 compares sludge production by county in 1987 and 1992. It should be noted that some county sludge production increased dramatically, while sludge production in other counties actually decreased. This can be partly explained by the closure of a large number of category three (3) DTWs (a permitted daily flow from 1.0 to 4.999 mgd), which connected to regional DTWs located in neighboring counties, that could already provide increased levels of treatment. For example, when compared to the information in the 1987 SSMP, Table 9 indicates that the existing flow in Hudson County decreased by approximately 50 mgd; however, the existing flow in neighboring Essex County increased by 30 mgd. In fact, it should be noted that actual wastewater flows statewide have decreased by almost 40 mgd since 1987. While wastewater flow has decreased over time, the state has required higher levels of wastewater/treatment (higher levels of wastewater treatment generate more sludge), which thereby has produced a relatively small increase in statewide sludge production. In addition, as stated earlier, the DEPE historically relied on theoretical algorithms which tend to overestimate sludge production. For example, the dramatic decrease in sludge production for Camden County between 1987 and 1992 is largely due to the overestimates of the strength of influent wastewater inherent in the theoretical calculations.

Lastly, Tables 10 and 11 are new tables summarizing sludge production information based on the size of the DTW (as presented in SQAR). The majority of the DTWs are small package plants with a design flow under 0.99 mgd. However, these facilities only generate approximately three percent of the total sludge production. 97% of the state's total sludge production is generated by 103 DTWs with design flows in excess of one mgd.

b. **Analysis of Existing Sludge Production:** As reflected in Tables 8 through 11, the statewide production of sludge is estimated to be approximately 1.87 million dry pounds per day (dp/d). As a conversion to tonnage, this translates into approximately 935 dt/d or 341,000 dry tons per year (dt/y) of material requiring management. This represents a significant amount of sludge, particularly in consideration of the fact that approximately 530 dt/d or 193,000 dt/y, representing 57% of all sludge produced, is currently exported out-of-state primarily for landfill disposal.

Another significant aspect of New Jersey sludge production relates to the enormous disparity in the quantities of sludge produced by generators. Currently, there are 442 known sludge generators in New Jersey. Of this total number, 103 DTW's produce over 97% of all sludge generated. The huge range of quantities produced by each generator can further be exemplified by focussing on the six former ocean dumping authorities. As of November 1992,

TABLE 7

EXISTING SLUDGE MANAGEMENT MODES
(As of August 1993, dp/d)

CTY	MUNICIPALITY	NJPDES #	FACILITY	EXIST. FLOW (mgd)	DESIGN FLOW (mgd)	SHORT TERM ON-SITE	LONG TERM ON-SITE	INCIN. (CUSTOMER)	INCIN (OWNER)	LAND APPLIC	OUT-OF-STATE	UNDETERM
Atl	Atlantic City	0024473	Atlantic County UA	26.4300	40.0000	0	0	* 0	31716	0	0	0
Atl	Buena Boro	0021717	Boro of Buena MUA	0.3200	0.4000	0	0	0	0	720	0	0
Atl	Buena Vista	0074004	Wilmad Glass	0.0030	0.0030	0	0	0	0	0	0	2
Atl	Egg Harbor	0055042	Stoney Fields Mobile Home Pk	0.0267	0.0267	0	0	0	0	0	0	22
Atl	Egg Harbor Twp.	0020800	Federal D.O.T. F.A.A. & NAFEC	0.1180	0.2100	0	0	204	0	0	0	0
Atl	Galloway Twp.	0073679	Smithville Professional Center	0.0019	0.0019	0	0	0	0	0	0	3
Atl	Hamilton Twp.	0026531	NJ Exp Authority Weymouth	0.0178	0.0500	0	0	40	0	0	0	0
Atl	Hammonton Town	0025160	Hammonton WWTP	0.6986	1.6000	0	0	* 1205	0	0	0	0
Atl	Hammonton Twp.	0026522	NJ Exp. Authority Hammonton	0.0010	0.0040	0	0	0	0	0	2	0
Atl	Mullica Township	0067032	Moorings at Sweetwater	0.0180	0.0180							1
Atl	Weymouth	0060682	Oaks of Weymouth	0.0184	0.0963	0	0	15	0	0	0	0
			Total	27.6534	42.4099	0	0	1464	31716	720	2	28
Ber	Edgewater Boro	0020591	Edgewater Boro STP	3.4600	6.0000	0	0	0	0	3145	0	0
Ber	Franklin Borough	0071196	Franklin Lakes Shopping Ctr	0.0053	0.0053							5
Ber	Franklin Lakes Boro	0053490	Mtn.Shadows at Franklin Lakes	0.0080	0.0220	0	0	18	0	0	0	0
Ber	Little Ferry Boro	0020028	Bergen County UA	66.5000	94.0000	0	0	* 0	0	0	85560	0
Ber	Oakland Boro	0021253	Ramapo-Indian Hills H.S.	0.0090	0.0336	0	0	20	0	0	0	0
Ber	Oakland Boro	0021342	Skyview Hi Brook STP	0.0230	0.0230	0	0	51	0	0	0	0
Ber	Oakland Boro	0027774	Oakland DPW - Oakwood Knolls	0.0350	0.0350	0	0	79	0	0	0	0

TABLE 7 (cont'd.)

CTY	MUNICIPALITY	NJPDES #	FACILITY	EXIST. FLOW (mgd)	DESIGN FLOW (mgd)	SHORT TERM ON-SITE	LONG TERM ON-SITE	INCIN. (CUSTOMER)	INCIN (OWNER)	LAND APPLIC	OUT-OF-STATE	UNDETERM
Ber	Oakland Boro	0083038	Columbia	0.0020	0.0020							1
Ber	Oakland Boro	0086797	Oakland Borough/N.J. Associate	0.0020	0.0020	0	0	0	0	0	0	2
Ber	Oakland Borough	0053112	Boro of Oakland-Chapel Hill	0.0100	0.0100	0	0	22	0	0	0	0
Ber	Oakland Borough	0078565	Russ Berrie Co., Inc.	0.0043	0.0043	0	0	0	0	0	0	3
Ber	Oaklyn Boro	0029858	Oaklyn Care Center	0.0220	0.0300	0	0	20	0	0	0	0
Ber	Ridgewood Twp.	0024791	Ridgewood Village STP	3.2900	5.0000	0	0	7700	0	0	0	0
Ber	Waldrick Boro	0024813	Northwest Bergen County UA	8.6000	9.5000	0	0	* 0	11470	0	0	0
			Total	81.9860	114.6826	0	0	7910	11470	3145	85560	26
Bur	Bass River Twp.	0054372	Off Shore Manor	0.0336	0.0336	0	0	0	0	0	0	27
Bur	Beverly City	0027481	Beverly SA	0.4292	1.0000	0	740	0	0	0	0	0
Bur	Bordentown City	0024678	City of Bordentown STP	1.6660	3.0000	0	0	1921	0	0	1922	0
Bur	Bordentown Twp.	0026719	Youth Correctional Institution	0.4000	0.6000	0	0	0	0	0	690	0
Bur	Bordentown Twp.	0027375	Johnson State Training Center	0.0642	0.1100	0	111	0	0	0	0	0
Bur	Burlington City	0024660	Common Council-Burlington City	2.1970	3.2000	0	0	0	0	3790	0	0
Bur	Burlington Township	0004235	Occidental Chemical Group	0.0100	0.0200	0	0	0	0	0	23	0
Bur	Burlington Twp.	0021695	Burlington Twp.La Gorce Sq STP	0.1675	0.2000	0	0	0	0	0	209	0
Bur	Burlington Twp.	0021709	Burlington Twp.Central Ave STP	0.9517	1.6500	0	0	0	0	0	1642	0
Bur	Cinnaminson Twp.	0024007	Cinnaminson SA	1.2940	2.0000	0	0	3028	0	0	0	0
Bur	Delran Twp.	0023507	Delran SA	1.3860	1.5000	0	0	0	0	0	3243	0
Bur	Evesham Twp.	0024031	Evesham Twp. Elmwood STP	1.5420	2.3000	0	0	0	0	4203	0	0
Bur	Evesham Twp.	0024040	Evesham Twp. Woodstream STP	1.0250	1.5000	0	0	0	0	2306	0	0
Bur	Evesham Twp.	0029203	Kings Grant Sewerage Corp STP	0.0980	0.6000	0	0	0	0	221	0	0

CTY	MUNICIPALITY	NJPDES #	FACILITY	EXIST. FLOW (mgd)	DESIGN FLOW (mgd)	SHORT TERM ON-SITE	LONG TERM ON-SITE	INCIN. (CUSTOMER)	INCIN (OWNER)	LAND APPLIC	OUT-OF-STATE	UNDETERM
Bur	Fieldsboro Boro	0031810	Fieldsboro STP	0.0587	0.1000	0	0	0	0	0	132	0
Bur	Florence Twp.	0023701	Florence Twp. STP	0.8620	1.5000	0	0	743	0	0	744	0
Bur	Hainesport Township	0087203	Hainesport Board of Education	0.0108	0.0108	0	0	0	0	0	0	8
Bur	Mansfield Twp.	0022381	N Burl Co. Regional Sch.Dist.	0.0090	0.0135	0	0	0	0	0	20	0
Bur	Mansfield Twp.	0098663	Homestead Utility Company	0.0574	0.2500	0	315	0	0	0	0	0
Bur	Maple Shade	0069167	Maple Shade	2.1850	3.4000	0	0	0	0	0	4916	0
Bur	Medford Lakes Boro	0021326	Boro of Medford Lakes STP	0.3776	0.5500	0	0	0	0	0	651	0
Bur	Medford Twp.	0026832	Medford WPCP	1.2350	1.7500	0	0	0	0	2779	0	0
Bur	Moorestown	0058084	Moorestown Office Center	0.0061	0.0061	0	0	0	0	0	0	5
Bur	Moorestown Twp.	0024996	Moorestown Twp. STP	2.3700	3.5000	0	0	0	0	0	4088	0
Bur	Mount Holly Twp.	0024015	Mount Holly STP	2.2390	5.0000	0	0	0	0	0	3862	0
Bur	Mount Laurel Twp.	0023990	Mt. Laurel Rancocas STP	0.0421	0.1200	0	0	0	0	98	0	0
Bur	Mount Laurel Twp.	0025178	Mount Laurel MUA	3.3000	4.0000	0	0	0	0	7425	0	0
Bur	N. Hanover Township	0085002	Cedar Grove Apartments	0.0108	0.0108	0	0	0	0	0	0	8
Bur	New Hanover Twp.	0004855	U.S. Army Ft. Dix Training Cen	1.9980	3.0000	0	0	0	0	0	3459	0
Bur	North Hanover	0065528	Executive Days Inn	0.0064	0.0064	0	0	0	0	0	5	0
Bur	North Hanover	0066249	Millstream Apts	0.0180	0.0180							15
Bur	North Hanover	0087360	Maplewood Apts	0.0072	0.0072							6
Bur	North Hanover Twp.	0027464	Hanover Mobile Home Park	0.0055	0.0200	0	0	0	0	0	10	0
Bur	North Hanover Twp.	0027511	California Villa Mobile Home	0.0156	0.0320	0	0	0	0	0	35	0
Bur	North Hanover Twp.	0027596	Spartan Village Mobile Home	0.0300	0.0300	0	0	0	0	0	21	0
Bur	Palmyra Boro	0024449	Palmyra STP	0.5300	0.5300	0	0	0	0	0	1192	0

TABLE 7 (cont'd.)

CTY	MUNICIPALITY	NJPDES #	FACILITY	EXIST. FLOW (mgd)	DESIGN FLOW (mgd)	SHORT TERM ON-SITE	LONG TERM ON-SITE	INCIN. (CUSTOMER)	INCIN (OWNER)	LAND APPLIC	OUT-OF-STATE	UNDETERM
Bur	Pemberton Twp.	0022438	Pemberton Twp. H.S. #1 STP	0.0003	0.0500	0	0	0	0	0	54	0
Bur	Pemberton Twp.	0024821	Pemberton Twp MUA	1.7560	2.5000	0	0	0	0	4109	0	0
Bur	Riverside Twp.	0022519	Riverside STP	0.8308	1.0000	0	0	0	0	1433	0	0
Bur	Riverton Boro	0021610	Riverton	0.1580	0.2200	0	0	273	0	0	0	0
Bur	Shamong	0082686	Wharton Treat Youth Correc. Fa	0.0250	0.0250							20
Bur	Southhampton Twp.	0023736	Southhampton Sewerage Co.	0.2887	0.5000	0	0	0	0	361	0	0
Bur	Southhampton Twp.	0028665	Mobile Estates of Southhampton	0.0600	0.0600	0	0	0	0	0	135	0
Bur	Springfield Twp.	0021571	Springfield Twp. School STP	0.0004	0.0075	0	0	0	0	0	1	0
Bur	Springfield Twp.	0058076	NJ Dot-295 Rest Area	0.0031	0.0600	0	0	0	0	0	0	2
Bur	Tabernacle Twp.	0091294	Tabernacle Twp. Middle School	0.0250	0.0250	0	0	0	0	0	20	0
Bur	Vincentown	0076538	Upper Elementary	0.0062	0.0062	0	0	0	0	0	0	5
Bur	Willingboro Twp.	0023361	Willingboro MUA	4.3160	4.8120	0	0	0	0	7445	0	0
Bur	Woodland Twp.	0021768	New Lisbon State School	0.1864	0.3150	0	0	0	0	0	322	0
Bur	Wrightstown Boro	0022578	McGuire AFB	1.0320	1.2500	0	0	0	0	0	1780	0
Bur	Wrightstown Boro	0022985	Wrightstown MUA	0.1610	0.2000	0	0	0	0	0	202	0
			Total	35.4873	52.5991	0	1166	5965	0	34170	29378	96
Cam	Camden City	0026182	Camden County MUA Main STP	54.0500	80.0000	0	0	* 0	0	54754	14754	0
Cam	Gloucester City	0005495	Amspec Chemical Co.	0.0060	0.0060	0	0	0	0	0	0	14
Cam	Gloucester Twp.	0029840	Lakeland Inst. Camden Co. Bd	0.0430	0.5000	0	0	0	0	0	0	97
Cam	Magnolia Boro	0021431	Magnolia SA	0.4500	0.4500	0	0	1053	0	0	0	0
Cam	Waterford Twp.	0091243	Waterford Twp. MUA	0.5500	0.7500	0	688	0	0	0	0	0
Cam	Winslow Township	0072354	Winslow Board of Education	0.0150	0.0150	0	0	12	0	0	0	0
Cam	Winslow Twp.	0021962	Ancora State Phychiatric Hosp.	0.2190	0.2390	0	378	0	0	0	0	0

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Cam	Winslow Twp.	0031615	Camden County Vo-Tech School	0.0120	0.0580	0	0	27	0	0	0	0
Cam	Winslow Twp.	0061760	Winslow Sanitary Corp.	1.2300	1.6500	0	0	0	0	2768	0	0
			Total	56.5750	83.6680	0	1066	1092	0	57522	14754	111
Cpm	Avalon Boro	0052990	Cape May Co. MUA 7-Mile Beach	3.0650	7.6700	0	0	0	0	5272	0	0
Cpm	Cape May Court House	0060631	Court House Convalescent Ctr.	0.0120	0.0120	0	0	9	0	0	0	0
Cpm	Dennis Township	0062936	Dennisville Lake Campground	0.0135	0.0135	0	0	0	0	0	0	11
Cpm	Dennis Township	0070246	Board of Education	0.0125	0.0125	0	0	0	0	0	0	10
Cpm	Dennis Twp.	0021121	NJ Hwy Auth. Garden State Pkwy	0.0137	0.0540	0	0	0	0	0	0	23
Cpm	Dennis Twp.	0063673	Holly Lake Campground	0.0360	0.0360	0	0	0	0	0	0	29
Cpm	Lower Twp.	0020371	Cape May City WWTP	1.2860	3.0000	0	0	0	0	1608	0	0
Cpm	Lower Twp.	0023809	Lower Twp. STP	1.4780	4.0000	0	0	0	0	864	2595	0
Cpm	Lower Twp.	0029297	Lewes Ferry DRBA	0.0080	0.0300	0	0	0	0	0	0	18
Cpm	Middle	0053007	CMCMUA- Wildwood/Lower STP	3.7340	14.1800	0	0	0	0	6441	0	0
Cpm	Middle Township	0084921	Briarwood Mobile Home Park	0.0146	0.0146							12
Cpm	Middle Township	0089984	Bay Cove Resorts	0.0346	0.0346							28
Cpm	Middle Twp.	0027197	Garden Lake Corp.	0.0210	0.0560	0	0	3	0	0	0	0
Cpm	Ocean City	0035343	Cape May County MUA Ocean City	3.4040	6.3000	0	0	0	0	5872	0	0
Cpm	Ocean View	0052183	Lutheran Nursing Home	0.0276	0.0276	0	0	0	0	22	0	0
Cpm	Upper	0062994	Cedar Square Shopping Center	0.0166	0.0166	0	0	0	0	0	0	13
Cpm	Upper	0069884	Avalon Golf Course	0.0050	0.0050	0	0	0	0	0	0	4
Cpm	Upper Township	0069922	Upper Twp Brd of Ed	0.0168	0.0168					14		0

TABLE 7 (cont'd.)

CTY	MUNICIPALITY	NJPDES #	FACILITY	EXIST. FLOW (mgd)	DESIGN FLOW (mgd)	SHORT TERM ON-SITE	LONG TERM ON-SITE	INCIN. (CUSTOMER)	INCIN (OWNER)	LAND APPLIC	OUT-OF-STATE	UNDETERM
Cpm	Upper Township	0073725	Tuckahoe Inn	0.0077	0.0077	0	0	0	0	0	0	6
Cpm	Upper Twp.	0005444	Atlantic City Electric	0.0080	0.0080	0	0	0	0	7	0	0
Cpm	Woodbine Boro	0021172	Woodbine State School	0.1300	0.1600	0	224	0	0	0	0	0
			Total	13.3446	35.6549	0	224	12	0	20100	2595	154
Cum	Bridgeton City	0024651	Cumberland County UA	2.9300	7.0000	0	0	3428	0	3428	0	0
Cum	Commercial Twp. BOE	0083682	Haleyville School	0.0054	0.0066							4
Cum	Deerfield Twp	0089001	Deerfield Twp. E. School	0.0084	0.0084					7		0
Cum	Lawrence Township	0099741	Redpack Foods	0.0043	0.0043							6
Cum	Maurice River Twp.	0021989	Bayside State Prison	0.2400	0.5500	0	0	0	0	0	488	0
Cum	Millville City	0029467	Millville SA STP	2.9470	5.0000	0	0	* 2505	0	0	2505	0
Cum	Millville City	0072524	Fairview Manor Park	0.0430	0.0500	0	0	0	0	97	0	0
Cum	Vineland	0084395	Chapman Mobile Homes	0.0595	0.0595							48
Cum	Vineland City	0025364	Landis SA STP	5.0560	8.2000	0	0	0	0	11831	0	0
Cum	Vineland City	0090263	Cumberland Mall Assoc.	0.0240	0.0600	0	0	0	0	56	0	0
			Total	11.3176	20.9388	0	0	5933	0	15419	2993	58
Ess	Caldwell Boro	0020427	Caldwell Boro	3.7250	4.5000	0	0	6426	0	0	0	0
Ess	Cedar Grove Twp.	0021687	Essex County Hospital Center	0.2960	1.5500	0	510	0	0	0	0	0
Ess	Cedar Grove Twp.	0025330	Cedar Grove STP	1.5000	2.0000	0	0	2588	0	0	0	0
Ess	Livingston Twp.	0024511	Livingston Twp. STP	3.1000	4.2000	0	0	7371	0	0	0	0
Ess	NJ Transit	0031992	Meadowlands Maint. Complex	0.1565	0.1565	0	0	195	0	0	0	0
Ess	Newark	0021016	Passaic Valley Sewerage Comm.	282.7500	330.0000	0	0	* 0	0	0	753597	0
Ess	Verona Boro	0024490	Verona STP	1.1000	4.1000	0	0	* 1075	0	0	0	0

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			Total	292.6275	346.5065	0	510	17655	0	0	753597	0
Glo	Franklin	0066605	Delsea Reg Brd of Ed	0.0200	0.0200	0	0	0	0	0	0	16
Glo	Franklin	0067652	Franklin Brd of Ed/Janvier Ele	0.0117	0.0117	0	0	0	0	0	0	9
Glo	Franklin Township	0078069	Cong. Daughters/Lady of Mercy	0.0100	0.0100							81
Glo	Greenwich Twp.	0030333	Greenwich Twp. STP	0.7000	1.0000	0	0	* 980	0	0	0	0
Glo	Harrison Twp.	0020532	Twp. of Harrison Mullica Hill	0.1037	0.4000	0	0	0	0	233	0	0
Glo	Logan Twp.	0027545	Logan Twp. MUA	0.4912	1.0000	0	0	0	0	0	1105	0
Glo	Mullica Hill	0054151	Laux Trailor Park	0.0410	0.0410	0	0	0	0	0	0	33
Glo	Swedesboro Boro	0022021	Boro of Swedesboro	0.1633	0.3500	0	0	0	0	205	0	0
Glo	West Deptford Twp.	0024686	Gloucester County UA	16.1000	20.1000	0	0	0	34000	3674	0	0
Glo	Woolwich	0088706	Kingway Regional HS	0.0190	0.0190							15
			Total	17.6599	22.9517	0	0	980	34000	4112	1105	154
Hud	Secaucus	0028410	Secaucus Motor Lodge	0.0150	0.0150							12
Hud	Bayonne City	0020257	U.S. Military Ocean Terminal	0.0900	0.1800	0	202	0	0	0	0	0
Hud	Hoboken City	0026085	Hoboken City STP	11.3900	20.8000	0	0	0	0	24454	0	0
Hud	Kearny	0027758	US Postal Office	0.0270	0.0500	0	0	70	0	0	0	0
Hud	Kearny	0031992	NJ Transit - MMC	0.0350	0.0350			28				
Hud	Kearny Town	0029505	Goody Products	0.0170	0.0500	0	0	29	0	0	0	0
Hud	North Bergen Twp.	0020508	The Daily News	0.0040	0.0110	0	0	10	0	0	0	0
Hud	North Bergen Twp.	0029084	North Bergen-Woodcliff	2.6500	2.6500	0	0	3312	0	0	0	0
Hud	North Bergen Twp.	0034339	North Bergen Central STP	6.3600	10.0000	0	0	7950	0	0	0	0
Hud	Secaucus Town	0023566	Hudson County Meadowview Hosp.	0.1955	0.7500	0	0	440	0	0	0	0

TABLE 7 (cont'd.)

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Hud	Secaucus Town	0025038	Secaucus MUA	2.8500	5.1200	0	0	* 2980	0	0	0	0
Hud	West New York Town	0025321	West New York Town MUA	8.4600	10.0000	0	0	0	0	0	10568	0
Hud	West New York Town	0029246	Lighthouse Bar and Restaurant	0.0030	0.0030	0	0	0	0	0	0	2
			Total	32.0965	49.6640	0	202	14819	0	24454	10568	14
Hun	Alexandria Twp.	0023001	Salvation Army - Camp Tecumseh	0.0160	0.0180	0	24	0	0	0	0	0
Hun	Alexandria Twp.	0027553	Lester Wilson School	0.0023	0.0075	0	0	4	0	0	0	0
Hun	Alexandria Twp.	0035670	Alexandria School	0.0030	0.0110	0	0	7	0	0	0	0
Hun	Bloomsbury	0058246	Fawn Run	0.0190	0.0190	0	0	0	0	0	0	15
Hun	Bloomsbury Boro	0023094	Union Oil Garden State Truck	0.0175	0.0200	0	0	39	0	0	0	0
Hun	Clinton Town	0020389	Clinton Town STP	1.0300	1.5300	0	0	* 0	0	0	1023	0
Hun	Clinton Township	0050857	Twin Oaks	0.0140	0.0140	0	0	0	0	0	0	11
Hun	Clinton Township	0067229	Arrow Mill	0.0066	0.0066	0	0	15	0	0	0	0
Hun	Clinton Township	0074527	Pine Ridge Schoolhouse Assoc	0.0062	0.0062	0	0	0	0	0	0	5
Hun	Clinton Twp	0087335	Rolling Hills of Hunt. Co.	0.0093	0.0093						7	0
Hun	Clinton Twp.	0023175	Round Valley School STP	0.0040	0.0090	0	0	9	0	0	0	0
Hun	Clinton Twp.	0028363	North Hunterdon High School	0.0138	0.0400	0	0	32	0	0	0	0
Hun	Clinton Twp.	0028487	Youth Corr'n. Inst.- Annandale	0.1700	0.1700	0	0	398	0	0	0	0
Hun	Clinton Twp.	0035084	Exxon Research & Development	0.0300	0.0500	0	0	52	0	0	0	0
Hun	Delaware Twp.	0027561	Delaware Twp. MUA	0.0208	0.0650	0	0	47	0	0	0	0
Hun	East Amwell Twp.	0076422	Highfields Residential Group	0.0032	0.0032	0	0	0	0	0	0	2
Hun	Flemington Borough	0028436	Raritan Twp MUA #2	0.8000	3.8500							1000

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Hun	Franklin Township	0072435	Franklin Twp. Elementary Schoo	0.0030	0.0030	0	0	0	0	0	0	2
Hun	Frenchtown Boro	0029831	Frenchtown STP	0.1287	0.1500	0	0	0	0	0	222	0
Hun	Glen Gardener Boro	0052281	Spruce Hills Development Corp.	0.0365	0.0580	0	0	30	0	0	0	0
Hun	Kingwood Twp.	0023311	Kingwood Twp. Board of Ed.	0.0017	0.0048	0	0	16	0	0	0	0
Hun	Lambertville City	0020915	Lambertville STP	0.8000	1.5000	0	0	1872	0	0	0	0
Hun	Lebanon Twp.	0022144	Hagadorn Geriatric Center	0.0201	0.0420	0	0	0	0	0	36	0
Hun	Milford Boro	0021890	Milford Sewer Utility STP	0.2102	0.4000	0	0	473	0	0	0	0
Hun	Raritan Township	0074128	Copper Hill Country Club	0.0046	0.0046	0	0	0	0	0	0	4
Hun	Raritan Twp.	0022047	Raritan Twp. MUA	2.3000	3.8000	0	0	* 0	0	4500	0	0
Hun	Readington Twp.	0026697	Readington Twp. Bd. of Ed.	0.0031	0.0170	0	0	7	0	0	0	0
Hun	Readington Twp.	0098922	Readington Lebanon SA	0.3500	0.8000	0	0	0	0	778	0	0
Hun	Tewksbury Twp.	0022781	Valley Road S.C.- Pottersville	0.0247	0.0480	0	0	55	0	0	0	0
Hun	Tewksbury Twp.	0028452	A.M. Best Company	0.0027	0.0075	0	0	6	0	0	0	0
Hun	Tewksbury Twp.	0053279	Hunters Glen	0.0156	0.0156	0	0	0	0	0	0	45
Hun	Tewksbury Twp.	0055956	Oldwick Village STP	0.0225	0.0300	0	0	0	0	0	0	18
Hun	Union Twp	0024091	Union Twp. Bd. of Ed.- Jutland	0.0050	0.0110	0	0	11	0	0	0	0
Hun	Washington Township	0068829	Brass Castle Estates	0.0288	0.0288	0	0	0	0	0	0	23
			Total	6.1229	12.7491	0	24	3073	0	5278	1288	1125
Mer	Buena Boro	0004243	NL Chemicals	0.0300	0.0300	0	0	* 2	0	0	0	0
Mer	East Windsor Twp.	0023787	East Windsor MUA	2.7500	3.3500	0	0	* 6500	0	0	0	0
Mer	Ewing Twp.	0023779	Mercer County Airport	0.0370	0.1250	0	0	32	0	0	0	0
Mer	Hamilton Twp.	0020737	NJ Turnpike Auth. Service Area	0.0410	0.0990	0	0	71	0	0	0	0

TABLE 7 (cont'd.)

CTY	MUNICIPALITY	NJPDES #	FACILITY	EXIST. FLOW (mgd)	DESIGN FLOW (mgd)	SHORT TERM ON-SITE	LONG TERM ON-SITE	INCIN. (CUSTOMER)	INCIN (OWNER)	LAND APPLIC	OUT-OF-STATE	UNDETERM
Mer	Hamilton Twp.	0026301	Independence Ave. WWTP	9.6000	16.0000	0	0	0	0	0	16560	0
Mer	Hightstown Boro	0029475	Hightstown Boro	0.6630	1.0000	0	0	* 0	0	0	1144	0
Mer	Hopewell Township	0000809	AT&T	0.0740	0.0800	0	0	60	0	0	0	0
Mer	Hopewell Twp.	0000795	Mobile Research and Dev. Corp.	0.0420	0.0974	0	0	95	0	0	0	0
Mer	Hopewell Twp.	0021776	Bear Tavern School	0.0064	0.0120	0	0	15	0	0	0	0
Mer	Hopewell Twp.	0027715	Mercer County Correction Cntr.	0.0480	0.0900	0	0	112	0	0	0	0
Mer	Hopewell Twp.	0032905	Hopewell Valley Reg. School	0.0120	0.0240	0	0	0	0	0	0	10
Mer	Hopewell Twp.	0035301	Stony Brook RSA - Hopewell STP	0.1143	0.3000	0	0	0	268	0	0	0
Mer	Hopewell Twp.	0035319	Stony Brook RSA Pennington STP	0.1704	0.3000	0	0	0	398	0	0	0
Mer	Lawrence Twp.	0022110	Educational Testing Service	0.0340	0.0800	0	0	42	0	0	0	0
Mer	Lawrence Twp.	0024759	Ewing Lawrence SA	10.6044	16.0000	0	0	0	0	0	17256	0
Mer	Princeton Twp.	0031119	Stony Brook RSA	8.0300	11.7000	0	0	0	18790	0	0	0
Mer	Trenton City	0020923	Trenton STP	15.6900	20.0000	0	0	27065	0	0	0	0
Mer	Washington Twp	0086169	Sharon School	0.0078	0.0078	0	0	0	0	0	0	6
			Total	47.9543	69.2952	0	0	33994	19456	0	34960	16
Mid	Middlesex Boro	0020672	Tingley Rubber	0.0020	0.0068	0	0	11	0	0	0	0
Mid	Monroe Township	0081639	Applegarth Care Center	0.0129	0.0129	0	0	0	0	0	0	10
Mid	Monroe Twp.	0028479	Jamesburg Training Center	0.1360	0.1500	0	0	0	0	0	235	0
Mid	Old Bridge Twp.	0022306	Old Bridge Bd. of Ed.	0.0068	0.0070	0	9	0	0	0	0	0
Mid	Plainsboro Twp.	0024104	Lincoln Property Utility Co.	0.8000	1.5000	0	0	1800	0	0	0	0
Mid	Plainsboro Twp.	0031445	Firmenich Inc.	0.0035	0.0070	0	0	18	0	0	0	0

CTY	MUNICIPALITY	NJPDES #	FACILITY	EXIST. FLOW (mgd)	DESIGN FLOW (mgd)	SHORT TERM ON-SITE	LONG TERM ON-SITE	INCIN. (CUSTOMER)	INCIN (OWNER)	LAND APPLIC	OUT-OF-STATE	UNDETERM
Mid	Sayreville Boro	0020141	Middlesex County UA	105.2800	147.0000	0	0	* 0	0	200980	0	0
Mid	Upper Township	0020079	Jamesway-Firestone	0.0110	0.0110	0	0	9	0	0	0	0
Mid	Woodbridge Twp.	0024643	Rahway Valley SA	25.6850	35.0000	0	0	* 0	0	30719	0	0
			Total	131.9372	183.6947	0	9	1838	0	231699	235	10
Mon	Aberdeen Twp.	0022535	Aberdeen Twp. Cliffwood STP	0.4840	0.7500	0	0	0	0	0	1090	0
Mon	Aberdeen Twp.	0022543	Aberdeen Twp. Strathmore STP	0.7640	0.8500	0	0	0	0	0	1719	0
Mon	Aberdeen Twp.	0022829	Aberdeen Twp. River Garden STP	0.1000	0.1000	0	0	0	0	0	234	0
Mon	Allentown Boro	0020206	Allentown WPCP	0.1720	0.2400	0	0	* 0	0	0	375	0
Mon	Asbury Park City	0025241	Asbury Park STP	2.8700	4.4000	0	0	4950	0	0	0	0
Mon	Colts Neck Twp.	0023540	Earle Naval Weapons Station	0.2674	0.3740	0	0	334	0	0	0	0
Mon	Colts Neck Twp.	0031771	Colts Neck Inn	0.0021	0.0060	0	0	3	0	0	0	0
Mon	Colts Neck Twp.	0085341	Colts Neck Shopping Center	0.0040	0.0040	0	0	0	0	0	0	3
Mon	Farmingdale	0061824	Angle Inn Motor Court	0.0003	0.0003	0	0	0	0	0	0	1
Mon	Freehold Twp.	0091219	Monmouth Battlefield State Pk	0.0038	0.0038	0	0	0	0	0	0	3
Mon	Holmdel Township	0068993	Twin Wells Executive Center	0.0199	0.0199	0	0	0	0	0	0	16
Mon	Holmdel Twp.	0000477	Bell Laboratories	0.0500	0.1000	0	0	113	0	0	0	0
Mon	Holmdel Twp.	0001775	Comdata	0.0047	0.0177	0	0	0	0	0	0	11
Mon	Holmdel Twp.	0027031	Bd. of Ed Holmdel Twp.	0.0031	0.0100	0	0	0	0	0	0	7
Mon	Holmdel Twp.	0027529	Holmdel Nursing and Convales.	0.0057	0.0250	0	0	13	0	0	0	0
Mon	Holmdel Twp.	0031674	Remington Cafe	0.0070	0.0280	0	0	16	0	0	0	0
Mon	Holmdel Twp.	0035718	Prudential Ins. Co. of America	0.0450	0.0450	0	0	78	0	0	0	0
Mon	Homdel	0071102	Homdel Shopping Center	0.0032	0.0032	0	0	0	0	0	0	3

TABLE 7 (cont'd.)

CTY	MUNICIPALITY	NJPDES #	FACILITY	EXIST. FLOW (mgd)	DESIGN FLOW (mgd)	SHORT TERM ON-SITE	LONG TERM ON-SITE	INCIN. (CUSTOMER)	INCIN (OWNER)	LAND APPLIC	OUT-OF-STATE	UNDETERM
Mon	Howell	0087696	Chapter House	0.0028	0.0028							2
Mon	Howell Twp.	0026956	Winding Brook Mobile Home TP	0.0230	0.0700	0	0	0	0	0	0	52
Mon	Long Branch City	0024783	Long Branch SA Joling Ave. STP	4.0800	5.4000	0	0	4773	0	4773	0	0
Mon	Manalapan Twp.	0023728	Western Monmouth UA	4.2400	6.6000	0	2913	* 0	0	0	0	0
Mon	Manasquan	0074063	Ven-Son International	0.0125	0.0125	0	0	0	0	0	0	10
Mon	Marlboro Twp.	0026816	Wickatuck Village	0.0100	0.0150	0	0	23	0	0	0	0
Mon	Marlboro twp.	0022586	Marlboro State Psychiatric Hos	0.2910	1.0000	0	680	0	0	0	0	0
Mon	Middletown Twp.	0022314	Sandy Hook Nat'l Rec Area	0.1760	0.1890	0	0	0	0	0	0	304
Mon	Middletown Twp.	0025356	Middletown Twp. SA	8.3000	10.8000	0	0	* 0	0	8415	0	0
Mon	Monmouth Beach Boro	0026735	Northeast Monmouth RSA	9.6100	10.0000	0	0	21622	0	0	0	0
Mon	Neptune Twp.	0024872	Neptune Twp.STP #2 Old Corlies	5.4830	8.5000	0	0	0	0	0	9458	0
Mon	Ocean Twp.	0024520	Twp.of Ocean SA	4.6000	7.5000	0	0	* 1300	0	1900	0	0
Mon	Roosevelt Boro	0022918	Roosevelt Boro STP	0.2500	0.2500	0	0	203	0	0	0	0
Mon	Union Beach Boro	0024708	Bayshore Regional SA	7.5800	10.3500	0	0	* 0	18070	0	0	0
Mon	Wall Twp.	0021148	NJ Hwy. Authority Garden S. P.	0.0167	0.0540	0	0	29	0	0	0	0
Mon	Wall Twp.	0022977	Brisbane Child Treatment Cntr.	0.0160	0.0280	0	0	56	0	0	0	0
Mon	Wall Twp.	0024562	South Monmouth RSA	5.0600	9.1000	0	0	0	0	0	8728	0
			Total	54.5572	76.8482	0	3593	33513	18070	15088	21604	412
Mor	Boonton	0063568	NJ Firemans Home	0.0110	0.0110	0	0	0	0	0	0	9
Mor	Chatham Boro	0024937	Madison-Chatham Joint Meeting	2.8500	3.5000	0	0	* 0	0	3183	0	0
Mor	Chatham Township	0069370	Magla Products	0.0030	0.0030			4				0
Mor	Chatham Twp.	0020281	Chatham Twp.- Park Central	0.0299	0.0300	0	0	89	0	0	0	0

CTY	MUNICIPALITY	NJPDES #	FACILITY	EXIST. FLOW (mgd)	DESIGN FLOW (mgd)	SHORT TERM ON-SITE	LONG TERM ON-SITE	INCIN. (CUSTOMER)	INCIN (OWNER)	LAND APPLIC	OUT-OF-STATE	UNDETERM
Mor	Chatham Twp.	0020290	Chatham Twp.- Main	0.7500	0.7500	0	0	1294	0	0	0	0
Mor	Chatham Twp.	0052256	Chatham Glen	0.0510	0.1550	0	0	88	0	0	0	0
Mor	Chester Boro	0026824	Chester Shopping Mall	0.0085	0.0110	0	0	19	0	0	0	0
Mor	Chester Boro	0090115	Chester Springs Shopping Cntr.	0.0230	0.0300	0	0	0	0	0	52	0
Mor	Chester Borough	0054101	Hills of Chester	0.0750	0.0750	0	0	248	0	0	0	0
Mor	Chester Township	0071013	Westminster Estates	0.0378	0.0378	0	0	0	0	0	0	31
Mor	Chester Township	0099520	Welkind Neurological Hospital	0.0170	0.0170	0	0	14	0	0	0	0
Mor	Florham Park Boro	0003476	Exxon Research and Eng. Co.	0.0850	0.2910	0	0	147	0	0	0	0
Mor	Florham Park Boro	0025518	Florham Park SA	0.8520	1.4000	0	0	* 997	0	0	0	0
Mor	Hanover Twp.	0024902	Hanover Twp. STP	1.9300	3.0000	0	0	* 1000	0	0	0	0
Mor	Hanover Twp.	0025496	Morristown STP	2.9300	3.4500	0	0	6855	0	0	0	0
Mor	Harding Twp.	0029912	NJDOT- Harding Rest Area	0.0086	0.0250	0	0	19	0	0	0	0
Mor	Jefferson Township	0075302	Milton Shopping Center	0.0046	0.0046	0	0	0	0	0	0	4
Mor	Jefferson Township	0081086	Moosepac Development	0.0707	0.0707							160
Mor	Jefferson Twp	0068331	Sandy Point, Inc.	0.0050	0.0185	0	0	0	0	0	0	4
Mor	Jefferson Twp.	0021091	Senior High- Middle School	0.0156	0.0275	0	0	35	0	0	0	0
Mor	Jefferson Twp.	0021105	Arthur Stanlick School	0.0060	0.0130	0	0	14	0	0	0	0
Mor	Jefferson Twp.	0026867	White Rock STP	0.0660	0.1295	0	0	0	0	0	148	0
Mor	Kinnelon Boro	0022276	Kinnelon Twp. Stony Brook Sch.	0.0055	0.0100	0	0	12	0	0	0	0
Mor	Kinnelon Boro	0022284	Kinnelon High School	0.0127	0.0300	0	0	30	0	0	0	0
Mor	Kinnelon Boro	0024457	Our Lady of the Magnificat	0.0012	0.0012	0	0	0	0	0	0	2
Mor	Lincoln Park Boro	0029386	Peq. Lincoln Park Fairfield SA	4.7720	7.5000	0	0	0	11795	0	0	0
Mor	Medham Township	0058050	Medham East	0.0400	0.0400	0	0	32	0	0	0	0

TABLE 7 (cont'd.)

CTY	MUNICIPALITY	NJPDES #	FACILITY	EXIST. FLOW (mgd)	DESIGN FLOW (mgd)	SHORT TERM ON-SITE	LONG TERM ON-SITE	INCIN. (CUSTOMER)	INCIN (OWNER)	LAND APPLIC	OUT-OF-STATE	UNDETERM
Mor	Mendham Boro	0021334	India Brook STP	0.3800	0.3900	0	0	878	0	0	0	0
Mor	Morris Twp.	0024911	Morris Twp.- Butterworth STP	1.6340	3.3000	0	0	* 2696	0	0	0	0
Mor	Morris Twp.	0024929	Morris Township- Woodland STP	1.4600	2.0000	0	0	* 1506	0	0	0	0
Mor	Morris Twp.	0026751	St. Mary's Abbey Delbarton Sch	0.0150	0.0350	0	0	27	0	0	0	0
Mor	Mount Arlington Boro	0026212	Mt. Arlington Sanitation Corp.	0.0300	0.0350	0	0	0	0	0	68	0
Mor	Mount Arlington Boro	0065226	Hills of Arlington	0.0040	0.1580	0	0	0	0	0	0	5
Mor	Mount Olive Twp.	0021954	Mt. Olive Twp. STP	0.2990	0.5000	0	0	673	0	0	0	0
Mor	Mount Olive Twp.	0027821	Musconetcong SA	1.0200	2.2750	0	0	* 0	0	1215	0	0
Mor	Mount Olive Twp.	0050393	Mt Olive Upper Elementary Sch.	0.0060	0.0111	0	0	0	0	0	0	13
Mor	Mount Olive Twp.	0051519	Mt. Olive H.S.- Bd. of Ed.	0.0180	0.0250	0	0	0	0	0	0	41
Mor	Mount Olive Twp.	0090051	Oak Wood STP	0.0940	0.1500	0	0	212	0	0	0	0
Mor	Mount Olive Twp.	0099538	Mount Olive Villages	0.3300	0.3300	0	0	589	0	0	0	0
Mor	Mt Arlington Borough	0062626	Bertrand Island Development	0.0220	0.0220	0	0	0	0	0	0	17
Mor	Oak Ridge	0052981	Bowling Green Townshouses	0.0225	0.0225	0	0	0	0	0	0	18
Mor	Parsippany Troy-Hill	0022349	Rockaway Valley Regional SA	7.9500	12.0000	0	0	8436	0	0	0	0
Mor	Parsippany Troy-Hill	0024970	Parsippany Troy-Hills STP	12.0000	12.0000	0	0	0	26513	0	0	0
Mor	Parsippany-Troy Hill	0026689	Greystone Park Psych. Hospital	0.2620	0.4000	0	0	690	0	0	0	0
Mor	Passaic Twp.	0024465	Long Hill Township STP	0.8395	0.8500	0	0	1448	0	0	0	0
Mor	Pequannock Twp	0072311	Edwards Engineering Corp.	0.0020	0.0020	0	0	0	0	0	0	1
Mor	Pequannock Twp.	0026514	Plains Plaza STP	0.0075	0.0200	0	0	17	0	0	0	0
Mor	Rockaway Twp.	0002500	ARDC- Picatinny Arsenal	0.2718	0.4100	0	0	469	0	0	0	0

CTY	MUNICIPALITY	NJPDES #	FACILITY	EXIST. FLOW (mgd)	DESIGN FLOW (mgd)	SHORT TERM ON-SITE	LONG TERM ON-SITE	INCIN. (CUSTOMER)	INCIN (OWNER)	LAND APPLIC	OUT-OF-STATE	UNDETERM
Mor	Rockaway Twp.	0032808	Rockaway Townsquare Mall STP	0.1000	0.1100	0	0	234	0	0	0	0
Mor	Roxbury	0067482	Prudent Publishing Co.	0.0063	0.0063	0	0	7	0	0	0	0
Mor	Roxbury Township	0101559	B.J.'s Wholesale Club	0.0020	0.0020							2
Mor	Roxbury Twp.	0022675	Roxbury Twp.- Ajax Terrace STP	1.0860	1.6860	0	0	1873	0	0	0	0
Mor	Roxbury Twp.	0022683	Roxbury Twp.- Skyview STP	0.0800	0.0800	0	0	180	0	0	0	0
Mor	Roxbury Twp.	0028304	Days Inn STP	0.0093	0.0400	0	0	21	0	0	0	0
Mor	Twp of Jefferson	0089028	Jefferson Village Square	0.0014	0.0014							2
Mor	Washington Twp.	0023493	Schooley's Mt. STP	0.3325	0.3670	0	222	195	0	0	0	0
			Total	42.9459	57.8591	0	222	31048	38308	4398	268	309
Oce	Barnegat	0064823	Pinewood Estates Mobile Park	0.1126	0.1126	0	0	0	0	0	0	9
Oce	Berkeley Twp	0062642	Central Reg. Middle/High Schoo	0.0375	0.0375	0	0	0	0	0	0	30
Oce	Berkeley Twp.	0029408	Ocean County UA Central STP	18.8900	28.0000	0	0	* 0	0	0	25823	0
Oce	Brick Twp.	0028142	Ocean County UA North STP	18.8100	28.0000	0	0	* 0	0	0	25055	0
Oce	Jackson	0069663	Carl Goetz School	0.0170	0.0170	0	0	0	0	0	14	0
Oce	Jackson Twp	0084697	Luxury Mobile Home Park	0.0210	0.0210							17
Oce	Jackson Twp.	0026263	Jackson Twp.MUA Gr. Adventure	0.1220	0.3400	0	0	275	0	0	0	0
Oce	Jackson Twp.	0029513	Jackson Twp. Board of Educ.	0.0490	0.1000	0	0	0	0	0	110	0
Oce	Jackson Twp.	0031267	Oak Tree Mobile Home	0.0320	0.0450	0	0	72	0	0	0	0
Oce	Jackson Twp.	0035653	Fountain Head Park, Inc.	0.0080	0.0080	0	0	0	0	0	18	0
Oce	Jackson Twp.	0062090	Maple Glen Mobile Park	0.0170	0.0170	0	0	0	0	0	0	61
Oce	Jackson Twp.	0090344	Southwind Mobile Homes Village	0.0230	0.0450	0	0	52	0	0	0	0
Oce	Lacey Twp.	0021130	NJ Hwy. Auth. Garden State Pkw	0.0210	0.0400	0	0	0	0	0	0	36
Oce	Lacey Twp.	0090158	Jackson Estates	0.0260	0.0350	0	0	0	0	0	59	0

TABLE 7 (cont'd.)

CTY	MUNICIPALITY	NJPDES #	FACILITY	EXIST. FLOW (mgd)	DESIGN FLOW (mgd)	SHORT TERM ON-SITE	LONG TERM ON-SITE	INCIN. (CUSTOMER)	INCIN (OWNER)	LAND APPLIC	OUT-OF-STATE	UNDETERM
Oce	Lakehurst	0079707	Alcoholism Trmt Ctr of NJ	0.0037	0.0037							3
Oce	Plumstead Twp.	0021407	Plumstead Twp.New Egypt School	0.0018	0.0200	0	0	0	0	0	2	0
Oce	Stafford Twp.	0026018	Ocean Co. UA Southern STP	6.3500	20.0000	0	0	* 0	0	5680	0	0
			Total	44.5416	76.8418	0	0	399	0	5680	51081	156
Pas	Edgewood Boro	0034169	Peter Cooper School	0.0038	0.0110	0	0	9	0	0	0	0
Pas	Pompton Lakes Boro	0023698	Pompton Lakes MUA	1.0000	1.2000	0	0	* 2739	0	0	0	0
Pas	Ringwood	0051098	Bald Eagle Village	0.0760	0.1000	0	0	171	0	0	0	0
Pas	Ringwood	0062316	Fieldstone Shopping Center	0.0034	0.0034	0	0	0	0	0	0	3
Pas	Ringwood	0069213	Franciscan Friars	0.0023	0.0075	0	0	0	0	0	0	2
Pas	Ringwood	0091278	State Pk/Skylands Manor STP	0.0500	0.0500	0	0	0	0	0	0	41
Pas	Ringwood Boro	0027006	Ringwood Acres	0.0320	0.0360	0	0	35	0	0	0	0
Pas	Ringwood Boro	0029432	Robert Erskine School	0.0021	0.0080	0	0	3	0	0	0	0
Pas	Ringwood Boro	0032395	Ringwood Shopping Plaza	0.0072	0.0116	0	0	9	0	0	0	0
Pas	Totowa Boro	0021261	No. Jersey Developmental Cntr.	0.0720	0.2000	0	0	124	0	0	0	0
Pas	Wanaque Boro	0053759	Wanaque Valley RSA	0.7200	1.2500	0	0	* 853	0	0	0	0
Pas	Wayne Boro	0028002	Wayne Twp.- Mountainview	5.9700	13.5000	0	0	* 0	8750	0	0	0
Pas	West Milford	0056618	Williamsburg	0.0750	0.0750	0	0	0	0	0	0	61
Pas	West Milford	0065706	Greenwood Waterside Townhouses	0.0045	0.0045	0	0	0	0	0	0	4
Pas	West Milford	0087530	West Milford Sopping Plaza	0.0039	0.0039							3
Pas	West Milford Twp.	0024414	West Milford Shopping Center	0.0120	0.0200	0	0	27	0	0	0	0
Pas	West Milford Twp.	0026174	Crescent Park STP	0.0355	0.0640	0	0	22	0	0	0	0

CTY	MUNICIPALITY	NJPDES #	FACILITY	EXIST. FLOW (mgd)	DESIGN FLOW (mgd)	SHORT TERM ON-SITE	LONG TERM ON-SITE	INCIN. (CUSTOMER)	INCIN (OWNER)	LAND APPLIC	OUT-OF-STATE	UNDETERM
Pas	West Milford Twp.	0026981	Milford Manor Nursing Home STP	0.0045	0.0200	0	0	11	0	0	0	0
Pas	West Milford Twp.	0027201	Reflection Lakes Garden Apts.	0.0020	0.0050	0	0	5	0	0	0	0
Pas	West Milford Twp.	0027669	Awosting STP	0.0450	0.0450	0	0	24	0	0	0	0
Pas	West Milford Twp.	0027677	Olde Milford Sewage Plant	0.0950	0.1720	0	0	49	0	0	0	0
Pas	West Milford Twp.	0027685	Highview STP	0.0387	0.2000	0	0	25	0	0	0	0
Pas	West Milford Twp.	0028541	West Milford Twp.- Birch Hill	0.0110	0.0160	0	0	5	0	0	0	0
Pas	West Milford Twp.	0030201	Camp Vacamas Assoc. of N.J.	0.0047	0.0100	0	0	4	0	0	0	0
Pas	West Milford Twp.	0033308	Marshall Hill Elemetary School	0.0052	0.0080	0	0	3	0	0	0	0
			Total	8.2758	17.0209	0	0	4118	8750	0	0	114
Sal	Carney's Point Twp.	0021601	Upper Penns Neck Twp. SA	0.5758	1.3000	0	0	0	0	0	720	0
Sal	Hancock's Bridge	0025411	PSE&G - Hope Creek	0.0700	0.0700	0	0	0	0	0	157	0
Sal	Lower Alloways Creek	0034282	Leisure Arms	0.0044	0.0150	0	0	0	0	10	0	0
Sal	Lower Alloways Creek	0050423	Hancock's Bridge Village STP	0.0077	0.0500	0	0	0	0	13	0	0
Sal	Lower Alloways Creek	0062201	Canton Village STP	0.0025	0.0500	0	0	0	0	6	0	0
Sal	Mannington Twp.	0028797	Salem Co. Vo-Tech School	0.0028	0.0150	0	0	0	0	6	0	0
Sal	Oldmans Twp.	0020761	NJ Turnpike Auth. Service Area	0.0570	0.1250	0	0	98	0	0	0	0
Sal	Oldmans Twp.	0024635	Pedricktown STP	0.0236	0.0300	0	0	0	0	0	0	63
Sal	Oldsman Township	0100684	295 Auto Truck Plaza	0.0068	0.0068							5
Sal	Penns Grove Boro	0024023	Penns Grove SA	0.4810	0.7500	0	0	1125	0	0	0	0
Sal	Pennsville Twp.	0021598	Pennsville STP	1.3050	1.8800	0	0	0	0	1631	0	0
Sal	Pittsgrove Twp.	0090221	Arthur P. Schalick H.S.	0.0040	0.0225	0	0	0	0	0	0	5

TABLE 7 (cont'd.)

CTY	MUNICIPALITY	NJPDES #	FACILITY	EXIST. FLOW (mgd)	DESIGN FLOW (mgd)	SHORT TERM ON-SITE	LONG TERM ON-SITE	INCIN. (CUSTOMER)	INCIN (OWNER)	LAND APPLIC	OUT-OF-STATE	UNDETERM
Sal	Pittsgrove Twp.	0099678	Harding Woods Inc.	0.0350	0.0500	0	0	0	0	0	79	0
Sal	Salem City	0024856	City of Salem STP	0.7073	1.4000	0	0	* 0	0	843	0	0
Sal	Woodstown Boro	0022250	Woodstown STP	0.2900	0.3000	0	0	* 0	0	92	0	0
			Total	3.5729	6.0643	0	0	1223	0	2601	956	73
Som	Bedminster Twp.	0028495	Bedminster Twp. STP	0.1480	0.2000	0	0	248	0	0	0	0
Som	Bedminster Twp.	0021865	Fiddler's Elbow Country Club	0.0030	0.0175	0	0	7	0	0	0	0
Som	Bedminster Twp.	0027227	John Z. Delorean/Cowperthwaite	0.0005	0.0008	0	0	6	0	0	0	0
Som	Bedminster Twp.	0033995	Environmental Disposal Corp.	0.4500	1.5000	0	0	* 630	0	0	0	0
Som	Bernards Twp.	0022845	Bernards Tp. SA-Harrison Brook	2.0320	2.5000	0	0	0	0	3500	0	0
Som	Bernardsville Boro	0021083	USVA Hospital STP- Lyons	0.2013	0.4000	0	0	347	0	0	0	0
Som	Bernardsville Boro	0026387	Bernardsville Boro STP	0.3198	0.8000	0	0	749	0	0	0	0
Som	Branchburg Twp.	0020338	Fox Hollow STP	0.0460	0.0460	0	0	56	0	0	0	0
Som	Branchburg Twp.	0020354	Neshanic Station STP	0.0247	0.0550	0	0	56	0	0	0	0
Som	Bridgewater Twp.	0024864	Somerset Raritan Valley SA	15.4400	21.3000	0	0	* 0	19300	0	0	0
Som	Bridgewater Twp.	0027324	Somerset Co. Shopping Center	0.0250	0.0250	0	0	43	0	0	0	0
Som	Hillsborough Twp.	0022764	Valley Road SC- River Rd STP	0.1172	0.1172	0	0	274	0	0	0	0
Som	Hillsborough Twp.	0022772	Valley Road SC- Fieldhedge STP	0.0430	0.0500	0	0	140	0	0	0	0
Som	Montgomery	0026140	Johnson and Johnson	0.0370	0.0500	0	0	64	0	0	0	0
Som	Montgomery	0069523	Montgomery Twp./Cherry Valley	0.2510	0.2510	0	0	564	0	0	0	0
Som	Montgomery Township	0069060	Computer Associates	0.0114	0.0114	0	0	0	0	0	0	9
Som	Montgomery Twp	0060038	Pike Brook STP	0.0500	0.4500	0	0	112	0	0	0	0
Som	Montgomery Twp.	0022390	North Princeton Devel. Center	0.4000	0.5000	0	0	* 1155	0	0	0	0

CTY	MUNICIPALITY	NJPDES #	FACILITY	EXIST. FLOW (mgd)	DESIGN FLOW (mgd)	SHORT TERM ON-SITE	LONG TERM ON-SITE	INCIN. (CUSTOMER)	INCIN (OWNER)	LAND APPLIC	OUT-OF-STATE	UNDETERM
Som	Montgomery Twp.	0023124	Montgomery Twp. Bd of Ed.	0.0070	0.0350	0	0	15	0	0	0	0
Som	Montgomery Twp.	0023663	Carrier Foundation	0.0400	0.0500	0	0	90	0	0	0	0
Som	Montgomery Twp.	0026891	Montgomery Twp.- STP #1	0.0094	0.0153	0	0	21	0	0	0	0
Som	Montgomery Twp.	0026905	Montgomery Twp.- STP #2	0.2984	0.4800	0	0	665	0	0	0	0
Som	Montgomery Twp.	0028703	Hunt & Augustine	0.0150	0.0200	0	0	18	0	0	0	0
Som	Montgomery Twp.	0032417	Bedens Brook Club	0.0048	0.0100	0	0	12	0	0	0	0
Som	Montgomery Twp.	0050130	Mont. Twp.- Riverside Farm STP	0.0661	0.1500	0	0	150	0	0	0	0
Som	Peapack-Gladstone	0021881	Boro of Peapack Gladstone STP	0.1800	0.2000	0	0	405	0	0	0	0
Som	Skillman	0087327	Montgomery Knoll Condo Assoc.	0.0094	0.0094							7
Som	Somerville Boro	0020036	USVA Supply Depot	0.0260	0.0800	0	0	53	0	0	0	0
Som	Warren Twp.	0022489	Warren Twp. SA- Stage II STP	0.4260	0.4700	0	0	0	0	0	690	0
Som	Warren Twp.	0022497	Warren Twp. SA- Stage IV STP	0.3900	0.8000	0	0	0	0	0	632	0
Som	Warren Twp.	0050369	Warren Twp. SA- Stage V STP	0.0930	0.3800	0	0	0	0	0	193	0
Som	Watchung Boro	0026727	September's On the Hill	0.0037	0.0175	0	0	84	0	0	0	0
			Total	21.1687	30.9911	0	0	5964	19300	3500	1515	16
Sus	Andover	0060321	Ascot Garden Apartments	0.0080	0.0100	0	0	0	0	0	0	18
Sus	Andover Township	0020419	Long Pond	0.0017	0.0100	0	0	0	0	0	17	0
Sus	Andover Twp.	0023132	St. Paul's Abbey	0.0020	0.0050	0	0	0	0	0	0	5
Sus	Andover Twp.	0090069	Andover Nursing Home	0.1400	0.1400	0	0	315	0	0	0	0
Sus	Annadale	0059595	NJDOC/Annadale - High Point	0.0075	0.0075	0	0	0	0	0	24	0
Sus	Beemerville	0090271	4-H Camp Rutgers	0.0030	0.0150	0	0	7	0	0	0	0
Sus	Branchville	0051322	4-H Camps/Stokes State Forest	0.0096	0.0096	0	0	0	0	0	0	8
Sus	Branchville Boro	0078743	Franklin Mutual Insurance Co.	0.0003	0.0003				1			

TABLE 7 (cont'd.)

CTY	MUNICIPALITY	NJPDES #	FACILITY	EXIST. FLOW (mgd)	DESIGN FLOW (mgd)	SHORT TERM ON-SITE	LONG TERM ON-SITE	INCIN. (CUSTOMER)	INCIN (OWNER)	LAND APPLIC	OUT-OF-STATE	UNDETERM
Sus	Branchville Borough	0073873	Selective Insurance	0.0150	0.0500	0	0	0	0	12	0	0
Sus	Byram Twp.	0022632	Byram Twp. Board of Education	0.0033	0.0180	0	0	0	0	0	0	7
Sus	Frankford Twp.	0022063	Sussex County Service Center	0.0182	0.0500	0	0	0	0	41	0	0
Sus	Hampton Twp.	0024163	Big N Shopping Center	0.0070	0.0200	0	0	16	0	0	0	0
Sus	Hampton Twp.	0050580	Hampton Commons STP	0.0216	0.0500	0	0	* 0	0	24	0	0
Sus	Hardyston Twp.	0053350	Sussex Co. MUA-Upper Wallkill	1.0122	2.5000	0	0	0	0	2277	0	0
Sus	Lafayette Township	0074861	Lafayette Consolidated School	0.0052	0.0070	0	0	0	0	6	0	0
Sus	Lafayette Twp.	0027049	Pope John XXIII Reg. H.S.	0.0025	0.0220	0	0	0	0	0	3	0
Sus	Montaque Twp.	0090417	Annandale Corrections	0.0050	0.0050	0	0	0	0	0	0	4
Sus	Newton Town	0020184	Newton Municipal STP	0.9010	1.4000	0	0	1552	0	0	0	0
Sus	Newton Town	0028894	Kittatiny Regional Bd. of Ed.	0.0087	0.0450	0	0	20	0	0	0	0
Sus	Sanayston Twp	0069116	NJ School of Conservation	0.0201	0.0201							25
Sus	Sparta Township	0027081	Sparta High School #2 STP	0.0220	0.0220	0	0	52	0	0	0	0
Sus	Sparta Township	0050806	Sussex Co. Vo-Tech High School	0.0180	0.0180	0	0	52	0	0	0	0
Sus	Sparta Twp.	0027057	Plaza STP	0.0410	0.0500	0	0	0	0	135	0	0
Sus	Sparta Twp.	0027065	Alpine School Sewage Plant	0.0022	0.0250	0	0	5	0	0	0	0
Sus	Sparta Twp.	0027073	Sparta High STP	0.0017	0.0300	0	0	0	0	7	0	0
Sus	Sussex Boro	0021857	Sussex Boro	0.2485	0.2500	0	0	0	0	0	813	0
Sus	Tranquility	0099171	Garden State Academy	0.0225	0.0225	0	0	18	0	0	0	0
Sus	Vernon Twp.	0023841	Vernon Tp/Lounsb. Hollow Sch.	0.0123	0.0320	0	0	10	0	0	0	0
Sus	Vernon Twp.	0023949	Great Gorge's Resort Hotel	0.1070	0.3500	0	0	0	0	0	241	0
Sus	Vernon Twp.	0091260	Vernon High School	0.0070	0.0120	0	0	0	0	6	0	0
Sus	Wantage Twp.	0029041	Regency at Sussex Co.	0.0126	0.0800	0	0	28	0	0	0	0

CTY	MUNICIPALITY	NJPDES #	FACILITY	EXIST. FLOW (mgd)	DESIGN FLOW (mgd)	SHORT TERM ON-SITE	LONG TERM ON-SITE	INCIN. (CUSTOMER)	INCIN (OWNER)	LAND APPLIC	OUT-OF-STATE	UNDETERM
Sus	Wantage Twp.	0031585	High Point Reg'l. High School	0.0046	0.0300	0	0	11	0	0	0	0
			Total	2.6913	5.3060	0	0	2086	1	2508	1098	67
Uni	Berkeley Heights Twp	0027961	Berkeley Heights STP	1.4000	3.1000	0	0	* 1541	0	0	0	0
Uni	Elizabeth City	0021636	New Providence STP	0.5300	1.5000	0	0	0	0	0	915	0
Uni	Elizabeth City	0024741	Jnt. Mtg. of Essex & Union Co.	61.7200	85.0000	0	0	* 0	0	0	39007	0
Uni	Linden City	0022225	Linden Investment Co.	0.0096	0.0140	0	0	22	0	0	0	0
Uni	Linden City	0024953	Linden Roselle SA	11.5600	17.0000	0	0	* 0	0	0	16184	0
Uni	Linden City	0025429	Turtle and Hughes Inc.	0.0030	0.0050	0	0	0	0	0	0	7
			Total	75.2226	106.6190	0	0	1563	0	0	56106	7
War	Allamuchy Twp.	0020605	Pequest Sewer Company	0.2783	0.6000	0	0	0	0	0	260	0
War	Belvidere Boro	0005118	Inmont Corporation	0.0600	0.0600	0	0	0	0	0	0	135
War	Belvidere Town	0035114	WC(PR)MUA- Belvidere Area STP	0.2242	0.5000	0	0	505	0	0	0	0
War	Blairstown	0077259	Fountain Mall	0.0057	0.0057							5
War	Blairstown Twp.	0022101	Blair Academy STP	0.0376	0.0500	0	0	86	0	0	0	0
War	Blairstown Twp.	0031046	North Warren Regional H.S. STP	0.0200	0.0200	0	0	0	0	0	0	15
War	Franklin Twp.	0020711	Warren County Technical School	0.0035	0.0120	0	0	8	0	0	0	0
War	Frelinghuysen Twp	0081680	Frelinghuysen Twp Brd of Ed	0.0060	0.0060	0	0	0	0	0	0	4
War	Great Meadows	0065161	Central School	0.0060	0.0050	0	0	0	0	0	0	5
War	Greenwich Township	0070688	Koh-I-Noor Rapidograph, Inc	0.0380	0.0380	0	0	0	0	0	0	3
War	Harmony Township	0089648	Harmony Twp. School	0.0090	0.0090	0	0	0	0	0	0	7
War	Knowlton Township	0071714	Delaware Elementary School	0.0090	0.0090	0	0	0	0	0	0	11

TABLE 7 (cont'd.)

CTY	MUNICIPALITY	NJPDES #	FACILITY	EXIST. FLOW (mgd)	DESIGN FLOW (mgd)	SHORT TERM ON-SITE	LONG TERM ON-SITE	INCIN. (CUSTOMER)	INCIN (OWNER)	LAND APPLIC	OUT-OF-STATE	UNDETERM
War	Knowlton Twp.	0052302	NJDOT Rest Area	0.0004	0.0250	0	0	0	0	0	0	1
War	Liberty Twp.	0033189	NJ Dept.Treas.-Peq. Fish Hatch	0.0005	0.2953	0	0	1	0	0	0	0
War	Liberty Twp.	0090166	Liberty Tp. Board of Education	0.0020	0.0050	0	0	0	0	0	0	5
War	Mansfield Twp.	0028592	Diamond Hill Sewage Plant	0.0800	0.1800	0	0	138	0	0	0	0
War	Oxford Twp.	0035483	WC(PR)MUA- Oxford Area STP	0.1523	0.5000	0	0	342	0	0	0	0
War	Phillipsburg Town	0024716	Phillipsburg STP	2.2800	3.5000	0	0	* 4605	0	0	0	0
War	Washington Boro	0021113	Washington Boro	0.6008	0.8500	0	0	* 1036	0	0	0	0
War	Washington Township	0065196	Brass Castle Satellite Stores	0.0027	0.0027	0	0	0	0	0	0	3
War	Washington Twp	0067610	Port Colden Mall	0.0040	0.0040	0	0	3	0	0	0	0
War	Washington Twp.	0021369	Hackettstown MUA WPCP	1.5600	2.0000	0	0	* 2550	0	0	0	0
War	Washington Twp.	0059897	Lakeland Shopping Ctr	0.0220	0.0220	0	0	0	0	0	0	18
War	White Twp.	0064289	Warren Residential Group Ctr	0.0025	0.0025	0	0	0	0	0	0	2
			Total	5.4045	8.7012	0	0	9274	0	0	260	214

NOTE: Ocean disposal was 0 for all generators in 1993.

* Indicates those volumes that were provided through actual site specific data rather than theoretical algorithms.

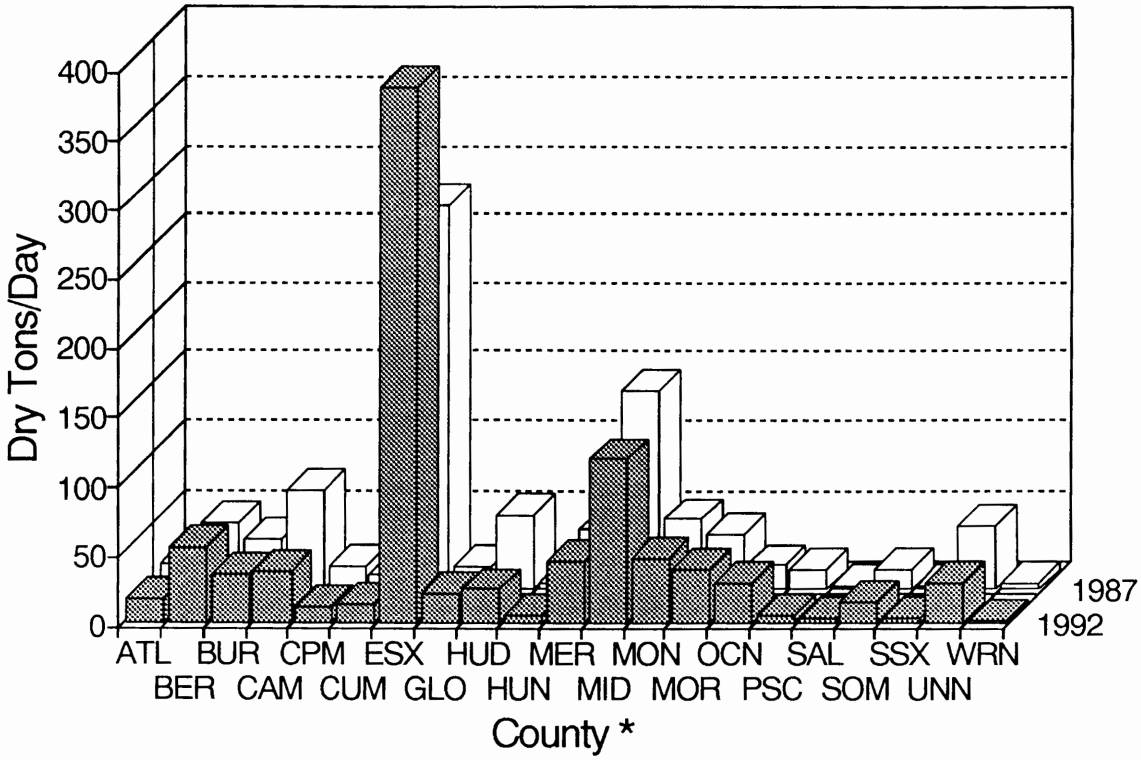
TABLE 6

SUMMARY OF EXISTING SLUDGE PRODUCTION BY MANAGEMENT MODES
(As of August 1993, dp/d)

COUNTY	SHORT TERM ON-SITE	LONG TERM ON-SITE	INCINERATION (AS CUSTOMER)	INCINERATION (OWNER)	LAND APPLICATION	OUT-OF-STATE	UNDETERMINED	COUNTY TOTAL
Atlantic	0	0	1464	31716	720	2	28	33,930
Bergen	0	0	7910	11470	3145	85560	26	108,111
Burlington	0	1166	5965	0	34170	29378	96	70,775
Camden	0	1066	1092	0	57522	14754	111	74,545
Cape May	0	224	12	0	20100	2595	154	23,085
Cumberland	0	0	5933	0	15419	2993	58	24,403
Essex	0	510	17655	0	0	753597	0	771,762
Gloucester	0	0	980	34000	4112	1105	154	40,351
Hudson	0	202	14819	0	24454	10568	14	50,057
Hunterdon	0	24	3073	0	5278	1288	1125	10,788
Mercer	0	0	33994	19456	0	34960	16	88,426
Middlesex	0	9	1838	0	231699	235	10	233,791
Monmouth	0	3593	33513	18070	15088	21604	412	92,280
Morris	0	222	31048	38308	4398	268	309	74,553
Ocean	0	0	399	0	5680	51081	156	57,316
Passaic	0	0	4118	8750	0	0	114	12,982
Salem	0	0	1223	0	2601	956	73	4,853
Somerset	0	0	5964	19300	3500	1515	16	30,295
Sussex	0	0	2086	1	2508	1098	67	5,760
Union	0	0	1563	0	0	56106	7	57,676
Warren	0	0	9274	0	0	260	214	9,748
	0	7016	183923	181071	430394	1069923	3160	1,875,487
% Total	0.00%	0.37%	9.81%	9.65%	22.95%	57.05%	0.17%	100.00%

FIGURE 1

ESTIMATED STATE AND COUNTY SLUDGE PRODUCTION
1987 and 1992



Total Statewide Production Estimate:
1987 : 1,835,822 dp/d
1992 : 1,873,144 dp/d

* County sludge production is for treatment plants physically located in each county but does not necessarily represent all wastewater flow originating in each county

one single authority, the PVSC, was producing 40% of the statewide sludge total. When combining the generation of two authorities, PVSC and the MCUA, 51% of total generation can be quantified. Finally, taken together, the six former ocean dumping authorities account for nearly 60%, or about three-fifths of all sludge produced in the state. Table 11, which follows, demonstrates the wide disparity of sludge production by categorizing generator size on the basis of existing flow. As is clear from the data presented in Table 11, there are a small number of large quantity generators and a significant number of very small quantity generators.

TABLE 9

SLUDGE PRODUCTION PROJECTIONS
(As of November 1992)

COUNTY	WASTEWATER FLOW		SLUDGE PRODUCTION	
	EXISTING	PERMITTED	EXISTING	PERMITTED
Atlantic	27.64	42.39	33,929	52,035
Bergen	81.98	114.67	108,161	151,291
Burlington	35.36	49.85	69,149	97,485
Camden	56.59	83.73	74,571	110,335
Cape May	13.33	35.64	23,075	61,695
Cumberland	11.24	20.86	24,338	45,168
Essex	293.79	346.51	773,007	911,721
Gloucester	17.43	22.98	40,415	53,284
Hudson	30.90	47.29	47,875	73,269
Hunterdon	6.03	12.75	10,575	22,360
Mercer	47.98	67.62	88,512	124,743
Middlesex	132.34	184.09	234,115	325,663
Monmouth	54.56	76.85	92,280	129,980
Morris	42.30	61.98	76,807	112,541
Ocean	44.52	76.82	57,296	98,865
Passaic	8.26	17.01	10,702	22,039
Salem	3.57	6.18	4,848	8,392
Somerset	21.16	30.99	30,289	44,360
Sussex	2.68	5.31	5,776	11,444
Union	75.22	106.62	57,676	81,752
Warren	5.40	8.70	9,748	15,705
TOTALS	1,012.28	1,418.84	1,873,144	2,554,127

NOTE: This table supersedes 1987 SSMP Table 3-10.

TABLE 10

1992 SEWAGE SLUDGE PRODUCTION BY SQAR CATEGORY *

SQAR CATEGORY	TOTAL # DTWs	DRY POUNDS PER DAY	% OF TOTAL
1	251	6,703	< 1%
2	87	36,155	2%
3	57	147,345	8%
4	33	612,352	33%
5	14	1,070,589	57%
TOTAL	442	1,873,144	100%

* Pursuant to the Sludge Quality Assurance Regulations (SQAR), N.J.A.C. 7:14-4.

TABLE 11

1992 SEWAGE SLUDGE PRODUCTION BY PERMITTED DAILY FLOW *

SQAR CATEGORY	TOTAL # DTWs	DRY POUNDS PER DAY	% OF TOTAL
1	251	6,703	< 1%
2	88	36,497	2%
3	61	166,635	9%
4	42	1,663,309	89%
TOTAL	442	1,873,144	100%

* These are revised SQAR categories with Category 5 broken into four categories reflecting volume of flow.

The above becomes important from a planning perspective as focus on the few large scale generators, most of which currently export sludge for out-of-state disposal, is needed on a priority basis to achieve the state's management goals. This has been the case historically, particularly in the context of the JCD's with each of the six former ocean dumping sewerage authorities. A summary of the plans and implementation schedules developed for these six authorities is summarized in Table 17 and serves as a primary basis for the planned capacity element of the statewide capacity analysis found in Section C.4. Meeting the long-term implementation schedules under the JCDs will be critical to achieve disposal self-sufficiency in the next seven years.

c. **Projected Sludge Production:** Sludge projections are extremely difficult to develop. Future sludge generation is dependent on a wide range of variables including treatment levels and the size of the sewered population. Since population projections are not available for treatment plant service areas, it is not possible to make accurate comparisons of changes in county-by-county sludge production. However, a statewide sludge production projection has been developed for comparison to the projections of sludge production at permitted treatment plant capacity.

The projections for each county at design flow of treatment plants have been developed utilizing the same information used to develop existing sludge production on a plant-by-plant basis. Table 9 reflects projected sludge productions at current design flows. It should be noted that projections do not include DTWs' additional sludge production from treatment plants required to meet more stringent effluent limitations. As a result of the amendments to the Water Pollution Control Act, most DTWs have or are in the process of upgrading their facilities to secondary treatment. Projections for additional upgrades to tertiary treatment would be extremely difficult and not meaningful given the variables involved in determining whether a DTW may be required to initiate such an upgrade. Additionally, DTWs that upgrade or expand treatment plant capacity are required to submit and implement a SMP for the projected quantity and quality of the sludge to be produced. As these plans are implemented, existing and projected sludge productions will be modified accordingly.

3. Beneficial Use and Sludge Disposal Trends

As illustrated in Table 12, out-of-state sludge management has increased from 17 % to approximately 57% since 1987. This is largely due to the cessation of the ocean disposal of sewage sludge, since five of the six former ocean disposers account for 87% of the total sludge production currently being transported out-of-state for management and disposal. In addition, the largest increase in in-state capacity since 1987 has been for beneficial use alternatives which have increased from approximately 12% to over 20%, while the state's dependency on incineration has held relatively constant at approximately 20% Figures 2 and 3 further demonstrate changing trends in sludge management modes over time.

TABLE 12

COMPARISON OF MANAGEMENT METHODS: 1987 AND 1992

MANAGEMENT METHOD	1987 SSMP (%)	1992 (%)
Short-term On-site	0.37	0.00
Long-term On-site	0.43	0.43
Incinerator (as customer)	9.22	10.73
Incinerator (Owner)	8.17	9.74
Land Application	11.84	22.19
Ocean Disposal	50.70	0.00
Out-of-state	17.09	56.60
Undetermined	2.18	0.32
	100.00	100.00

a. **Inventory of Existing Land-based Sludge Management Operations:** Table 13 is provided as a reference of all existing permitted sludge handling and ultimate sludge management operations. Please note, transfer stations and storage installations are not considered ultimate management operations, but are included on Table 13 as part of the existing infrastructure that could be utilized by sludge generators prior to ultimate sludge management. In addition, each of the subparts of Part 4 of Section F. addressed one of the available management alternatives. Although Part 4 presented a wide range of management alternatives, it was never intended to present all available options. In fact, one of the responsibilities of this SSMP Update as well as the 1987 SSMP, is the constant evaluation of new sludge management proposals. As part of the discussion of these alternatives, the status of existing operations is inventoried in the following tables. As the field evolves, additional alternatives may be incorporated into the SSMP Update. It is important that planners and sludge generators not interpret these lists as restrictive, but rather, as a starting point. These inventories are updated as follows:

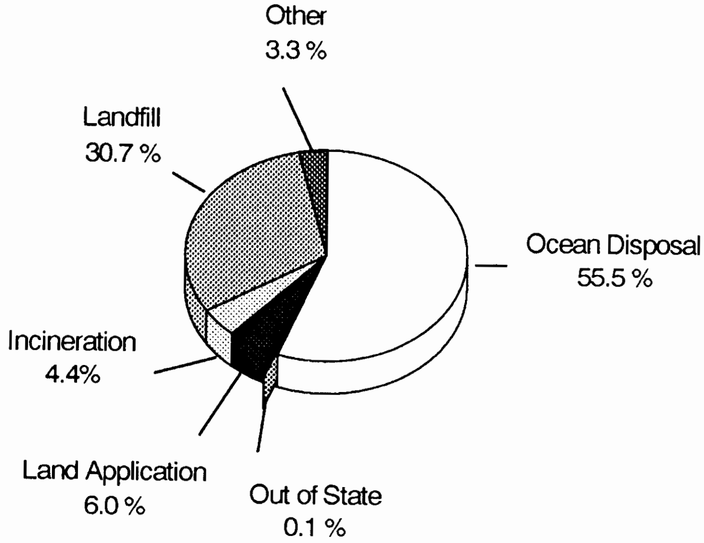
1. Table 13: "Existing New Jersey Land-based Sludge Operations";

2. Table 14: "Existing In-state Sludge Land Application Operations";
3. Table 15: "Existing Compost Production Operations";
4. Table 16: "Capacity at Existing Incinerators";
5. Table 17: "Former Ocean Dumpers";
6. Table 18: "Existing Facilities Utilizing Alternative/Innovative Technologies"; and
7. Table 19: "Existing Permitted Residuals Storage Installations".

FIGURE 2

NEW JERSEY SLUDGE MANAGEMENT
1983 and 1986

1983



1986

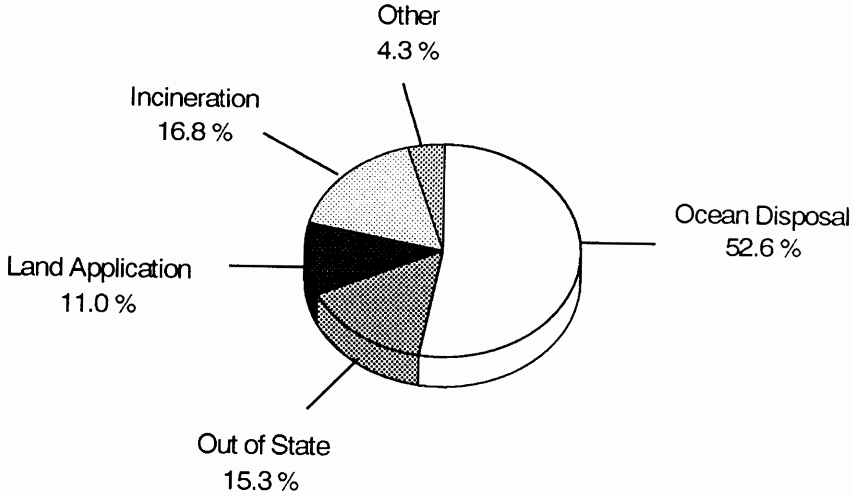
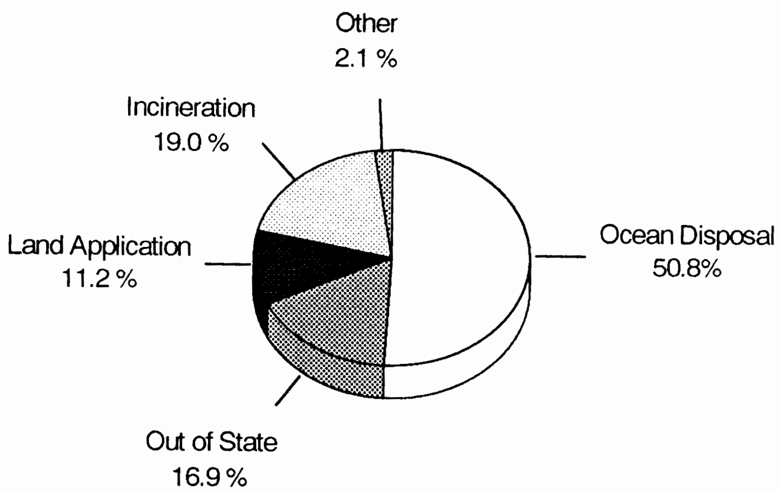


FIGURE 3

NEW JERSEY SLUDGE MANAGEMENT
1989 and 1992

1989



1992

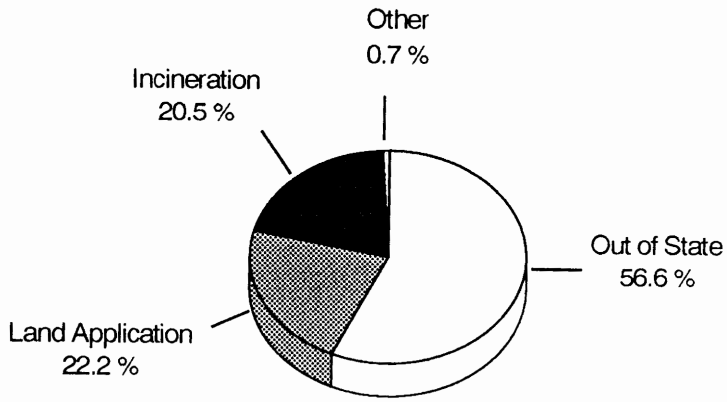


TABLE 13

EXISTING NEW JERSEY LAND-BASED SLUDGE OPERATIONS
(As of August 1993)

TABLE 13		
COUNTY	PERMITTEE	TYPE OF OPERATION
Atlantic	Atlantic Co. UA Buena Borough MUA	Incineration Composting with Distribution
Bergen	Northwest Bergen Co. UA	Incineration
Burlington	Applied Land Sciences Pemberton Township MUA Burlington City [1] Mack McKenzie, Inc Beverly City SA New Lisbon Development Center [2] Johnstone Training Ct. Mount Holly SA Burlington County [4]	Land Application, Storage & Lime Stabilization Land Application, Storage & Lime Stabilization Reed Beds Land Application, Storage & Lime Stabilization Reed Beds Reed Beds Reed Beds Wet Air Oxidation with Distribution Composting with Distribution
Camden	Camden Co. MUA, under MOA with Philadelphia Camden Co. MUA Ancora Psychiatric Hospital Camden Co. MUA [2]	Composting with Distribution Incineration Reed Beds In-Vessel Composting with Distribution
Cape May	Caprioni's Sewerage Service Cape May Co. MUA Woodbine Developmental Center	Land Application & Lime Stabilization In-Vessel Composting with Distribution Reed Beds
Cumberland	Cumberland Co. UA Landis SA	Land Application Land Application

TABLE 13		
COUNTY	PERMITTEE	TYPE OF OPERATION
Essex	Passaic Valley Sewage Commissioners Essex Co. Hospital Center R. J. Longo (Epic)	Wet Air Oxidation Reed Beds Dewatered Residuals Intermodal Transfer Operation
Gloucester	Gloucester Co. UA	Incineration
Hudson	Bayonne Military Ocean Terminal SpectraServ Inc.	Reed Beds Mobile Dewatering/On-Site Dewatering, Lime Stabilization/Transfer Operation
Hunterdon	Lambertville SA [1] Readington-Lebanon SA Salvation Army-Camp Tecumseh Russell Reid	Land Application Land Application and Composting with Distribution Reed Beds Liquid Residual Transfer Operation
Mercer	Stony Brook Regional SA Mercer Co. IA [2]	Incineration Oil Immersion/ Dehydration
Middlesex	Middlesex Co. UA Old Bridge Board of Education Jamesburg Training Center [1]	Advanced Alkaline Stabilization with Distribution Reed Beds Land Application
Monmouth	Middletown Twp Sa Bayshore Regional SA Marlboro Psychiatric Hospital Western Monmouth UA	Composting with Distribution Incineration Reed Beds Reed Beds

TABLE 13		
COUNTY	PERMITTEE	TYPE OF OPERATION
Morris	Pequannock: Lincoln Park, Fairfield Sa Parsippany-Troy Hills Musconetcong SA [2] Washington Twp - Schooley Mtn.	Incineration Incineration Composting with Distribution Reed Beds
Ocean	Ocean Co. UA [1]	Oil-Immersion/Dehydration
Passaic	Wayne Tp DPW	Incineration
Salem	Pennsville Twp STP Ash Lane Farms Inc	Composting with Distribution Land Application, Storage & Lime Stabilization
Somerset	Somerset Raritan Valley SA North Princeton Developmental Center Applied Wastewater Services	Incineration Reed Beds Liquid Residual Transfer Operation
Sussex	Sussex Co. MUA	Composting with Distribution
Union	None	
Warren	Ag-Organic, Inc.	Land Application/Advanced Alkaline Stabilization with Distribution & Storage

1 - not operating

2 - under construction

3 - proposed but not fully permitted

4 - planned and permitted

NOTE: This table supersedes 1987 SSMP Table 3-1.

TABLE 14

EXISTING IN-STATE SLUDGE LAND APPLICATION OPERATIONS
(As of August 1993)

TABLE 14				
FACILITY	APPROVED FOR	APPROXIMATE APPLICATION AREA (ACRES)	CROPS GROWN	APPROXIMATE CAPACITY (LB/DAY)
AgOrganic, Inc. Harmony Dale Farm Harmony Township Warren County	Stabilized Sewage Sludge; Non-hazardous Bulk Liquids; Food Processing Residuals and Vegetative Wastes	148	Alfalfa, Corn, Grasses, Small Grains, Sorghum, Soybeans	4,055
Applied Land Sciences Inc Sunnyside Farm Westampton Twp Burlington County	Stabilized Sewage Sludge; Non-hazardous Bulk Liquids	272	Clover/Grass Mixture, Corn, Grasses, Small Grains, Sorghum, Soybeans, Sudan Grass/Sorghum Mix	7,452
Applied Land Sciences Inc Westampton Twp Burlington County	Stabilized Sewage Sludge; Non-hazardous Bulk Liquids; Food Processing Residuals and Vegetative Wastes	90	Alfalfa, Corn, Grasses, Small Grains, Sorghum, Soybeans	2,466
Caprioni Sewerage Service Inc Repici Farm Dennis Tp Cape May County	Stabilized Sewage Sludge; Non-hazardous Bulk Liquids; Food Processing Residuals and Vegetative Wastes	36	Alfalfa, Clover/Grass Mixture, Corn, Grasses, Small Grains, Sorghum, Soybeans	986
Mack McKenzie Honeysuckle Farm Pemberton Tp. Burlington County	Stabilized Sewage Sludge; Non-hazardous Bulk Liquids	210	Alfalfa, Corn, Grasses	5,753
Pemberton Tp., MUA Pemberton Tp. Burlington County	Stabilized Sewage Sludge	133	Alfalfa, Clover/Grass Mixture, Corn, Grasses, Small Grains, Sorghum, Soybeans	3,644
Cumberland County MUA Cumberland Nursery Fairfield Tp. Cumberland County	Stabilized Sewage Sludge	170	Grasses, Horticultural Crops, Small Grains, Soybeans	4,658

TABLE 14				
FACILITY	APPROVED FOR	APPROXIMATE APPLICATION AREA (ACRES)	CROPS GROWN	APPROXIMATE CAPACITY (LB/DAY)
Cumberland County MUA Newkirk Sod Farm Hopewell Tp Cumberland County	Stabilized Sewage Sludge	138	Alfalfa, Corn, Grasses, Small Grains, Soybeans	3,780
Cumberland County MUA Tice Farms Upper Deerfield Cumberland County	Stabilized Sewage Sludge	70	Corn, Grasses, Horticultural Crops, Small Grains, Soybeans, Sudan Grass/Sorghum Mix	1,918
Ash Lane Farm Alloway Tp Salem County	Stabilized Sewage Sludge	170	Alfalfa, Clover/Grass Mixture, Corn, Grasses, Small Grains, Sorghum, Soybeans	4,740
Lambertville SA Hunterdon Hills Farm Delaware Tp Hunterdon County	Stabilized Sewage Sludge	85	Alfalfa, Clover/Grass Mixture, Corn, Grasses, Small Grains, Sorghum	2,329
Landis Sewerage Authority Deerfield Tp. Cumberland County	Stabilized Sewage Sludge	388	Corn, Grasses, Small Grains, Sudax	10,630
Jamesburg Training School Jamesburg Middlesex County	Stabilized Sewage Sludge	67	Corn, Grasses, Small Grains, Sorghum, Soybeans	1,836
Readington-Lebanon Sewerage Authority Readington Tp. Hunterdon County	Stabilized Sewage Sludge	8	Corn	219
	TOTALS	1985		54,466

* Capacity calculations were standardized to assume that one corn corp (150 lb of N per acre/year) and a small grain cover crop (60 lb of N per acre/year) is grown on each site each year. New Jersey Sludge Quality Assurance Regulation (SQAR) data (1/90-1/92) statistical analyses have determined average nitrogen concentrations in New Jersey sludges to be approximately 42 lbs/dry ton of sludge. Therefore, approximately 5 dry tons of sludge per year can be applied to each permitted acre. Actual capacities are highly variable due to the variety of crops grown and different cropping schedules for each permitted site.

TABLE 15
EXISTING COMPOST PRODUCTION OPERATIONS
(August 1993)

FACILITY	DESIGN SLUDGE PROCESSING CAPACITY	CURRENT SLUDGE VOLUME (dt/d)	STATUS OF FACILITY
Atlantic County Buena Bor MUA	0.5	0.4	Operating
Burlington County	55.0	-	Permitted, under Construction
Camden County MUA	50.0	-	Permitted, under Construction
Cape May County MUA	20.0	8.8	Operating
Monmouth County Middletown Tp MUA	5.0	4.2	Operating
Morris County Musconetcong SA	4.0	1.5	Permitted
Salem County Pennsville SA	1.0	0.4	Operating
Sussex County MUA	12.0	** 1.1	Operating
Total	147.50	16.4	

** The Sussex County composting facility accepts customer sludges in addition to the sludge volume indicated here.

NOTE: This table supersedes 1987 SSMP Table 4-III-4.

TABLE 10

CAPACITY AT EXISTING INCINERATOR OPERATIONS
(Dp/d)

Facility	Incinerator Design Capacity	Incinerator Permitted Capacity	Incinerator Operational Capacity	Plant Sludge Production Existing	Plant Sludge Production Design	Available Customer Capacity Existing	Available Customer Capacity Design	Hours & Days of Operation	Receiving Capability (Yes or No) Liq.	Receiving Capability (Yes or No) Dew.	Will Burn Customer Sludge	Comments
Bayshore RSA	36,000	36,000	36,000	18,070	24,633	17,930	11,367	16 hrs/day 5 days/wk 7 hrs/day 1 day/wk	Y	N	N	
Pequannock Lincoln Park, Fairfield SA	144,000	72,000	72,000	11,795	22,639	60,205	49,361	24 hrs/day 5 days/wk	Y	N	Y	Design capacity includes 2nd reactor planned as contingency
Stony Brook RSA	192,000	192,000	143,040	19,456	24,803	123,584	118,237	24 hrs/day 6 days/wk	Y	Y	Y	Operational capacity is limited to processing 14,900 wet lbs/hr at 20% solids for each reactor
Somerset Raritan Valley SA	104,800	71,200	71,200	19,300	26,625	51,900	44,575	24 hrs/day 7 days/wk	Y	Y	Y	Design capacity includes 2nd reactor used as contingency
Parsippany Troy Hills SU	168,000	84,000	84,000	26,513	37,441	57,487	46,559	8 hrs/day 5 days/wk	Y	N	Y	Design capacity includes 2nd reactor used as contingency
Northwest Bergen County UA	76,000	48,000	39,400	11,470	15,300	27,930	24,100	138 hrs/wk	Y	N	Y	Operational capacity excludes 30 hrs/week maintenance closure; design capacity includes 2nd reactor which is closed
Tp of Wayne Mountain View WPCF	80,000	40,000	40,000	6,480	14,653	33,520	25,347	24 hrs/wk 5 days/wk	Y	N	Y	Design capacity includes 2nd reactor used as contingency
Atlantic County UA	48,000	48,000	48,000	31,716	48,000	16,284	0	24 hrs/day 7 days/wk	Y	Y	Y	
Camden County MUA	16,400	16,400	16,400	0	0	16,400	16,400	24 hrs/day 5 days/wk	Y	N	Y	
Gloucester County UA	106,000	72,000	72,000	37,674	47,034	34,326	24,996	24 hrs/day 7/days/wk	Y	N	N	Design capacity includes existing 34,000 dry lbs/day reactor and a second 72,000 lbs/day reactor under construction. When completed the 34,000 dry lbs/day reactor will be used as contingency
Totals	971,200	679,600	622,040	182,474	261,128	439,566	360,942					

TABLE 17

FORMER OCEAN DUMPERS - 1993

Treatment Plant	Estimated Present Sludge Quantity (dp/d)	Dewatering and Stabilization Capability	Interim Management Mode	Planned Final Management Mode	Comments
Bergen County UA	85,560	Gravity thickening, anaerobic digestion and centrifuge dewatering.	Removal of dewatered sludge for out-of-state landfilling.	Beneficial Use through alkaline stabilization and distribution or use of sludge derived product for landfill cover.	Sludge dewatering system was completed on May 17, 1993.
Joint Meeting of Essex and Union Counties	39,007	Anaerobic digestion, centrifuge dewatering and lime stabilization.	Removal of dewatered sludge for out-of-state landfilling.	Thermal drying followed by distribution and marketing of a sludge derived product.	Completion of a beneficial use management system anticipated by March 1, 1997.
Linden Roselle Sewerage Authority	16,184	Gravity sludge thickening, anaerobic digestion and belt filter press dewatering.	Removal of liquid sludge for off-site dewatering and lime stabilization for out-of-state landfilling.	Beneficial use contracts which include in-state lime stabilization and out-of-state beneficial use and marketing and distribution of a sludge-derived product	Completion of beneficial use management system anticipated by July 1, 1995.
Middlesex County Utilities Authority	200,980	Aerobic digestion, belt filter press dewatering and alkaline stabilization	Upon cessation of ocean dumping, MCUA implemented its final sludge management plan	Generation of alkaline stabilized product for daily landfill cover or other distribution.	MCUA's JCD has been terminated.
Passaic Valley Sewerage Commissioners	753,597	Anaerobic digestion, gravity and centrifuge thickening followed by either wet air oxidation and plate and frame filter press dewatering or belt filter press dewatering and lime stabilization.	Removal of dewatered sludge for out-of-state landfilling.	Belt filter press dewatering followed by multiple hearth incineration.	PVSC is conducting further beneficial use analyses. JCD is being modified.
Rahway Valley Sewerage Authority	30,719	Anaerobic digestion, belt filter press dewatering and lime stabilization.	Removal of dewatered sludge to out-of-state beneficial use sites (backed by out-of-state landfilling)	Beneficial use contracts which include continued out-of-state beneficial use followed by in-state alkaline stabilization and marketing and distribution of a sludge derived product.	Implemented final plan on May 27, 1993. JCD has been terminated.
Total	1,126,047				

TABLE 18

EXISTING FACILITIES UTILIZING ALTERNATIVE/INNOVATIVE TECHNOLOGIES
(As of August 1993)

FACILITY (COUNTY)	PROCESS/TECHNOLOGY
Burlington County:	
Beverly City Sewerage Authority	Reed Beds
Burlington City STP	Reed Beds (not operating)
Johnstone Training Center	Reed Beds
New Lisbon Devel. Center	Reed Beds (under construction)
Mt. Holly Sewerage Authority	Wet Air Oxidation
Camden County:	
Ancora Psychiatric Hospital	Reed Beds
Cape May County:	
Woodbine Devel. Center	Reed Beds
Essex County:	
Passaic Valley Sewerage Commissioners	Wet Air Oxidation
Essex County Hospital Center	Reed Beds
Hudson County:	
Bayonne Military Ocean Terminal	Reed Beds
Hunterdon County:	
Salvation Army-Camp Tecumseh	Reed Beds
Mercer County:	
Mercer County Improvement Authority	Oil Immersion/Dehydration (under construction)
Middlesex County:	
Old Bridge Tp. Board of Education	Reed Beds
Middlesex County UA	Advanced Alkaline Stabilization
Monmouth County:	
Marlboro State Psychiatric Hospital	Reed Beds
Western Monmouth UA	Reed Beds
Morris County:	
Washington Twp. STP (Schooley's Mtn)	Reed Beds
Ocean County:	
Ocean County UA	Oil Immersion/Dehydration
Somerset County:	
North Princeton Devel. Center	Reed Beds
Warren County:	
AgOrganic, Inc.	Advanced Alkaline Stabilization

NOTE: This table supersedes 1987 SSMP Table 4-VII-1.

TABLE 19

EXISTING PERMITTED RESIDUALS STORAGE INSTALLATIONS *
(As of August 1993)

FACILITY	TYPE OF INSTALLATION	APPROVED RESIDUALS
AgOrganic Inc Harmony Dale Farm Harmony Township Warren County Applied Wastewater Services	Bunker Silo Concrete Pad Lagoon Mobile Frac Tanks	Dewatered Sludge (Class A and B) Food processing residuals Liquid Sludge (Class A and B) Food processing residuals Liquid Sludge (Class A, B and C) Food processing residuals Septage
Mack McKenzie, Inc Honeysuckle Farm Pemberton Township Burlington County	Slurry Tanks	Liquid Sludge (Class A and B) Food processing residuals
Applied Land Sciences Inc Sunny Side Farm Westampton Township Burlington County	Slurry Tanks	Liquid Sludge (Class A and B) Food processing residuals
Ash Lane Farm Alloway Township Salem County	Slurry Tanks	Liquid Sludge (Class A and B)
Spectraserv Kearny, NJ Hudson County	Slurry Tanks	Liquid Sludge (Class A, B and C) Food Processing residuals Non-hazardous industrial liquid sludge Septage
Russell Reid Glen Gardener, NJ Hunterdon County	Mobile Frac Tank	Septage
EPIC (RJ Longo) Denville, NJ Morris County	Enclosed Steel Transport Containers	Dewatered Sludge

* Storage, holding and thickening installations which are associated with sewage treatment plants and located on the treatment plant grounds are excluded from this table.

NOTE: This table supersedes 1987 SSMP Table 4-IX-1.

b. **Costs of Sludge Management Facilities and Operations:** The 1987 SSMP presented information as to the real costs of existing sludge facilities and operations as well as estimated costs updated by Table 20. During July and August 1992, the DEPE conducted phone surveys of various DTWs to obtain updated sludge management costs. Cost per dry ton information was obtained directly from sludge generators, however, extreme caution should be exercised in drawing any firm conclusions from the survey data due to the limited number of participants. The DEPE provides this data only to provide an indication of the costs related to sludge management. The data should not be used by DTWs as a reason for not considering all the management alternatives available. In addition, the costs presented may not be indicative of all sludge management costs or benefits associated with a particular sludge management method. Site-specific considerations or constraints could increase or decrease costs from one generator to the next. Therefore, prior to investing time, commitments or capital in a particular sludge management alternative, DTWs are required to perform their own cost/benefit analysis to determine the management alternative that best meets their needs.

TABLE 20

ESTIMATED SLUDGE MANAGEMENT COSTS

TABLE 20		
FACILITY	MANAGEMENT METHOD	COST/DRY TON
Beverly SA	Reed Beds	* $ 60
Bayshore RSA	Operator incineration	$ 109
Cedar Grove SA	Contractual incineration	$ 118
Gloucester County UA	Operator incineration	$ 128
Maple Shade DPW	Contractual land application	$ 152
Somerset Raritan Valley	Operator incineration	$ 175
Middletown SA	Operator composting	$ 175
Pemberton SA	Operator land application	$ 180
Musconetcong SA	Operator composting	** $ 191
Camden County MUA	Contractual composting	$ 230
Sussex County MUA	Operator composting	$ 250
Bernards SA	Contractual alkaline stabilization	$ 250
Woodstown SA	Contractual land application	$ 254
Landis SA	Operator land application	$ 278

TABLE 20		
FACILITY	MANAGEMENT METHOD	COST/DRY TON
Middlesex County UA	Operator alkaline stablization	$ 279
Cape May County MUA	Operator composting	$ 300
Atlantic County UA	Operator incineration	$ 305
Camden County MUA	Operator incineration	$ 310
Camden County MUA	Operator composting	** $ 340
Cumberland County UA	Operator land application	$ 350
Buena SA	Operator composting	$ 355
Gloucester County UA	Contractual alkaline stabilization	$ 356
Northwest Bergen Co UA	Operator incineration	$ 367
Cumberland County UA	Contractual incineration	$ 450
Ocean County UA	Operator oil immersion/dehydration	*** $ 450-600
Two Bridges SA	Operation incineration	$ 480
Readington Lebanon SA	Operator land application	$ 490
City of Salem	Contractual land application	$ 587
Raritan SA	Contractual land application	$ 600
Pennsville SA	Contractual land application	**** $ 650
Readington Lebanon SA	Operator composting	** $ 700
Musconetcong SA	Contractual composting	$ 840

* cost is projection for bed evacuation only
** projected cost only since not operational
*** depends on operating efficiency
**** PSA also has limited composting

c. **Inventory and Trends of Sludge Quality:** Wastewater treatment employs many different techniques. The more treatment steps (to produce a cleaner effluent to meet more stringent effluent limitations) the more sludge the DTW will produce and the more efficient a DTW becomes at removing pollutants. Therefore, as treatment efficiency increases, it is possible that sludge quality can deteriorate at the DTW even though the actual pollutant loadings may have decreased. This is just one of several problems the DTW must overcome to assure a sludge quality suitable for the sludge management method chosen. Thus, a DTW must sample and analyze its sludge frequently to obtain representative data. Table 21 summarizes the quality classification of sludge generated by county. As of 1992, 46% of the sludge produced meets Class A/B. It must be noted that the county-by-county breakdown reflects the location of the individual DTWs and does not account for the regional dimension of wastewater flow.

TABLE 21

EXISTING SLUDGE QUALITY INFORMATION
(As of 1992, dp/d)

TABLE 21					
COUNTY	CLASS A	CLASS B	CLASS C	NOT DETERMINED *	TOTAL
Atlantic	0	33,641	0	288	33,929
Bergen	3,145	11,470	93,260	286	108,161
Burlington	370	62,436	5,802	541	69,149
Camden	0	72,288	1,093	1,190	74,571
Cape May	1,619	21,268	59	129	23,075
Cumberland	0	11,984	12,354	0	24,338
Essex	4,538	14,677	753,597	195	773,007
Gloucester	0	38,112	2,164	139	40,415
Hudson	39,172	7,950	0	753	47,875
Hunterdon	0	5,278	2,682	2,615	10,575
Mercer	268	41,850	45,465	929	88,512
Middlesex	0	233,499	0	616	234,115
Monmouth	44,876	27,613	18,136	1,655	92,280

TABLE 21					
COUNTY	CLASS A	CLASS B	CLASS C	NOT DETERMINED *	TOTAL
Morris	2,696	61,981	6,867	5,263	76,807
Ocean	110	56,558	0	628	57,296
Passaic	6,480	3,592	0	630	10,702
Salem	0	4,611	237	0	4,848
Somerset	0	4,130	19,548	6,611	30,289
Sussex	325	2,518	2,528	405	5,776
Union	0	41,548	17,099	29	57,676
Warren	0	2,550	5,983	1,215	9,748
	103,599	759,554	986,874	24,117	1,873,144
% Total	5.5%	40.5%	53%	1%	100%

* Not determined column consists of those category 1 and 2 (flow of less than 1 mgd) DTWs that infrequently remove sludge.

DTWs have shown a reduction in heavy metal concentration over time. The four pages that make up Figure 4 summarize sludge quality changes over a six-year period from 1987 through 1992 for those DTWs with delegated pretreatment programs (Table 4). Average values in milligrams per kilogram (mg/kg) have been plotted on an annual basis for arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc. As is clear for each metal constituent, levels of pretreatment by the major DTWs have resulted in significant reductions in metals loadings in sludge. Beyond these summary tables, detailed breakout graphs (Figure 5) have been included for each of the ten major DTWs over the time period 1987 through 1992 with average values for each metal constituent presented over the six-year period. These graphs also show significant reductions in metal loadings in general.

Annual mean concentrations for each metal can be compared to New Jersey Class A and Class B sludge quality classification limits listed under each graph. The general trend for most heavy metals concentrations is downward for the DTWs represented. Where this is not the case, the fluctuations in heavy metal concentrations largely occur below Class B classification limits. Upward trends of certain metals concentrations may be indicative of service area expansion into industrial areas, which has resulted in the degradation of sludge quality for some constituents. Others simply reflect periodic fluctuations in sludge quality. These graphs do not include organic concentrations, because the overwhelming majority of these DTWs' SQAR reports have indicated undetectable concentrations.

From this data, the enormous disparity in generation trends once again becomes very important. In order to maximize beneficial use opportunities, it is critical that pretreatment programs advance to yield the highest quality sludges necessary. The marketability of Class A sludge, for instance, is generally much greater than that of Class C sludge. As Table 21 points out, nearly 53 percent of New Jersey's current sludge generated is of Class C quality. This does not mean this material can not be processed or otherwise be applied in a beneficial use system. However, the opportunities for such use are clearly more limited. Of the one million dp/d of Class C sludge produced, 76% is generated by a single DTW, PVSC. Figure 5.C shows that, on average, PVSC metals concentrations through July of 1992 were within Class A criteria, however, PVSC is currently considered to be a Class C sludge generator. The following factors are relevant to this issue:

(1) Since early 1992, PVSC's sludge production has decreased dramatically (largely due to reductions in high volume, low contaminant level industrial discharges) with resultant increases in the concentration of some metals in the remaining sludge production; and

(2) PVSC sludge quality did not meet Class B criteria for some metals since July 1992. Evaluation of PVSC's sludge quality will continue. In order to classify PVSC's sludge quality with any degree of confidence, sufficient sludge quality data must be gathered following the stabilization of PVSC's production volumes.

Further, as of July 1992, three DTWs (PVSC, BCUA, and LRSA) cumulatively produce 87% of the Class C sludges in New Jersey (LRSA's sludge is approaching Class B quality, however, it exceeds Class B quality parameters in copper). These statistics highlight the need to advance pretreatment for these three major DTWs as outlined earlier, where feasible and practical.

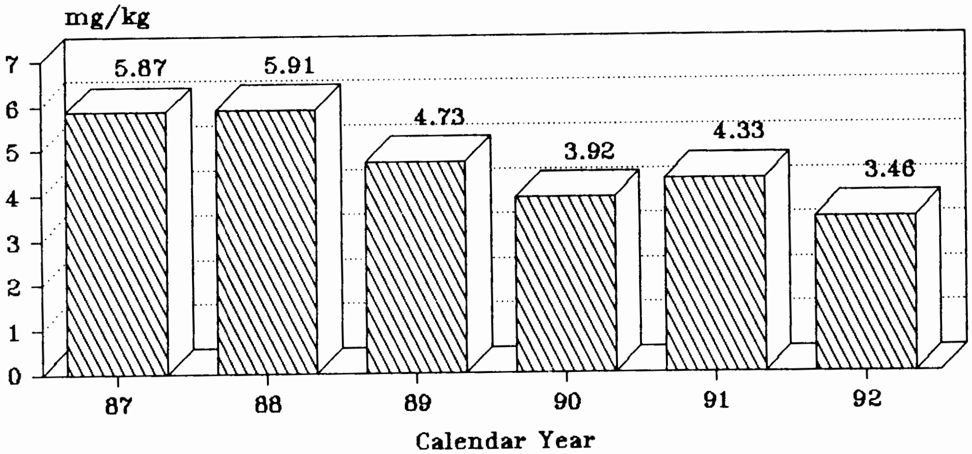
d. Sources of Contaminants in Sewage Sludge: Contaminants present in raw sewage entering a DTW could have several fates, partitioning to sewage sludge, to the effluent discharged to receiving waters, or to the atmosphere through volatilization. Thus, NJPDES permits are issued in order to protect two media: receiving waters and sewage sludge. To comply with its NJPDES permit and meet other environmental criteria, a DTW must limit the pollutants it receives that are not amenable to treatment. Typically, DTWs receive a mixture of two

FIGURE 4

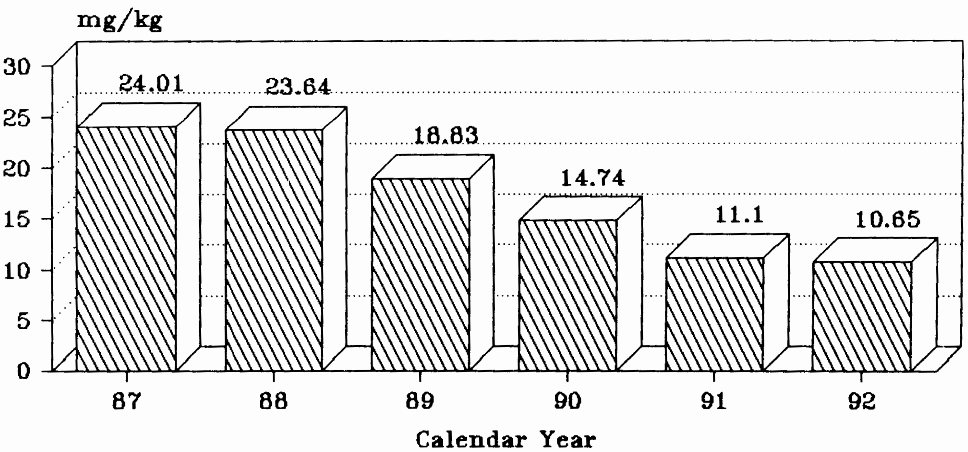
METAL LOADINGS TRENDS 1987 - 1992

Pretreatment Program Effect on Delegated POTW Sludge Quality

Parameter: Arsenic



Parameter: Cadmium



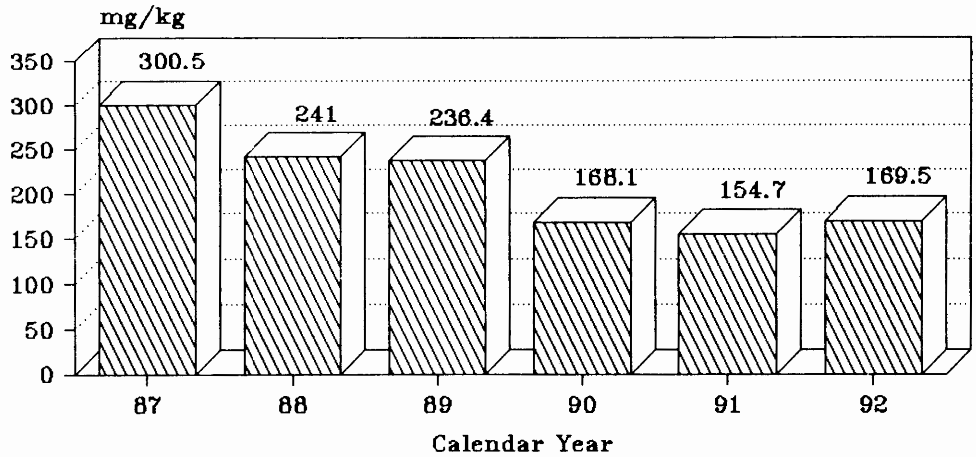
Annual Averages

Source: 403 Annual Reports

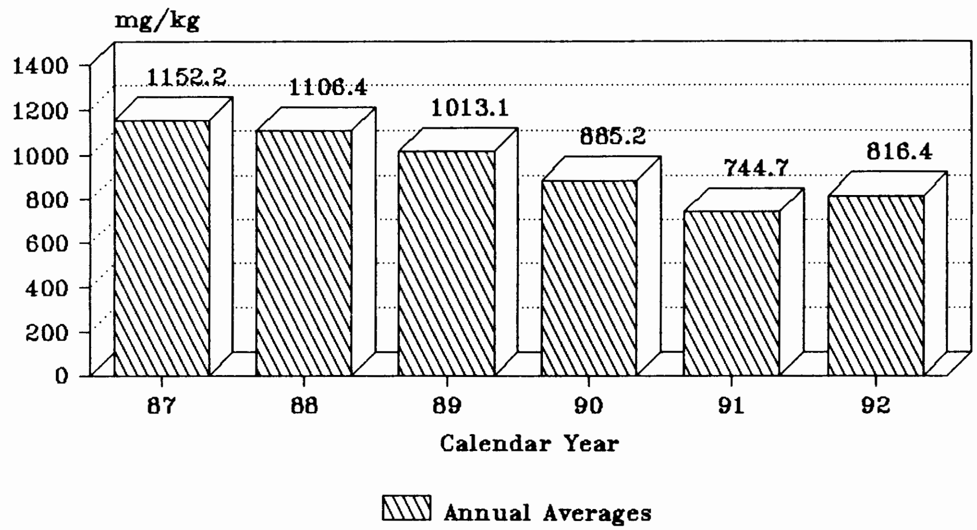
FIGURE 4 (cont.)

METAL LOADINGS TRENDS 1987 - 1992

Pretreatment Program Effect on Delegated POTW Sludge Quality
Parameter: Chromium



Parameter: Copper

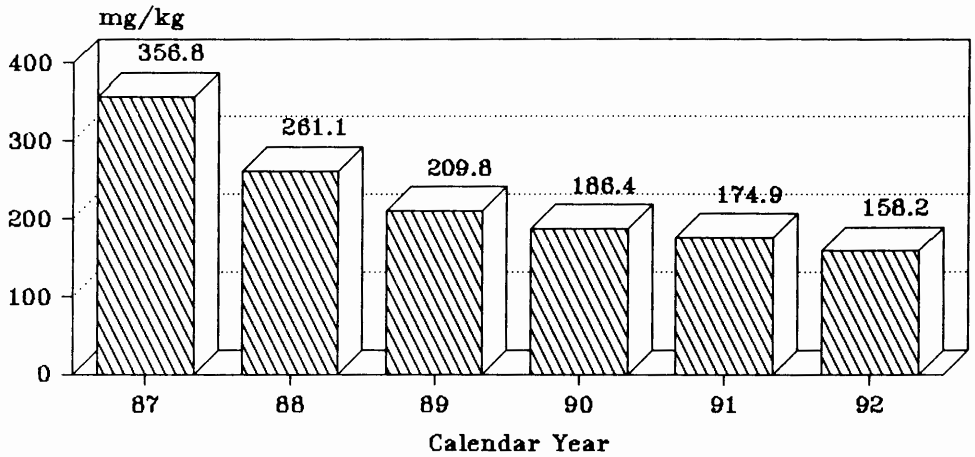


Source: 403 Annual Reports

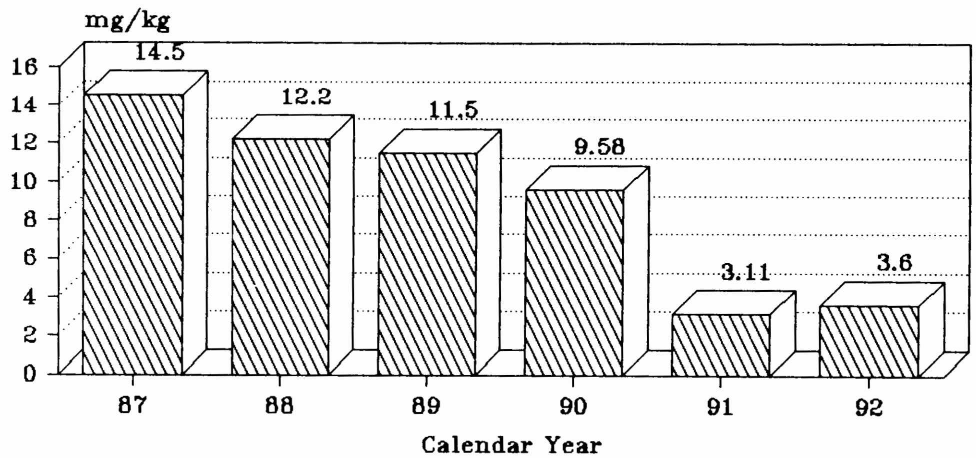
FIGURE 4 (cont.)

METAL LOADINGS TRENDS 1987 - 1992

Pretreatment Program Effect on Delegated POTW Sludge Quality
Parameter: Lead



Parameter: Mercury

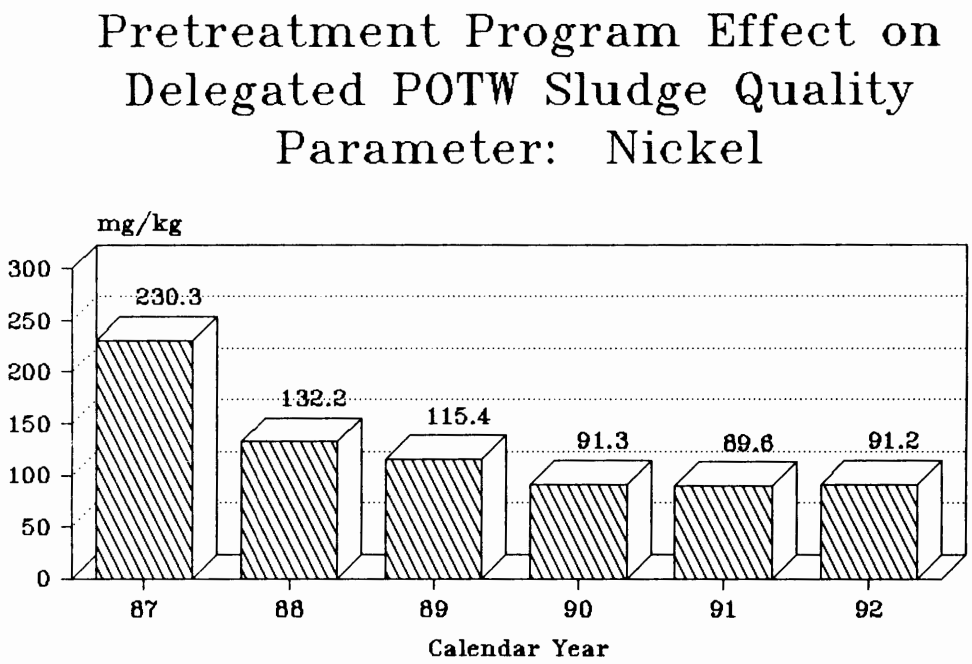


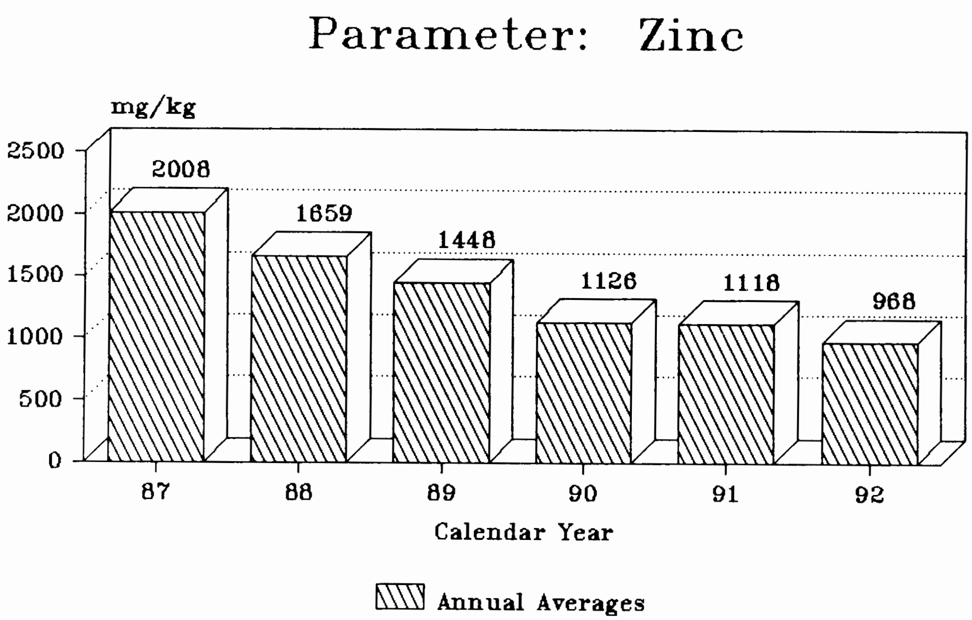
Annual Averages

Source: 403 Annual Reports

FIGURE 4 (cont.)

METAL LOADINGS TRENDS 1987 - 1992



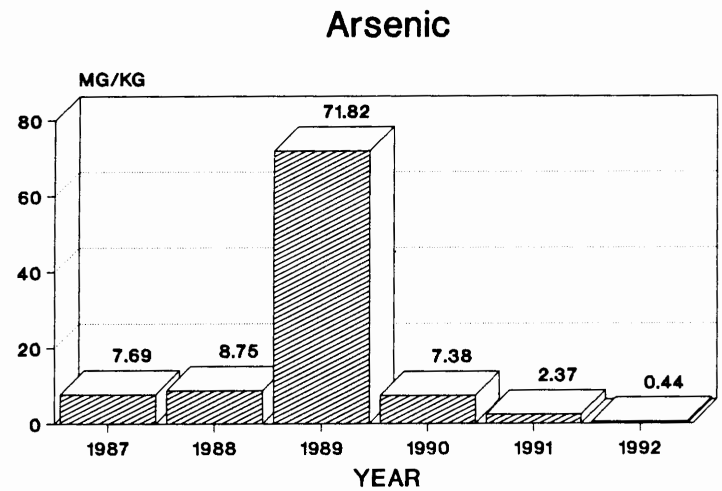


Source: 403 Annual Reports

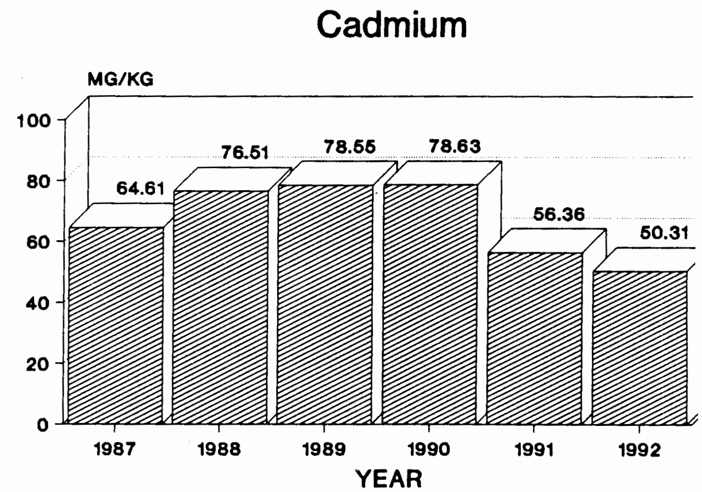
FIGURE 5A

TRENDS IN HEAVY METALS CONCENTRATIONS
SQAR DATA
CONCENTRATIONS IN MG/KG

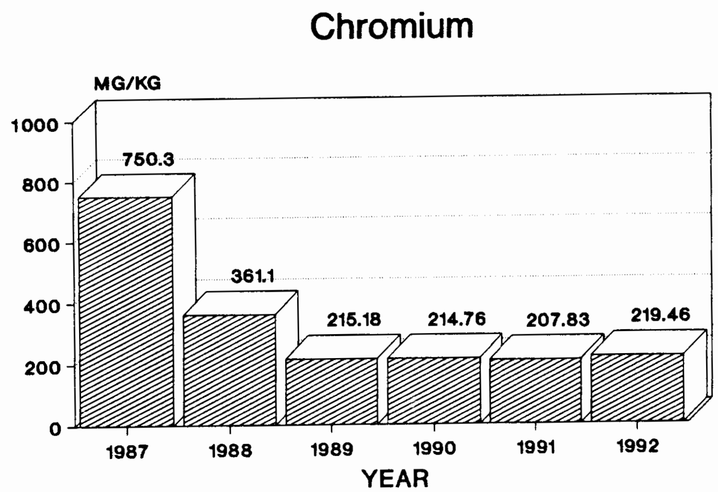
BERGEN COUNTY UTILITIES AUTHORITY



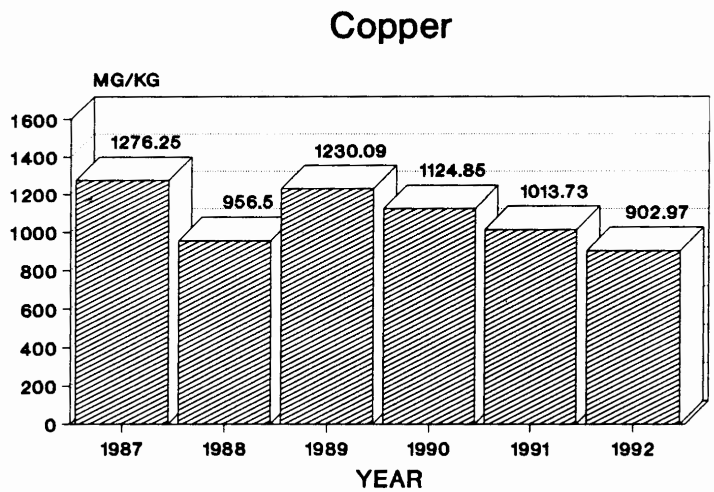
CLASS A LIMIT - 10 MG/KG
CLASS B LIMIT - 10 MG/KG



CLASS A LIMIT - 20 MG/KG
CLASS B LIMIT - 40 MG/KG



CLASS A LIMIT - 1000 MG/KG
CLASS B LIMIT - 1000 MG/KG

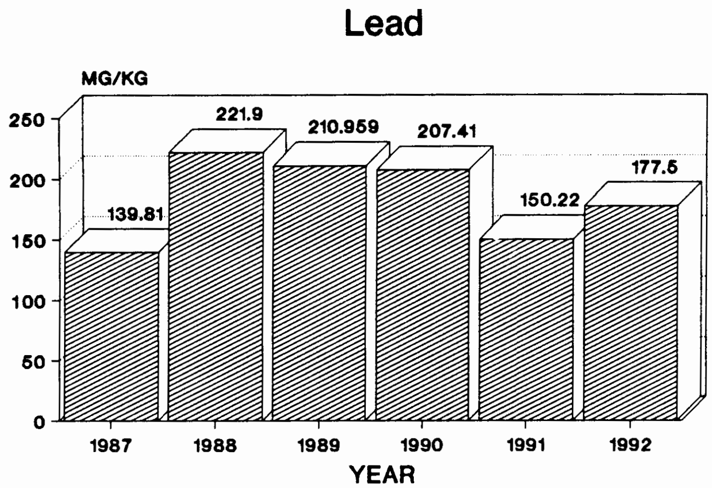


CLASS A LIMIT - 600 MG/KG
CLASS B LIMIT - 1200 MG/KG

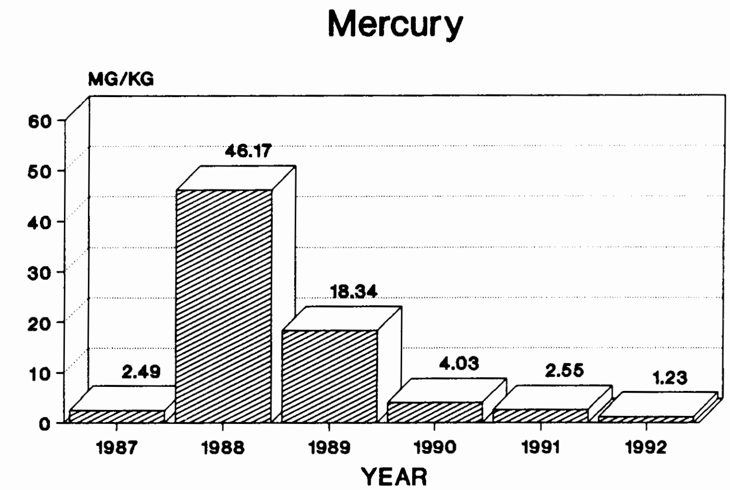
FIGURE 5A (CONT.)

TRENDS IN HEAVY METALS CONCENTRATIONS
SQAR DATA
CONCENTRATIONS IN MG/KG

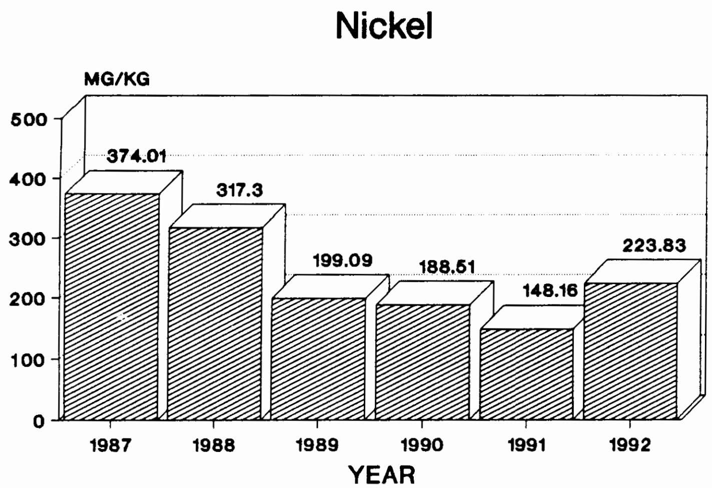
BERGEN COUNTY UTILITIES AUTHORITY



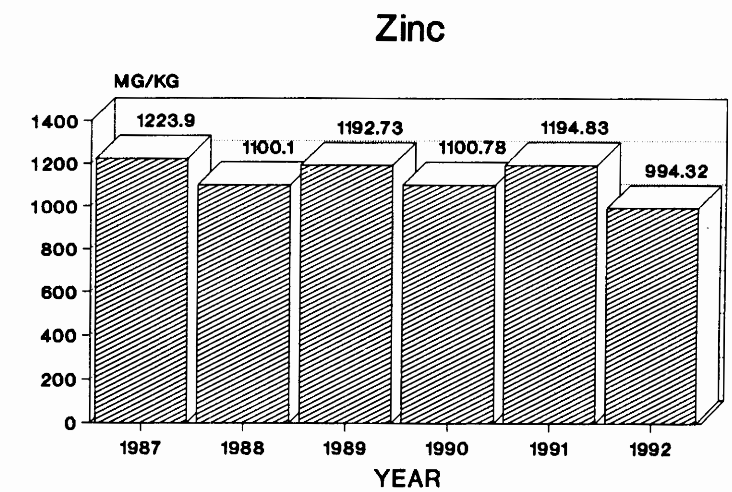
LASS A LIMIT - 2400 MG/KG
LASS B LIMIT - 4800 MG/KG



CLASS A LIMIT - 10 MG/KG
CLASS B LIMIT - 10 MG/KG



LASS A LIMIT - 625 MG/KG
LASS B LIMIT - 1250 MG/KG

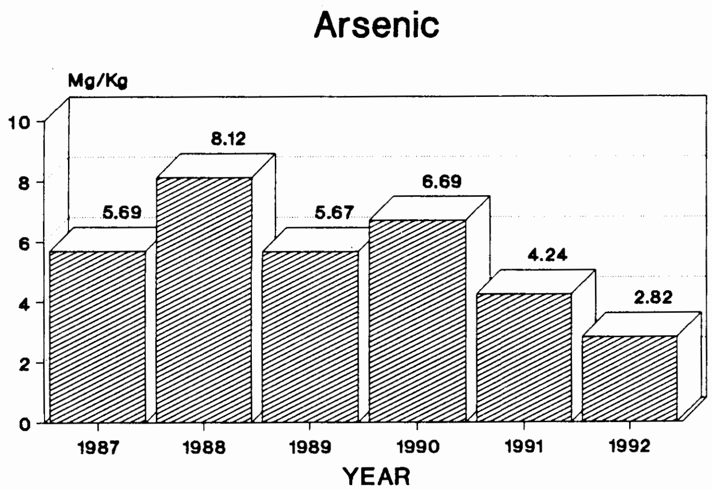


CLASS A LIMIT - 1200 MG/KG
CLASS B LIMIT - 2400 MG/KG

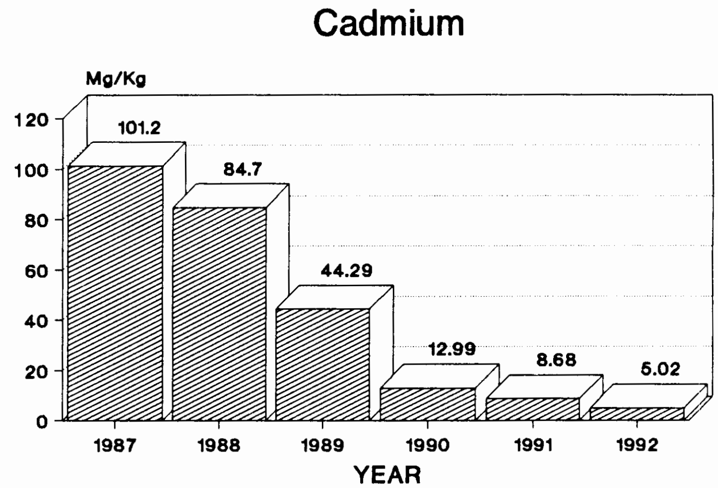
FIGURE 5B

TRENDS IN HEAVY METALS CONCENTRATIONS
SQAR DATA
CONCENTRATIONS IN MG/KG

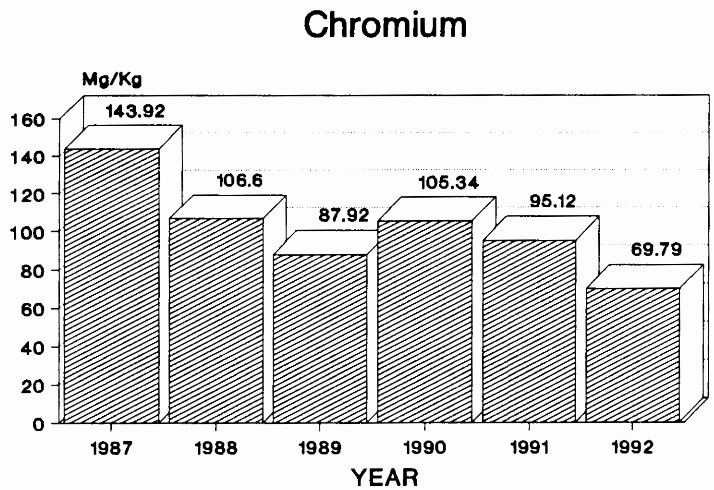
MIDDLESEX COUNTY UTILITIES AUTHORITY



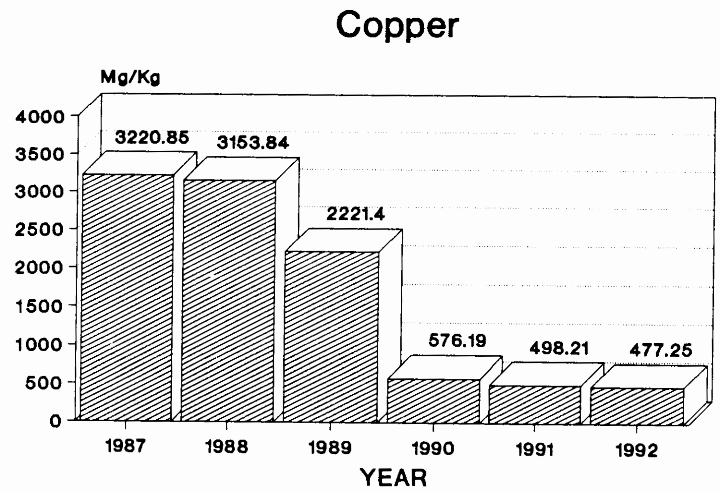
CLASS A LIMIT - 10 MG/KG
CLASS B LIMIT - 10 MG/KG



CLASS A LIMIT - 20 MG/KG
CLASS B LIMIT - 40 MG/KG



CLASS A LIMIT - 1000 MG/KG
CLASS B LIMIT - 1000 MG/KG

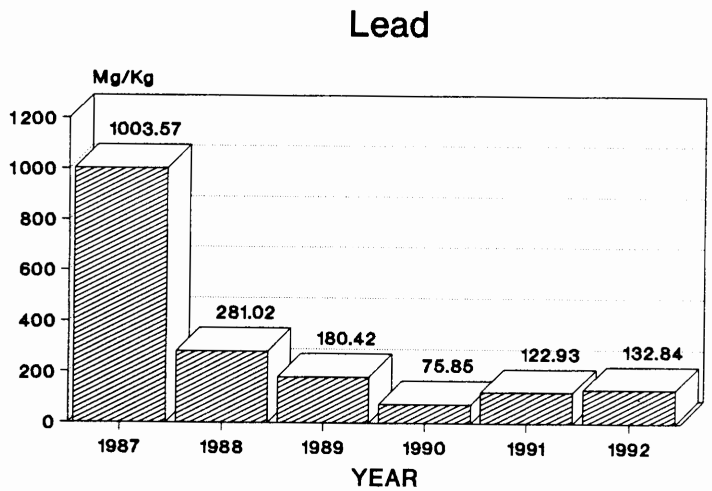


CLASS A LIMIT - 600 MG/KG
CLASS B LIMIT - 1200 MG/KG

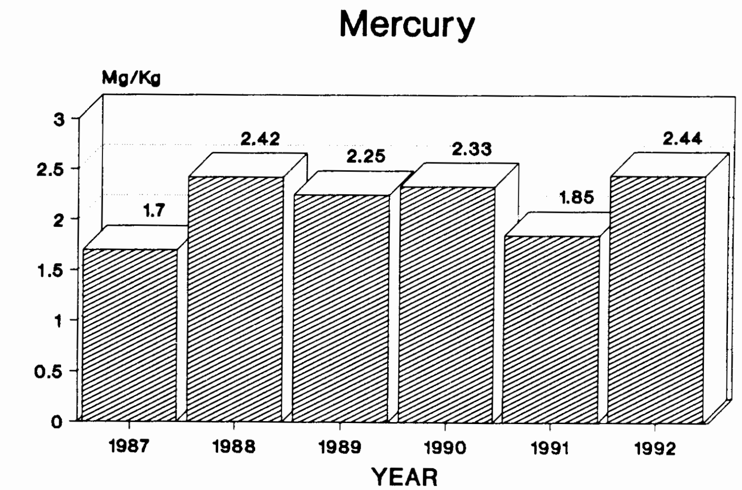
FIGURE 5B (CONT.)

TRENDS IN HEAVY METALS CONCENTRATIONS
SQAR DATA
CONCENTRATIONS IN MG/KG

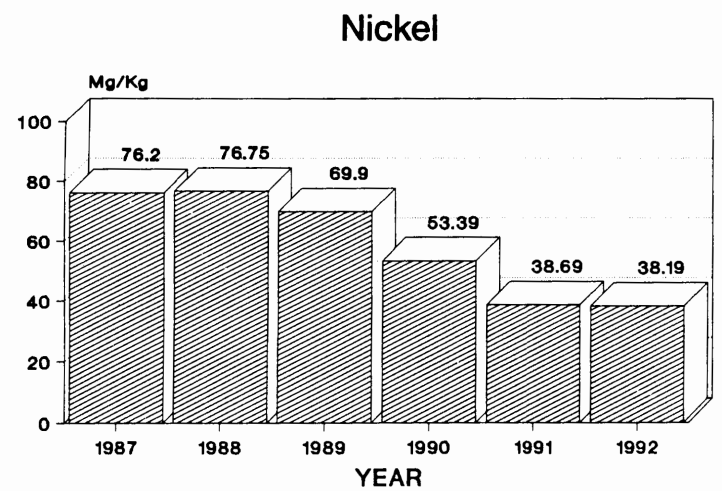
MIDDLESEX COUNTY UTILITIES AUTHORITY



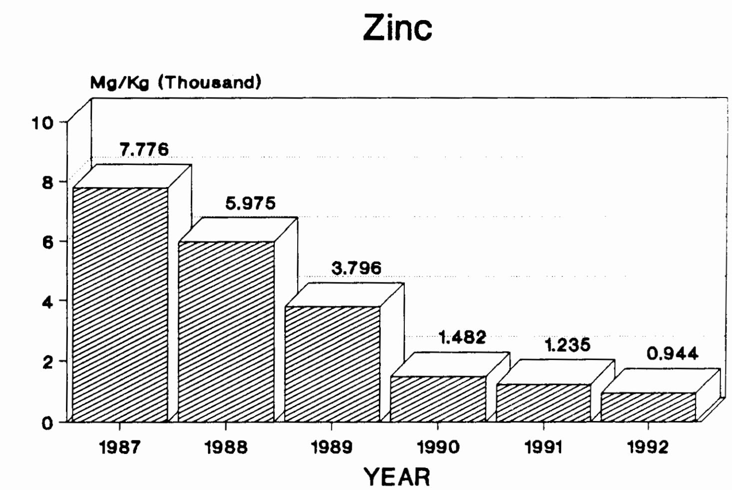
ASS A LIMIT - 2400 MG/KG
ASS B LIMIT - 4800 MG/KG



CLASS A LIMIT - 10 MG/KG
CLASS B LIMIT - 10 MG/KG



.ASS A LIMIT - 625 MG/KG
.ASS B LIMIT - 1250 MG/KG

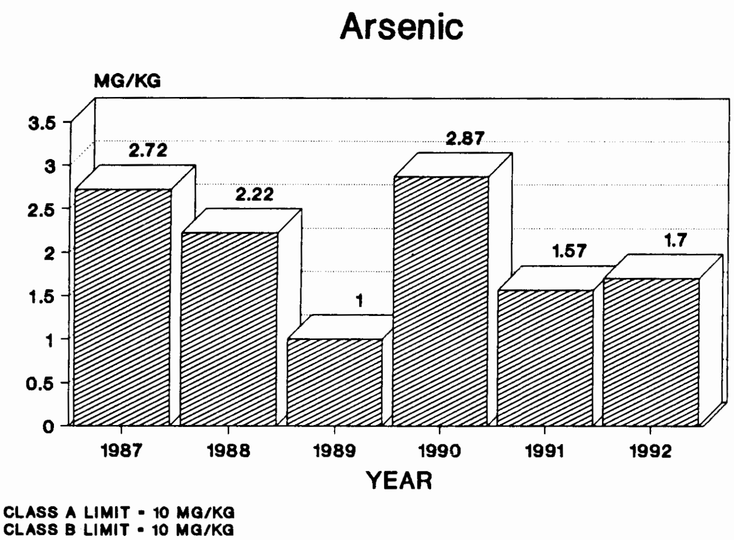


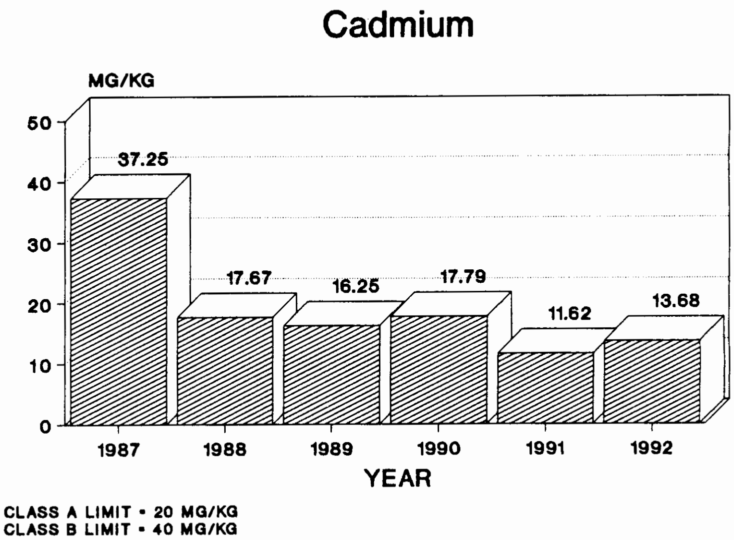
CLASS A LIMIT - 1200 MG/KG
CLASS B LIMIT - 2400 MG/KG

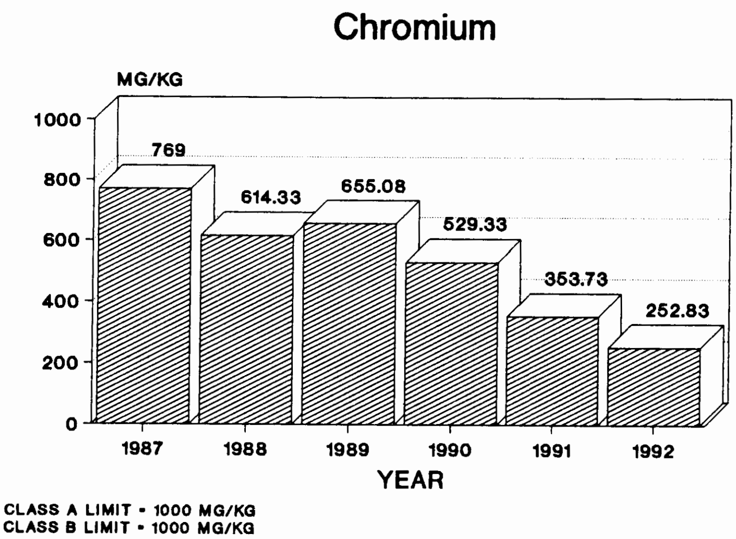
FIGURE 5C

TRENDS IN HEAVY METALS CONCENTRATIONS
SQAR DATA
CONCENTRATIONS IN MG/KG

PASSAIC VALLEY SEWERAGE COMMISSION







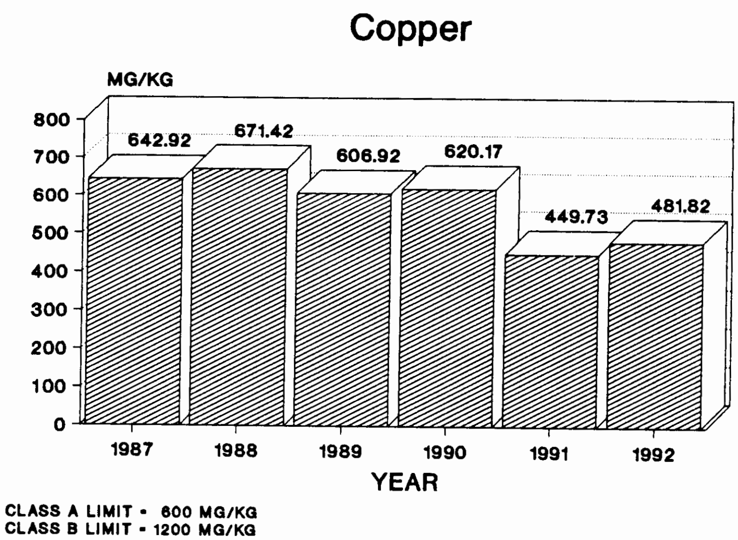
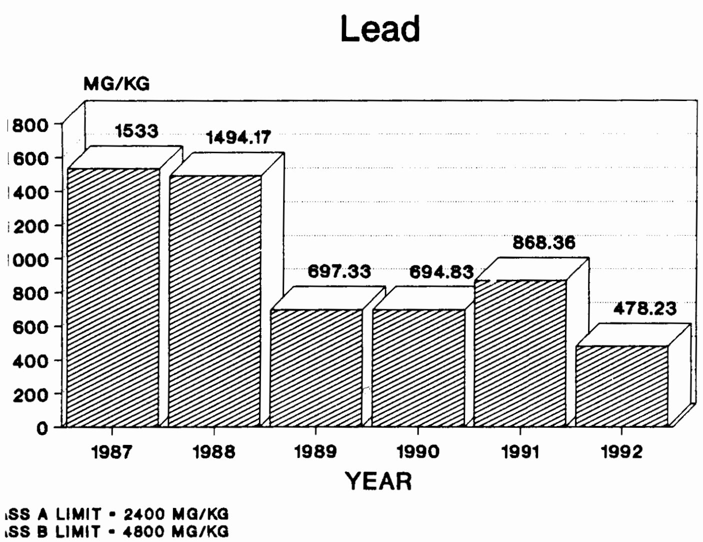
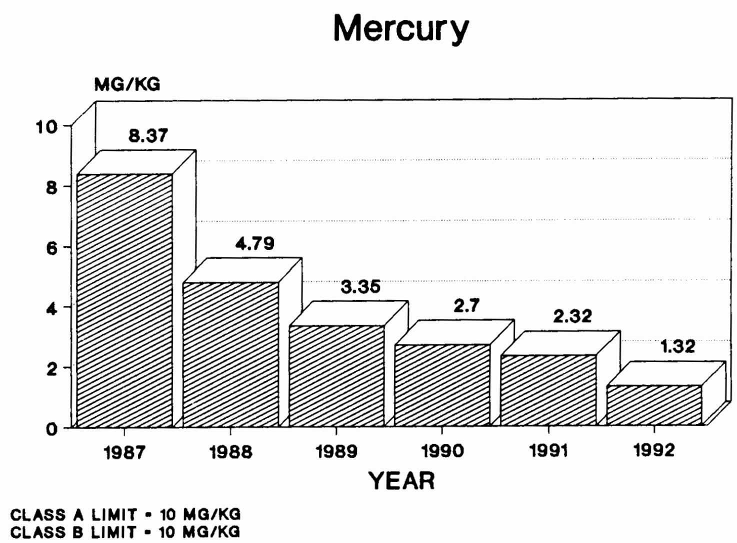


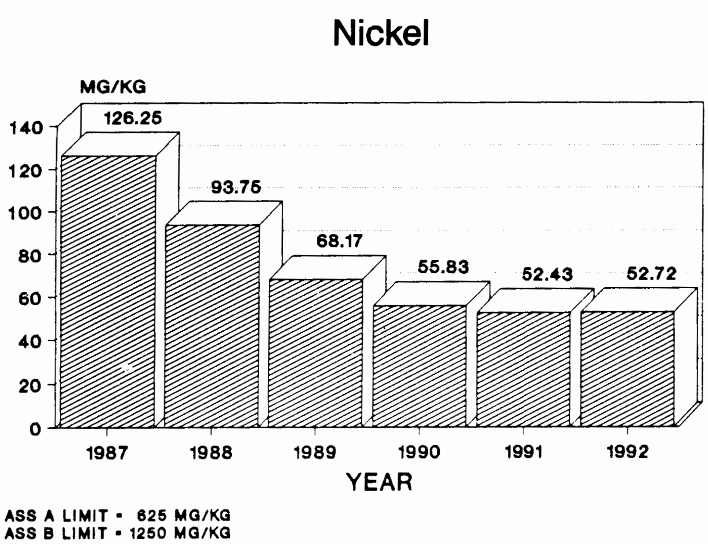
FIGURE 5C (CONT.)

TRENDS IN HEAVY METALS CONCENTRATIONS
SQAR DATA
CONCENTRATIONS IN MG/KG

PASSAIC VALLEY SEWERAGE COMMISSION







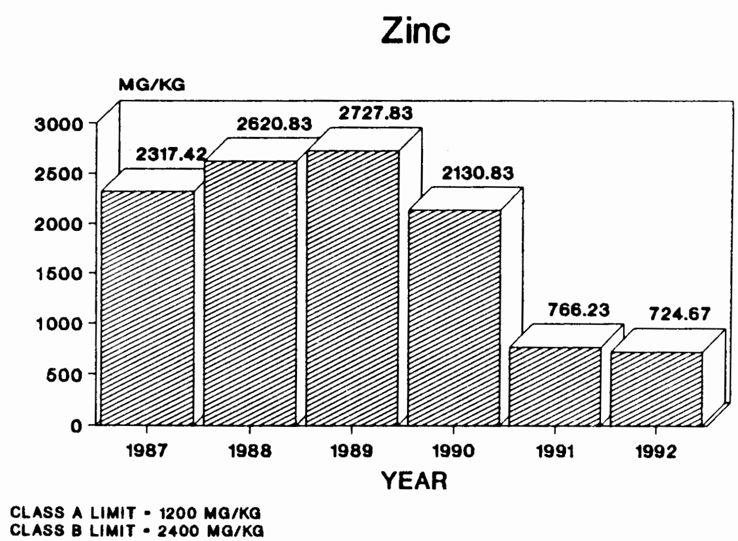
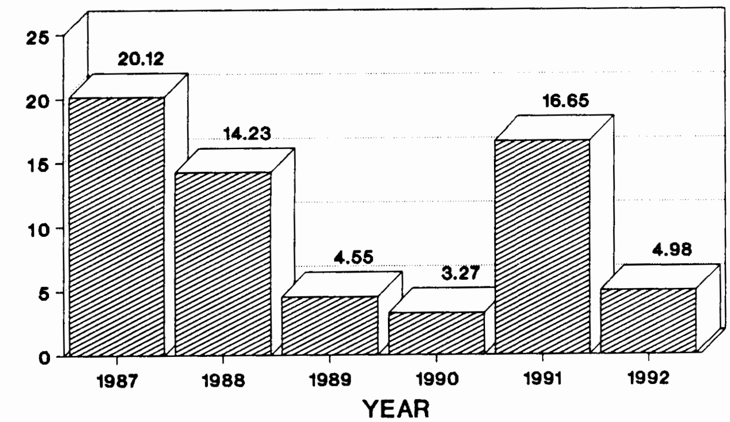


FIGURE 5D

TRENDS IN HEAVY METALS CONCENTRATIONS
SQAR DATA
CONCENTRATIONS IN MG/KG

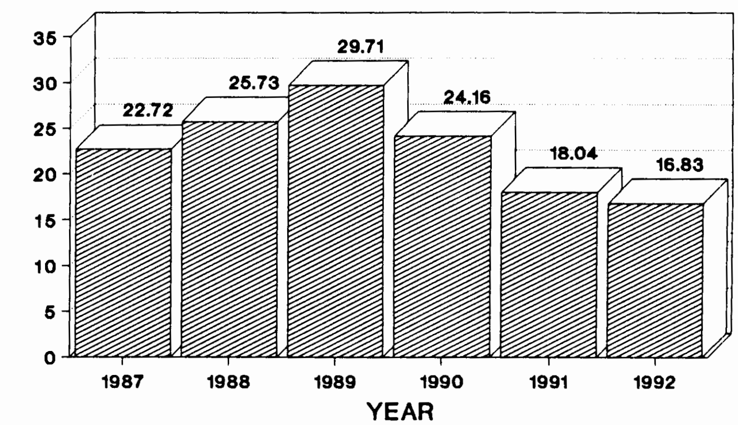
LINDEN-ROSELLE SEWERAGE AUTHORITY

Arsenic



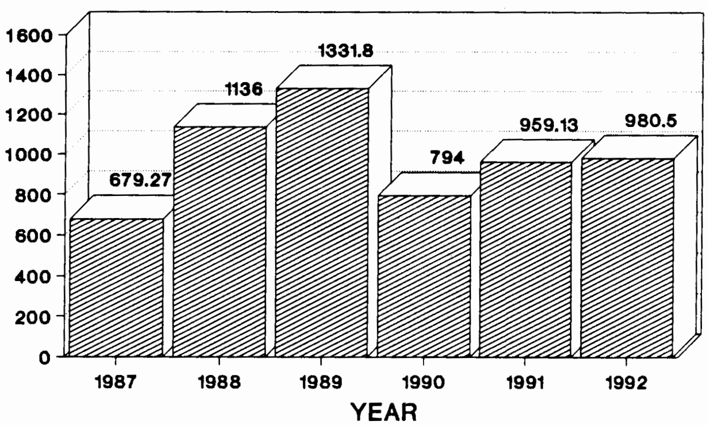
CLASS A LIMIT - 10 MG/KG
CLASS B LIMIT - 10 MG/KG

Cadmium



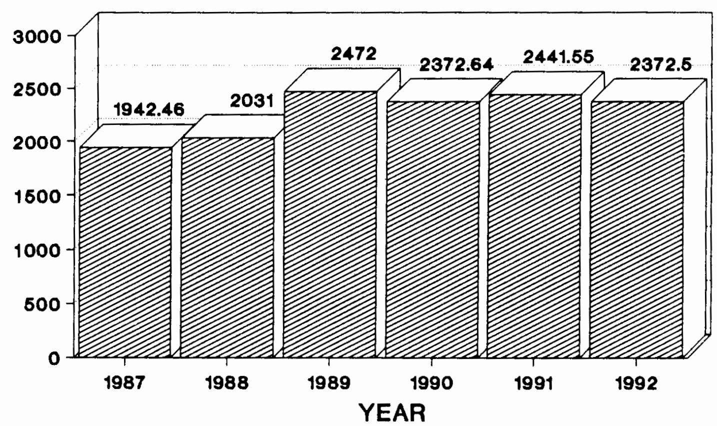
CLASS A LIMIT - 20 MG/KG
CLASS B LIMIT - 40 MG/KG

Chromium



CLASS A LIMIT - 1000 MG/KG
CLASS B LIMIT - 1000 MG/KG

Copper

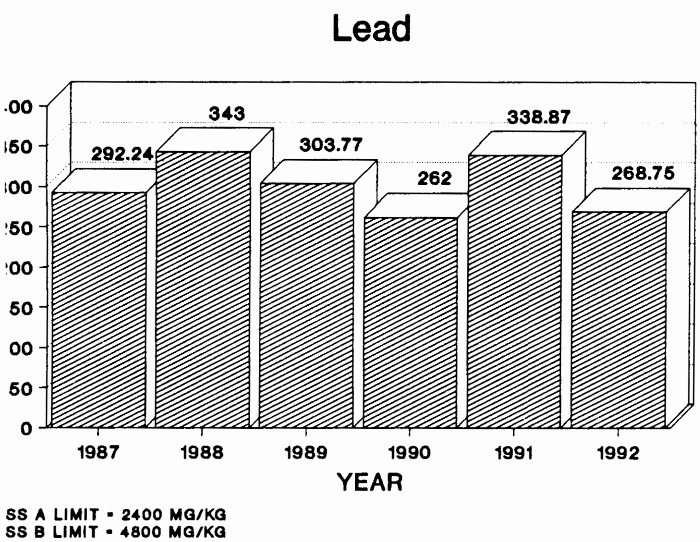


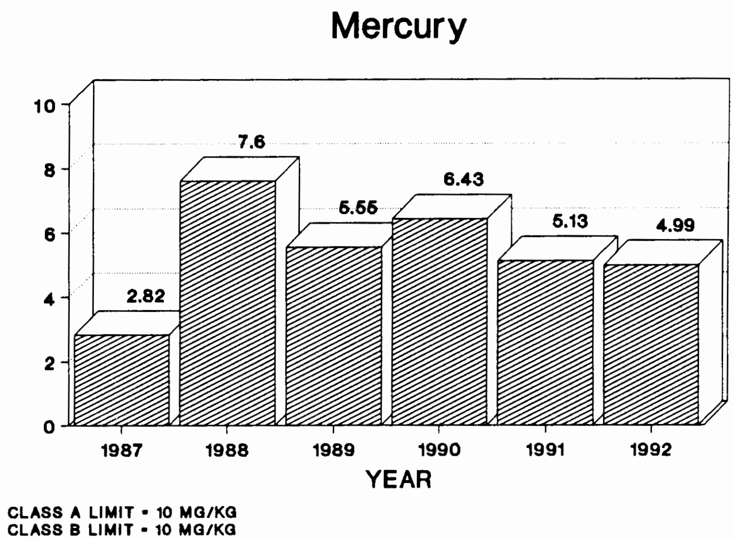
CLASS A LIMIT - 600 MG/KG
CLASS B LIMIT - 1200 MG/KG

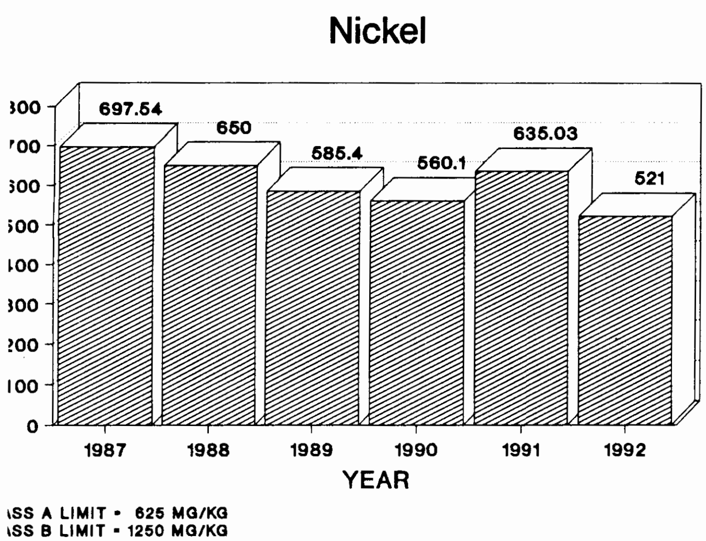
FIGURE 5D (CONT.)

TRENDS IN HEAVY METALS CONCENTRATIONS
SQAR DATA
CONCENTRATIONS IN MG/KG

LINDEN-ROSELLE SEWERAGE AUTHORITY







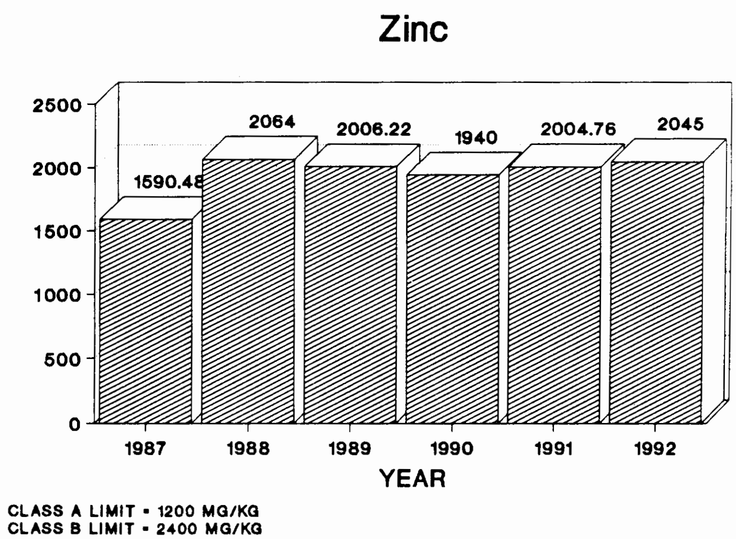
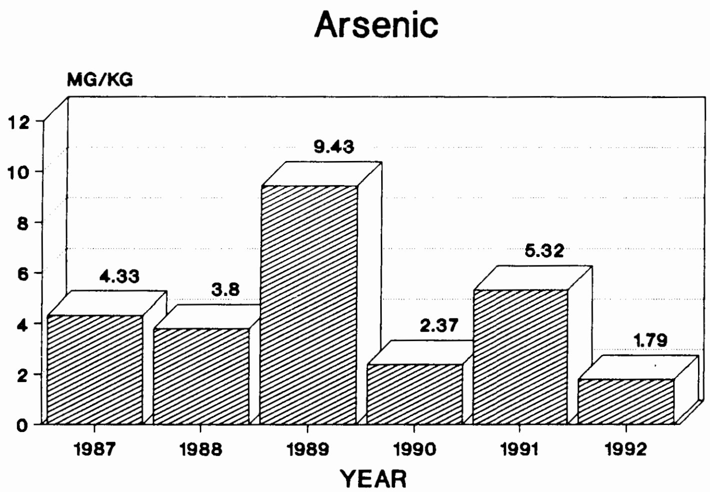


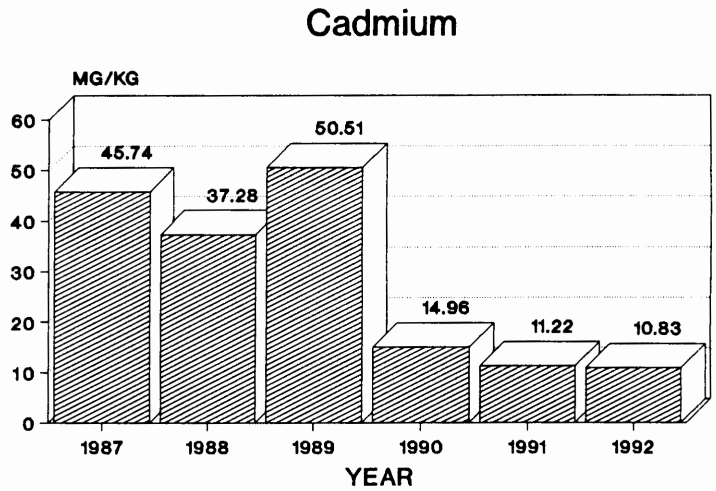
FIGURE 5E

TRENDS IN HEAVY METALS CONCENTRATIONS
SQAR DATA
CONCENTRATIONS IN MG/KG

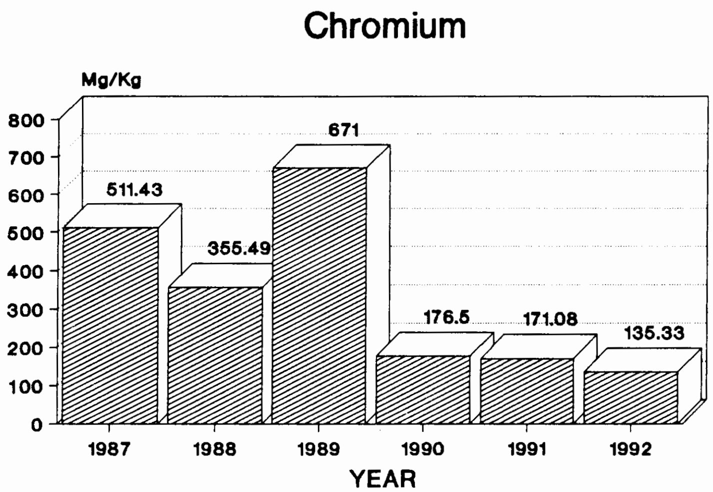
JOINT MEETING OF ESSEX AND UNION COUNTIES



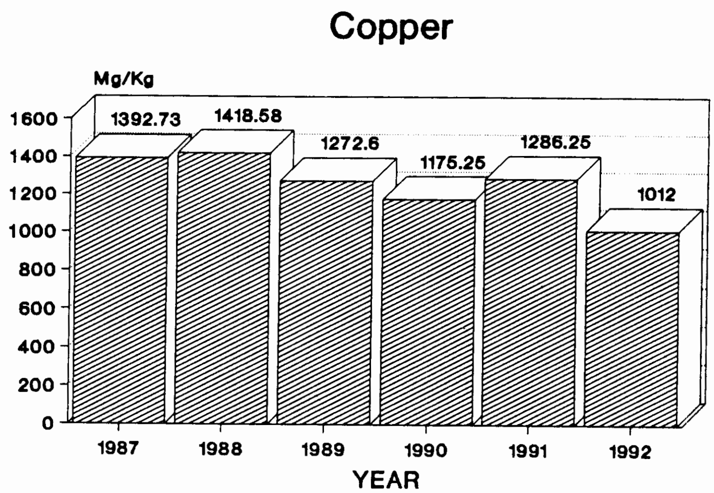
CLASS A LIMIT - 10 MG/KG
CLASS B LIMIT - 10 MG/KG



CLASS A LIMIT - 20 MG/KG
CLASS B LIMIT - 40 MG/KG



CLASS A LIMIT - 1000 MG/KG
CLASS B LIMIT - 1000 MG/KG



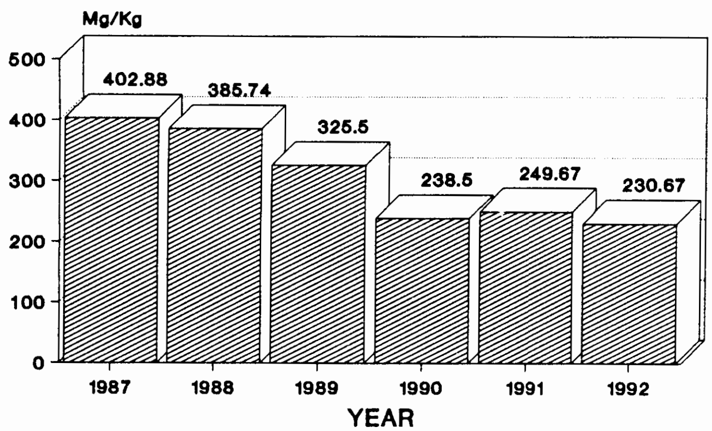
CLASS A LIMIT - 600 MG/KG
CLASS B LIMIT - 1200 MG/KG

FIGURE 5E (CONT.)

TRENDS IN HEAVY METALS CONCENTRATIONS
SQAR DATA
CONCENTRATIONS IN MG/KG

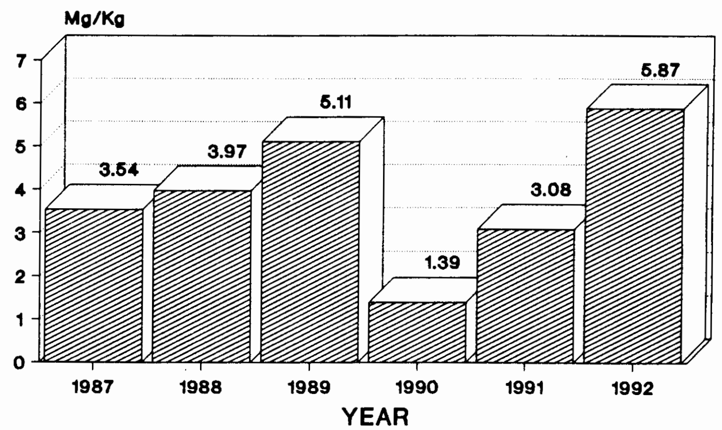
JOINT MEETING OF ESSEX AND UNION COUNTIES

Lead



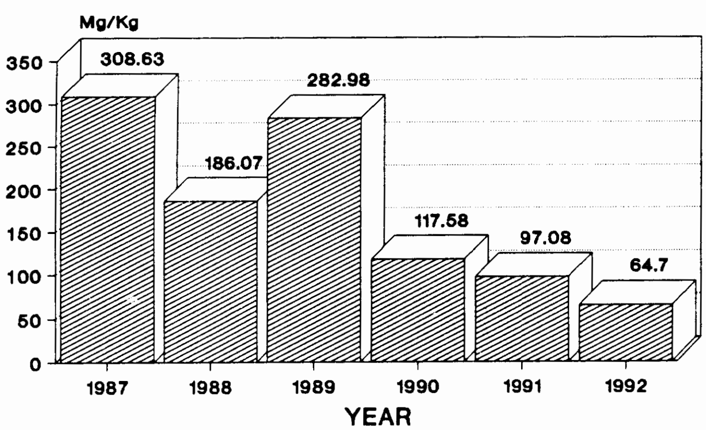
ASS A LIMIT - 2400 MG/KG
ASS B LIMIT - 4800 MG/KG

Mercury



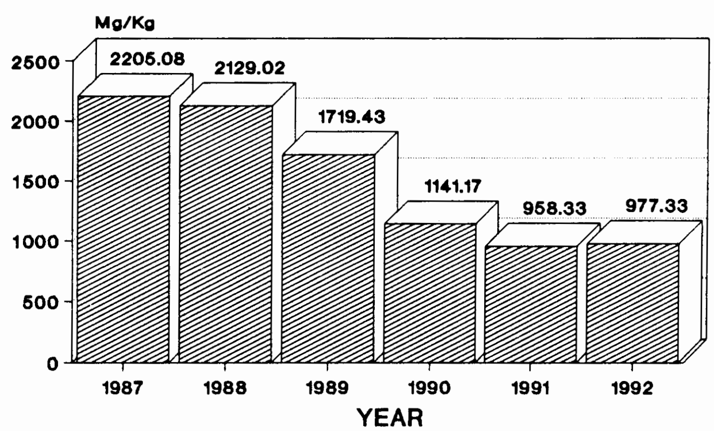
CLASS A LIMIT - 10 MG/KG
CLASS B LIMIT - 10 MG/KG

Nickel



ASS A LIMIT - 625 MG/KG
ASS B LIMIT - 1250 MG/KG

Zinc

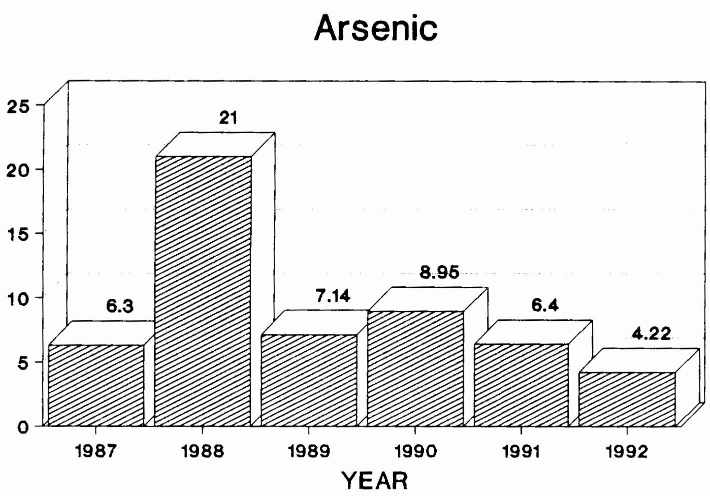


CLASS A LIMIT - 1200 MG/KG
CLASS B LIMIT - 2400 MG/KG

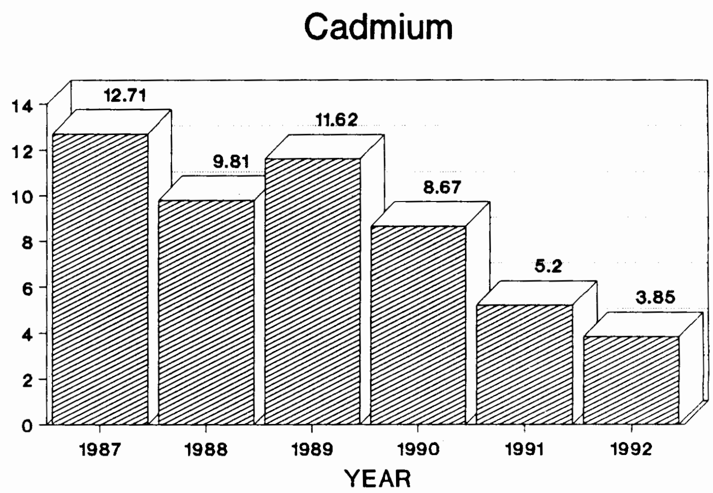
FIGURE 5F

TRENDS IN HEAVY METALS CONCENTRATIONS
SQAR DATA
CONCENTRATIONS IN MG/KG

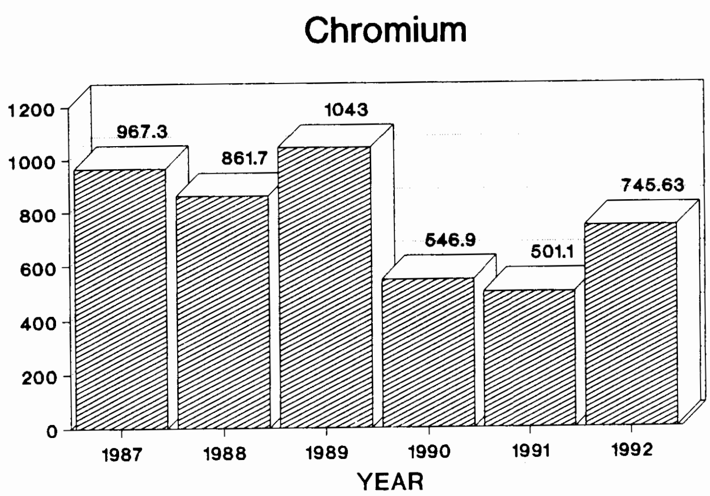
RAHWAY VALLEY SEWERAGE AUTHORITY



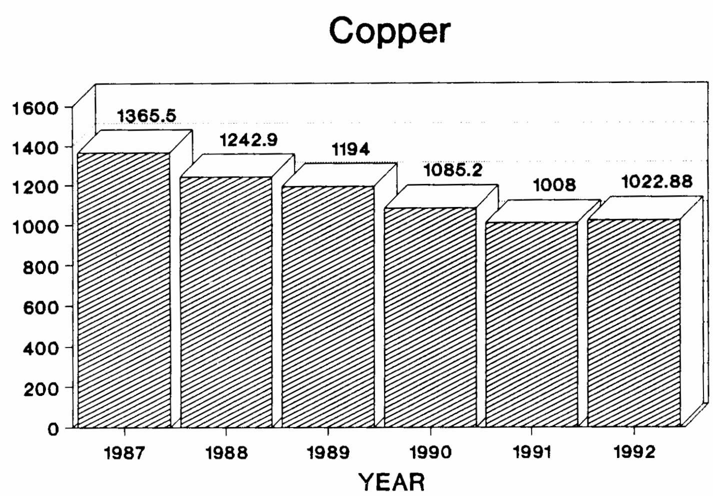
CLASS A LIMIT = 10 MG/KG
CLASS B LIMIT = 10 MG/KG



CLASS A LIMIT = 20 MG/KG
CLASS B LIMIT = 40 MG/KG



CLASS A LIMIT = 1000 MG/KG
CLASS B LIMIT = 1000 MG/KG

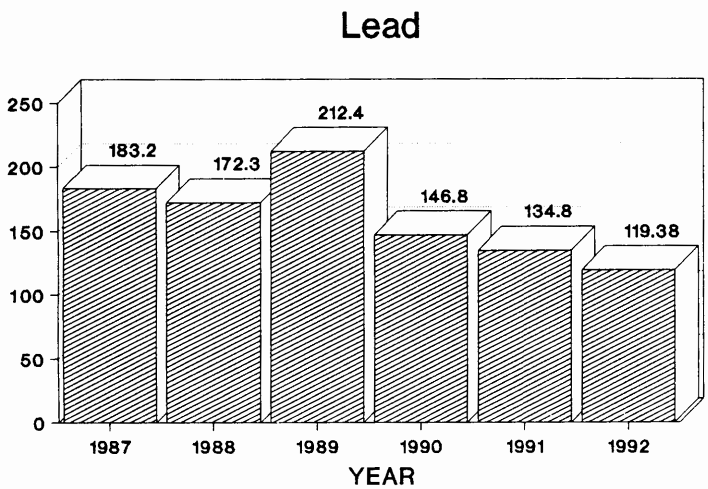


CLASS A LIMIT = 600 MG/KG
CLASS B LIMIT = 1200 MG/KG

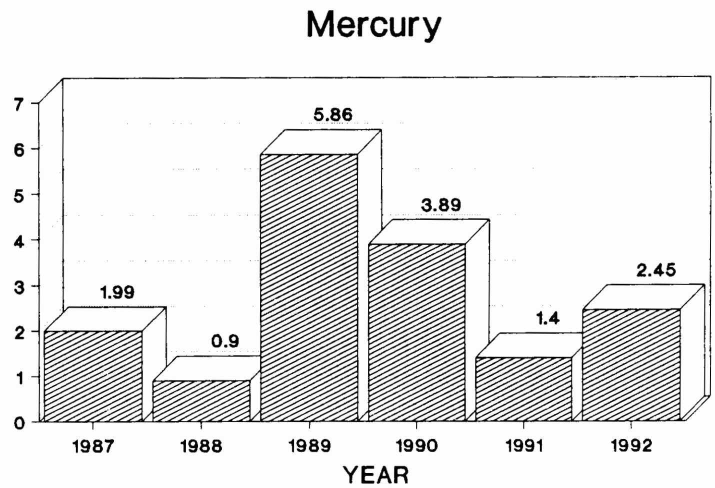
FIGURE 5F (CONT.)

TRENDS IN HEAVY METALS CONCENTRATIONS
SQAR DATA
CONCENTRATIONS IN MG/KG

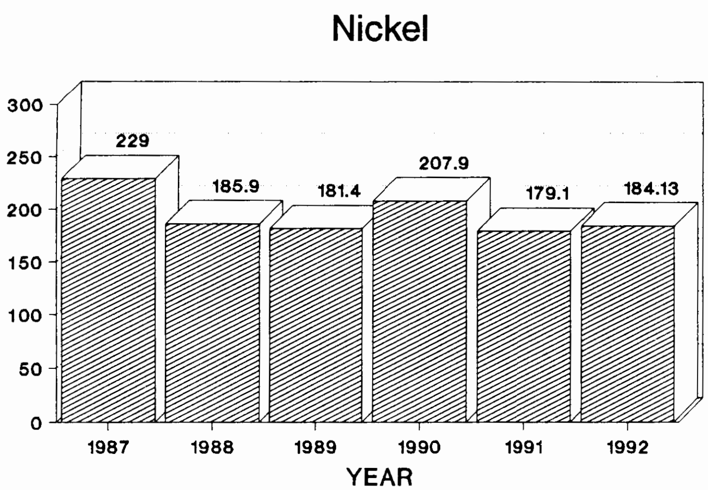
RAHWAY VALLEY SEWERAGE AUTHORITY



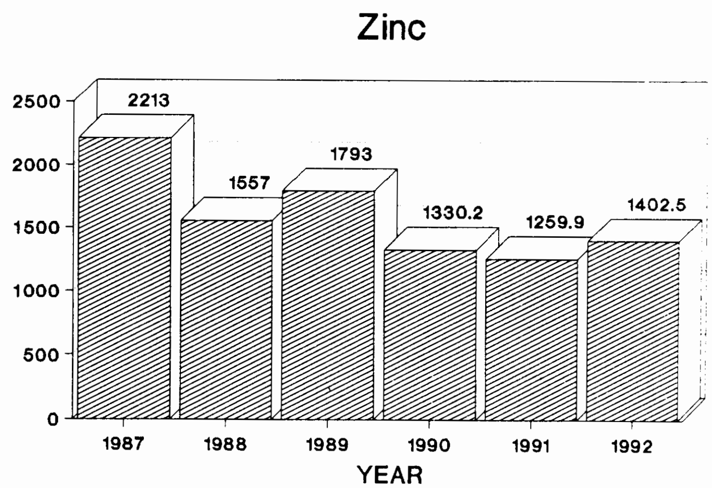
.ASS A LIMIT • 2400 MG/KG
.ASS B LIMIT • 4800 MG/KG



CLASS A LIMIT • 10 MG/KG
CLASS B LIMIT • 10 MG/KG



.ASS A LIMIT • 625 MG/KG
.ASS B LIMIT • 1250 MG/KG

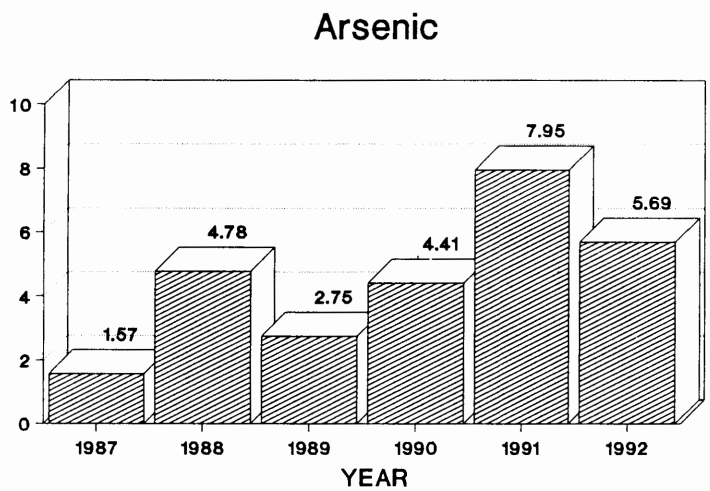


CLASS A LIMIT • 1200 MG/KG
CLASS B LIMIT • 2400 MG/KG

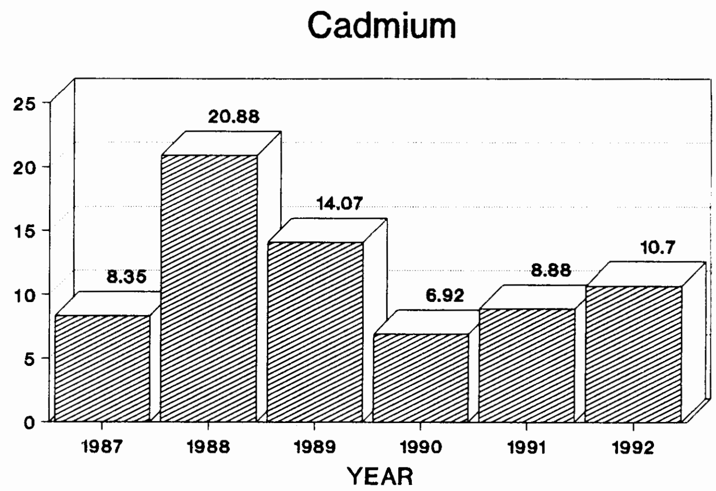
FIGURE 5G

TRENDS IN HEAVY METALS CONCENTRATIONS
SQAR DATA
CONCENTRATIONS IN MG/KG

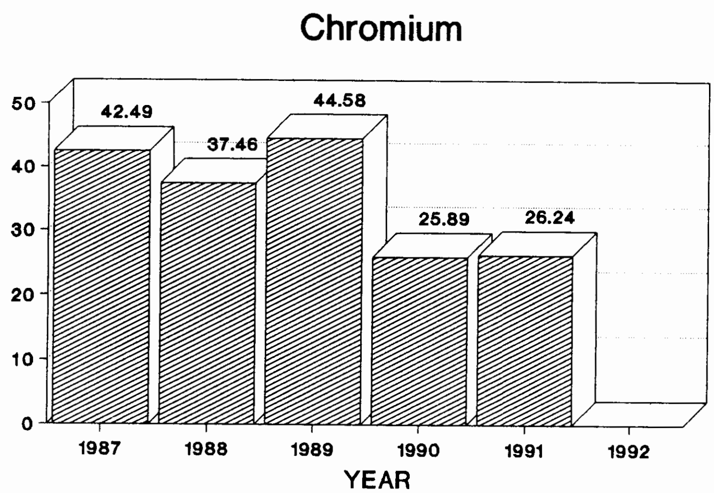
OCEAN COUNTY UTILITIES AUTHORITY



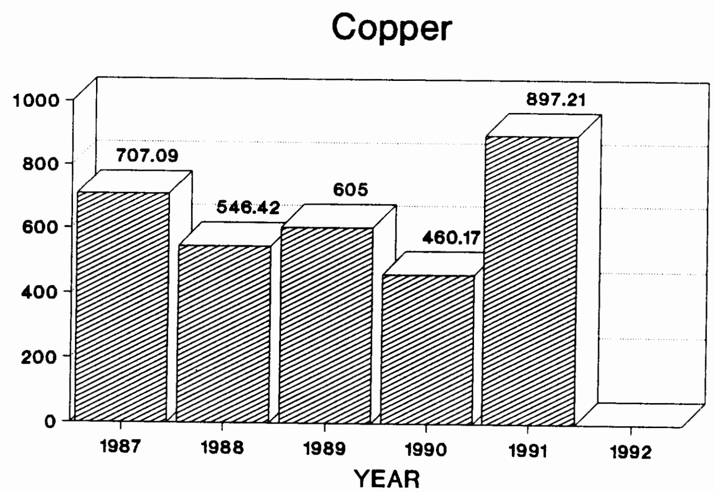
CLASS A LIMIT - 10 MG/KG
CLASS B LIMIT - 10 MG/KG



CLASS A LIMIT - 20 MG/KG
CLASS B LIMIT - 40 MG/KG



CLASS A LIMIT - 1000 MG/KG
CLASS B LIMIT - 1000 MG/KG

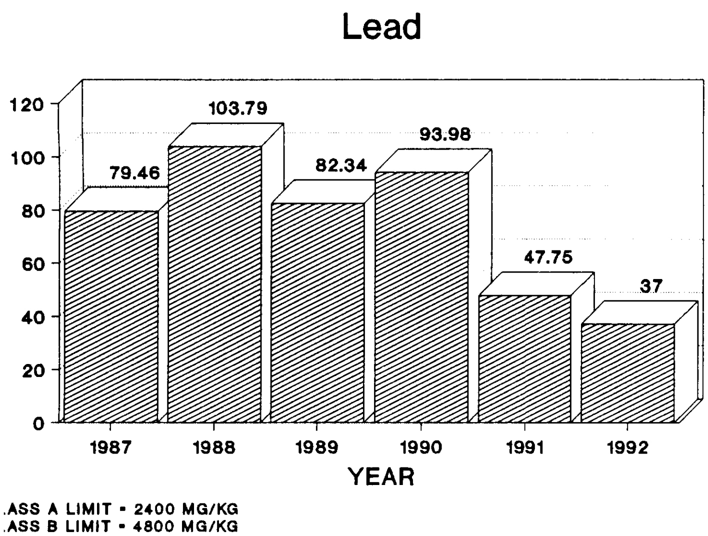


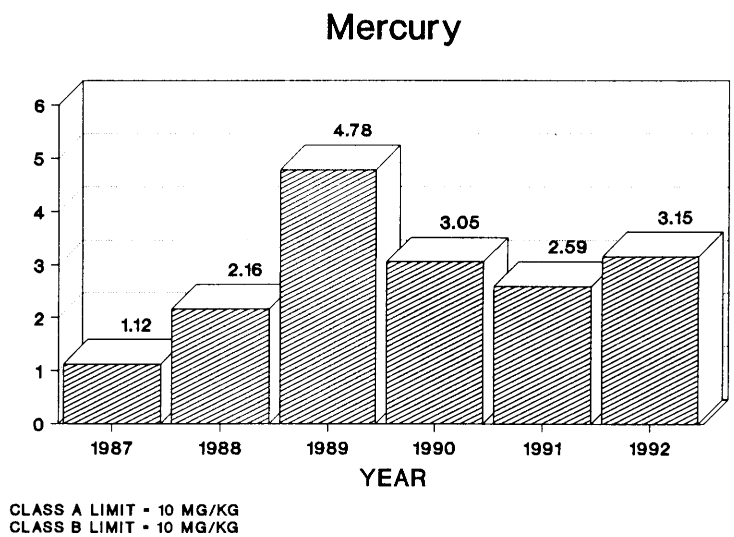
CLASS A LIMIT - 600 MG/KG
CLASS B LIMIT - 1200 MG/KG

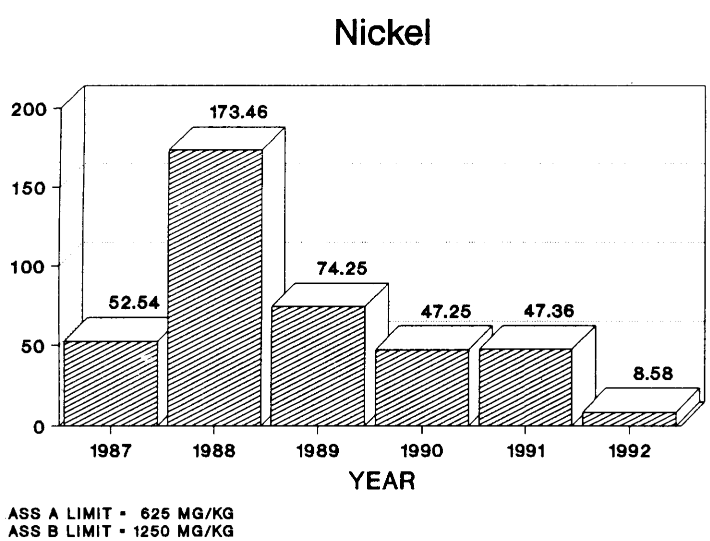
FIGURE 5G (CONT.)

TRENDS IN HEAVY METALS CONCENTRATIONS
SQAR DATA
CONCENTRATIONS IN MG/KG

OCEAN COUNTY UTILITIES AUTHORITY







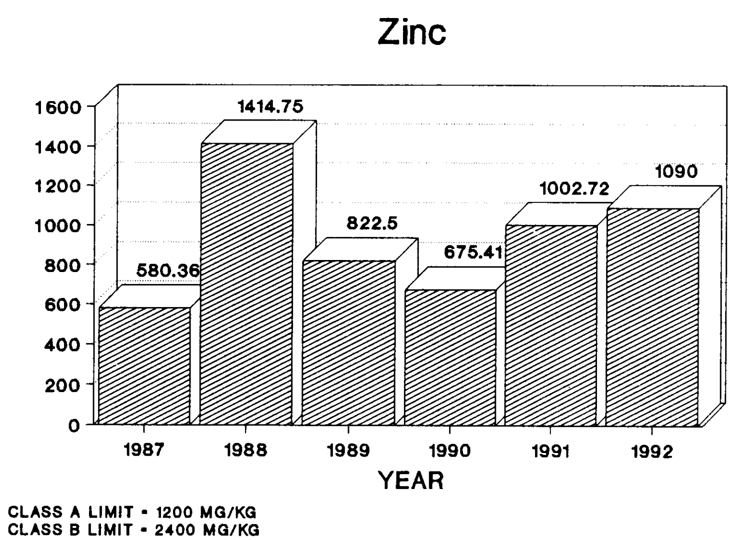
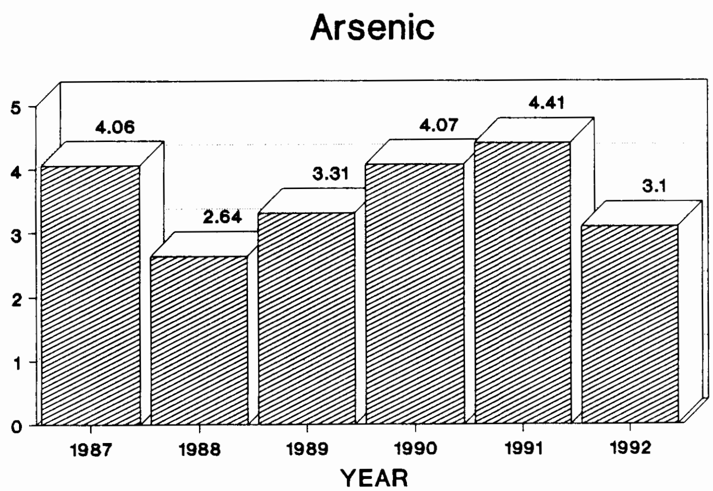


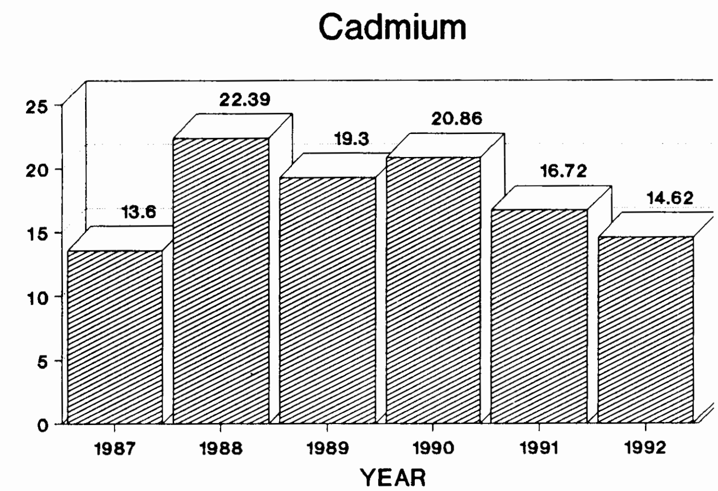
FIGURE 5H

TRENDS IN HEAVY METALS CONCENTRATIONS
SQAR DATA
CONCENTRATIONS IN MG/KG

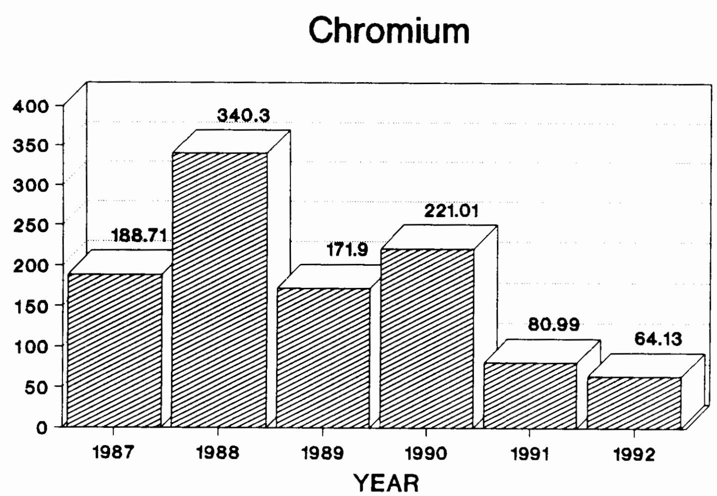
CAMDEN COUNTY MUNICIPAL UTILITIES AUTHORITY



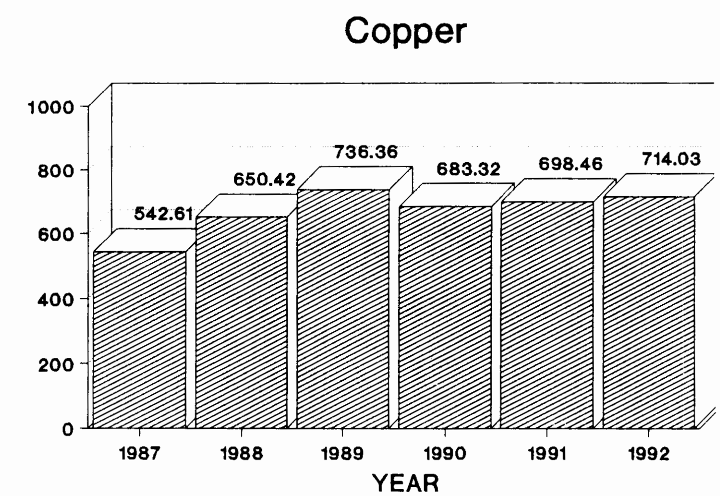
CLASS A LIMIT - 10 MG/KG
CLASS B LIMIT - 10 MG/KG



CLASS A LIMIT - 20 MG/KG
CLASS B LIMIT - 40 MG/KG



CLASS A LIMIT - 1000 MG/KG
CLASS B LIMIT - 1000 MG/KG

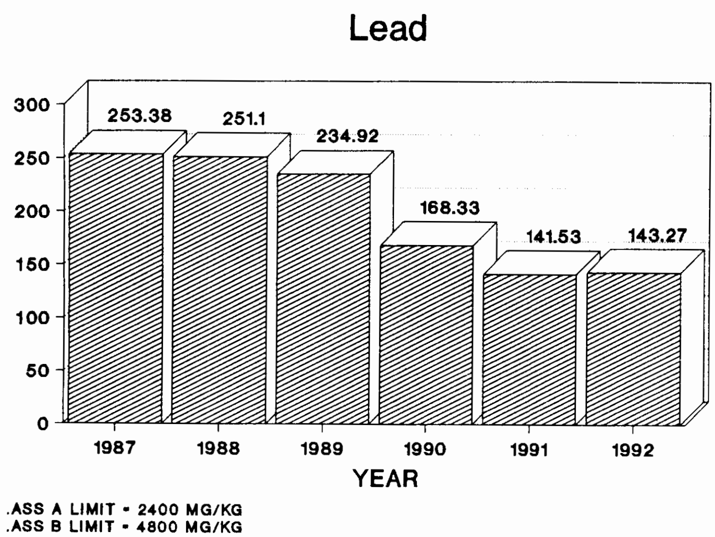


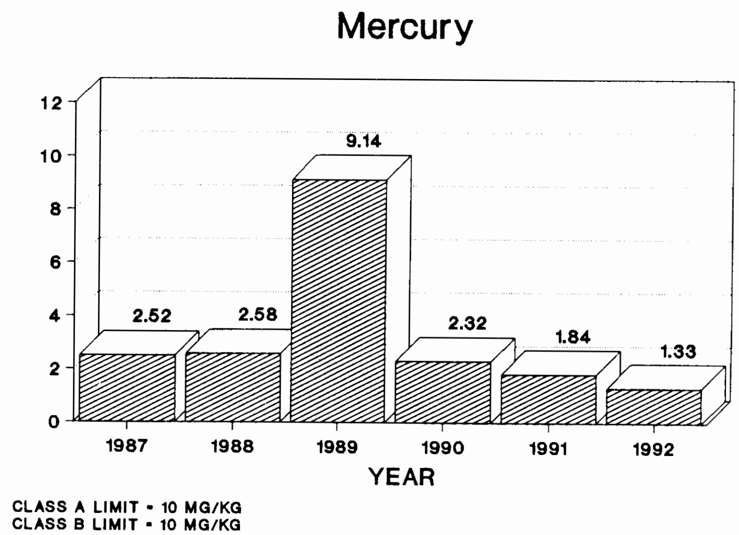
CLASS A LIMIT - 600 MG/KG
CLASS B LIMIT - 1200 MG/KG

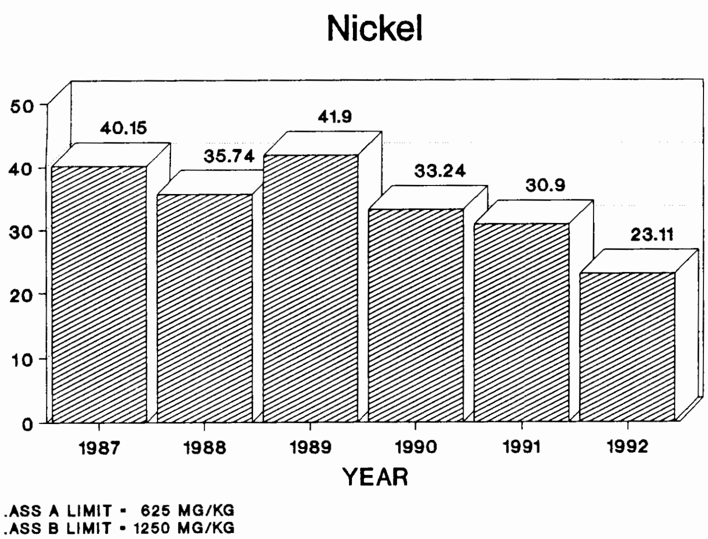
FIGURE 5H (CONT.)

TRENDS IN HEAVY METALS CONCENTRATIONS
SQAR DATA
CONCENTRATIONS IN MG/KG

CAMDEN COUNTY MUNICIPAL UTILITIES AUTHORITY







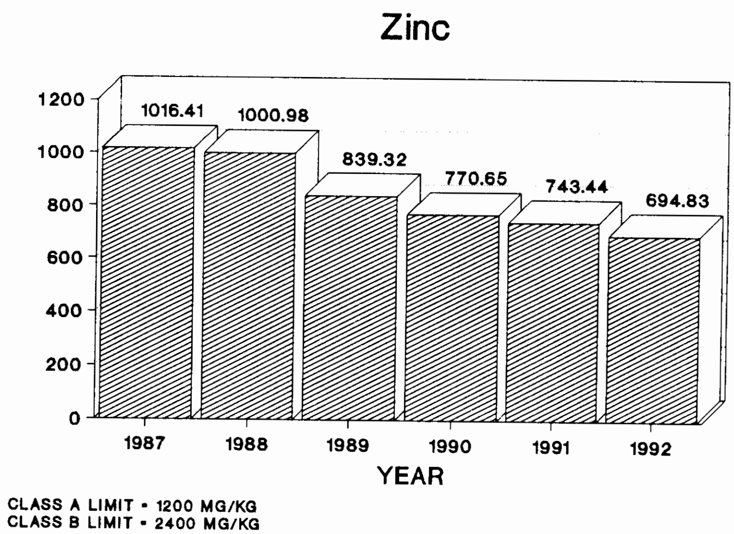
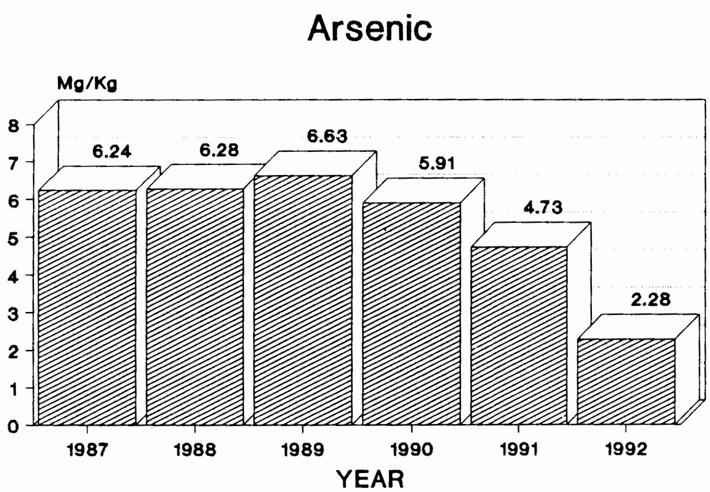


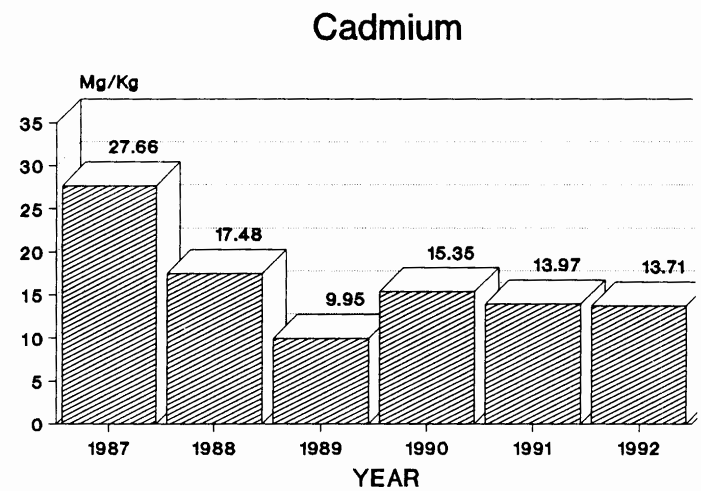
FIGURE 5I

TRENDS IN HEAVY METALS CONCENTRATIONS
SQAR DATA
CONCENTRATIONS IN MG/KG

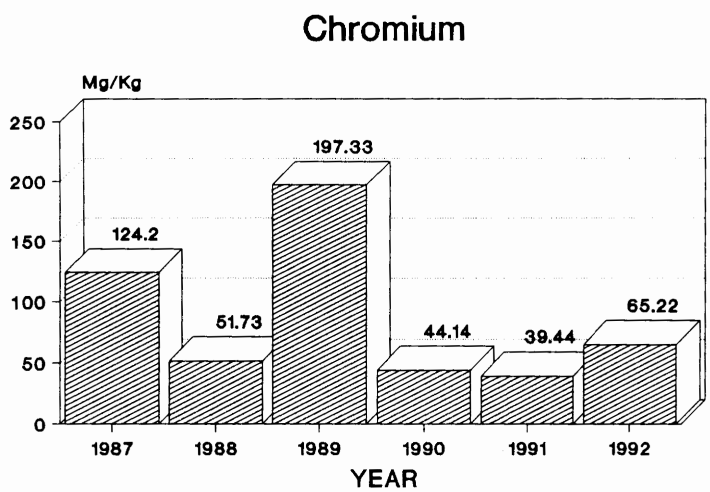
STONY BROOK REGIONAL SEWERAGE AUTHORITY



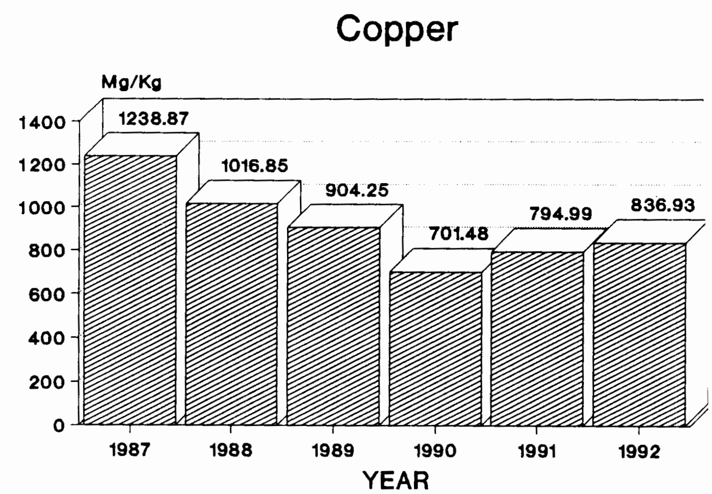
CLASS A LIMIT - 10 MG/KG
CLASS B LIMIT - 10 MG/KG



CLASS A LIMIT - 20 MG/KG
CLASS B LIMIT - 40 MG/KG



CLASS A LIMIT - 1000 MG/KG
CLASS B LIMIT - 1000 MG/KG



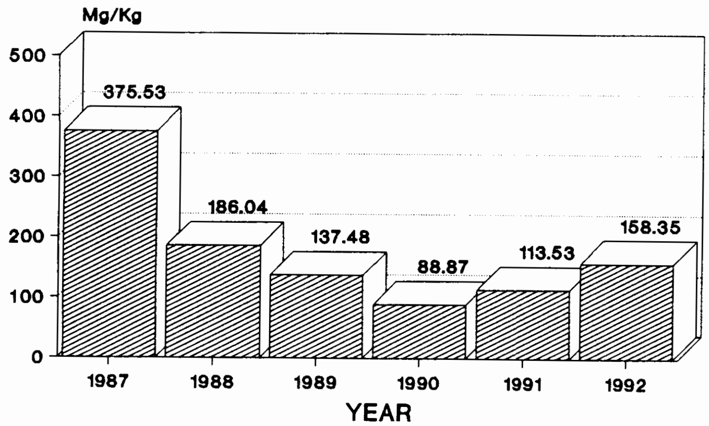
CLASS A LIMIT - 600 MG/KG
CLASS B LIMIT - 1200 MG/KG

FIGURE 5I (CONT.)

TRENDS IN HEAVY METALS CONCENTRATIONS
SQAR DATA
CONCENTRATIONS IN MG/KG

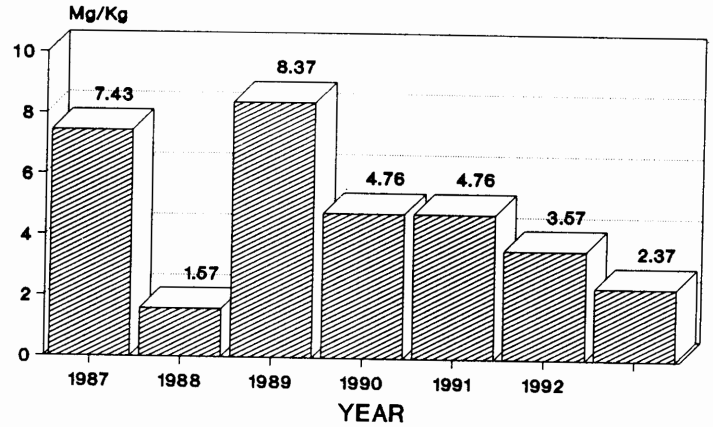
STONY BROOK REGIONAL SEWERAGE AUTHORITY

Lead



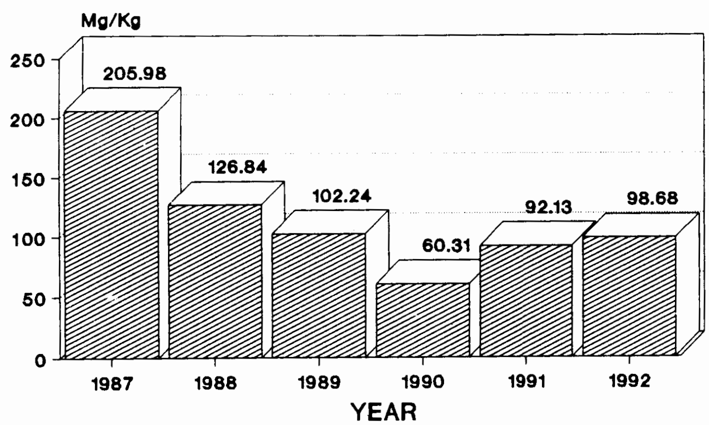
LASS A LIMIT - 2400 MG/KG
LASS B LIMIT - 4800 MG/KG

Mercury



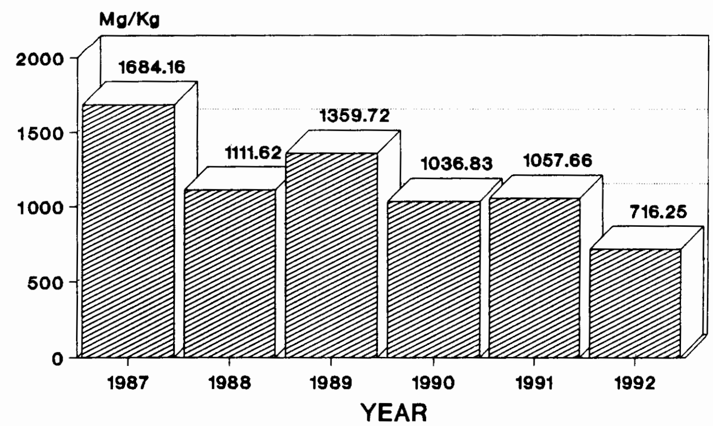
CLASS A LIMIT - 10 MG/KG
CLASS B LIMIT - 10 MG/KG

Nickel



LASS A LIMIT - 625 MG/KG
LASS B LIMIT - 1250 MG/KG

Zinc

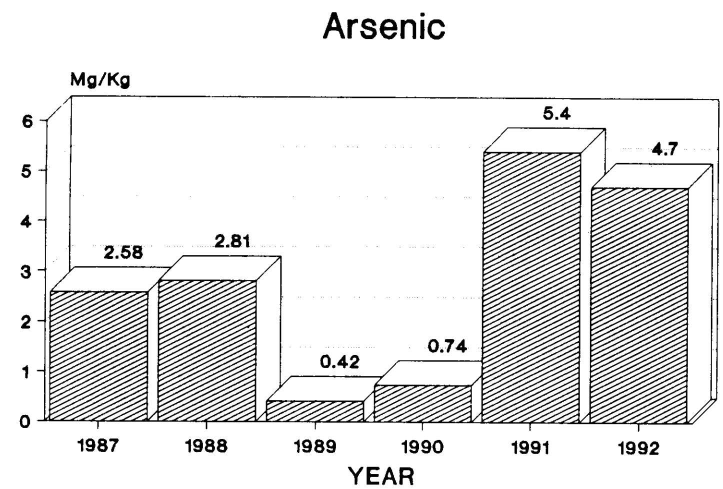


CLASS A LIMIT - 1200 MG/KG
CLASS B LIMIT - 2400 MG/KG

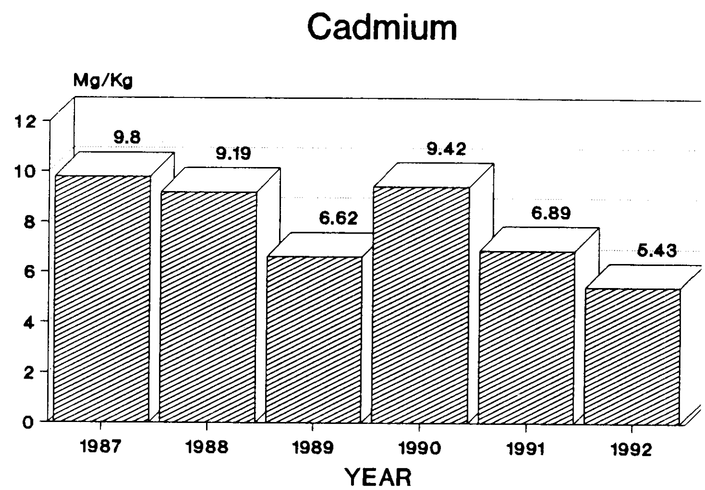
FIGURE 5J

TRENDS IN HEAVY METALS CONCENTRATIONS
SQAR DATA
CONCENTRATIONS IN MG/KG

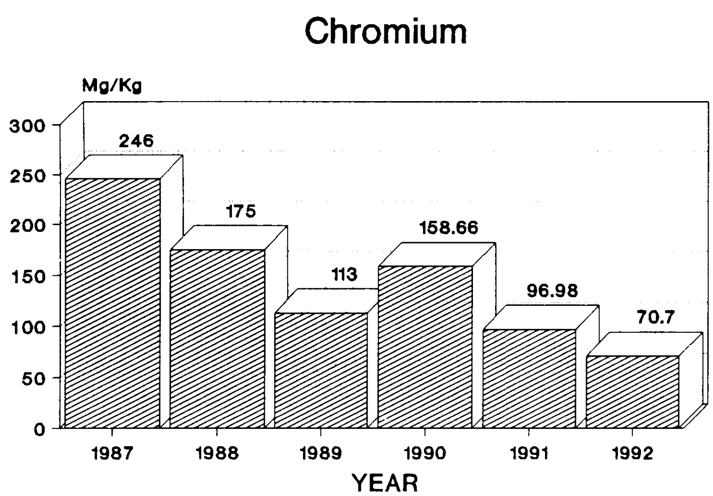
TWO BRIDGES SEWERAGE AUTHORITY



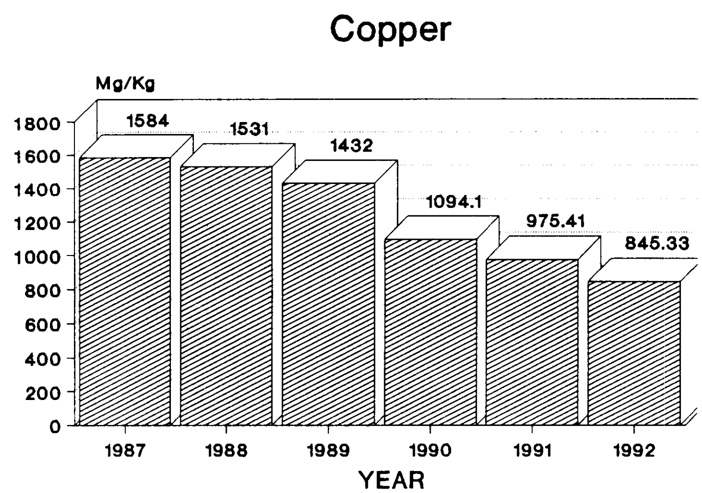
CLASS A LIMIT - 10 MG/KG
CLASS B LIMIT - 10 MG/KG



CLASS A LIMIT - 20 MG/KG
CLASS B LIMIT - 40 MG/KG



CLASS A LIMIT - 1000 MG/KG
CLASS B LIMIT - 1000 MG/KG

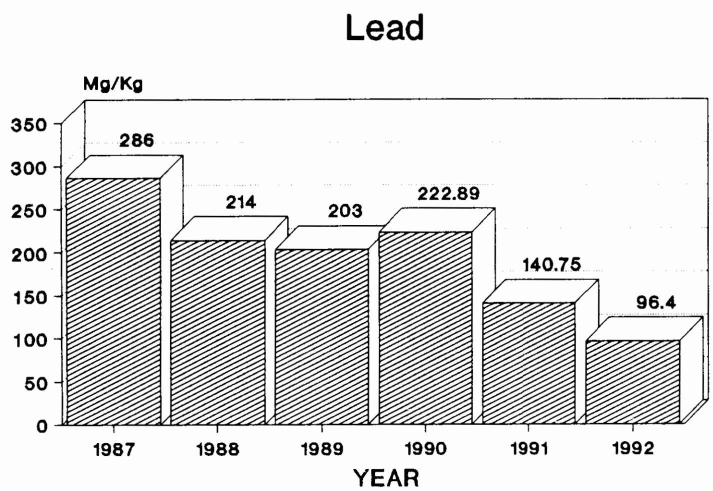


CLASS A LIMIT - 600 MG/KG
CLASS B LIMIT - 1200 MG/KG

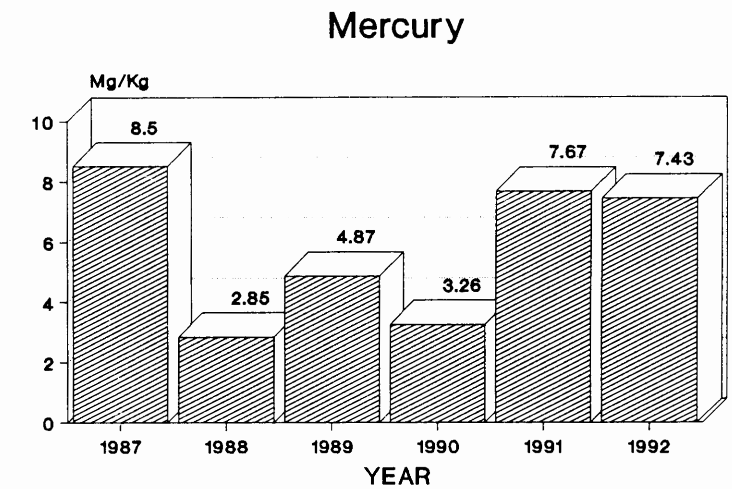
FIGURE 5J (CONT.)

TRENDS IN HEAVY METALS CONCENTRATIONS
SQAR DATA
CONCENTRATIONS IN MG/KG

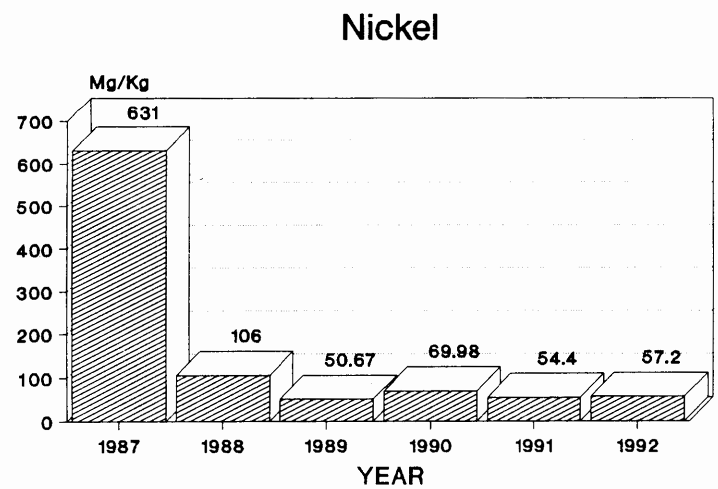
TWO BRIDGES SEWERAGE AUTHORITY



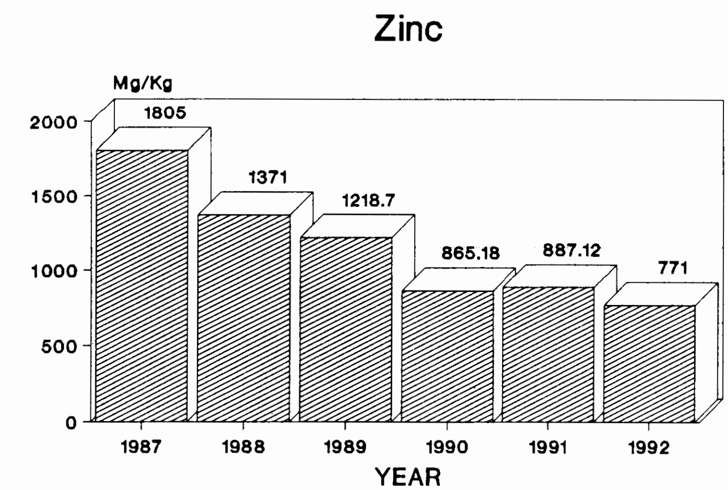
LASS A LIMIT - 2400 MG/KG
LASS B LIMIT - 4800 MG/KG



CLASS A LIMIT - 10 MG/KG
CLASS B LIMIT - 10 MG/KG



LASS A LIMIT - 625 MG/KG
LASS B LIMIT - 1250 MG/KG



CLASS A LIMIT - 1200 MG/KG
CLASS B LIMIT - 2400 MG/KG

NOTE: This figure supersedes 1987 SSMP Figure 3-10.

types of waste: domestic sewage from residential and commercial sources, and industrial discharges into the sewer. Contrary to popular belief, industrial discharges to DTWs alone cannot account for all Class C sludge generated in the state of New Jersey.

Figure 6 indicates that only 71 (or 16%) of the 442 total DTWs have industrial users. In addition, even though only 46% of the sewage sludge generated by volume has been determined to be Class A/B, see Table 21, a majority of DTWs by number have been found to be Class A/B. Figure 7 demonstrates that 67% of the DTWs for which quality determinations have been made are Class A/B. Furthermore, Figure 6 also indicates that a higher percentage of DTWs with industrial users (76%) than without industrial users (66%) have been determined to be Class A/B.

FIGURE 6

NEW JERSEY DOMESTIC TREATMENT WORKS

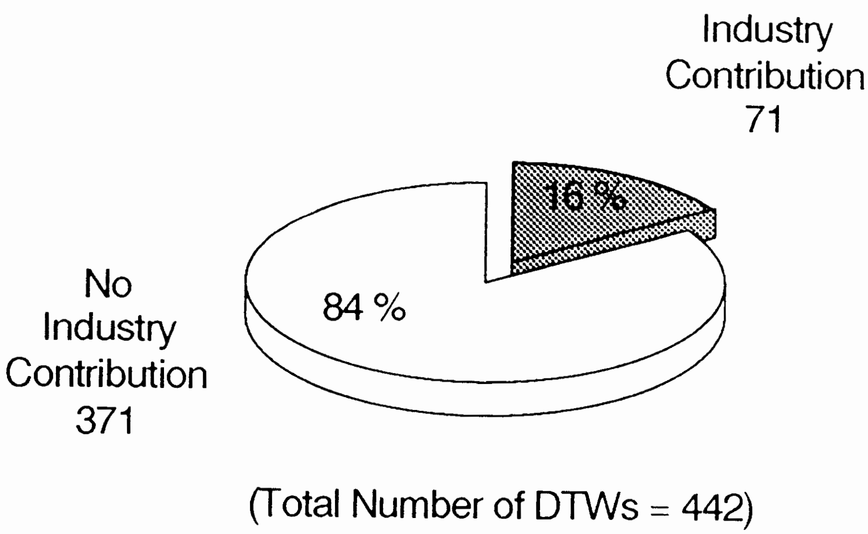
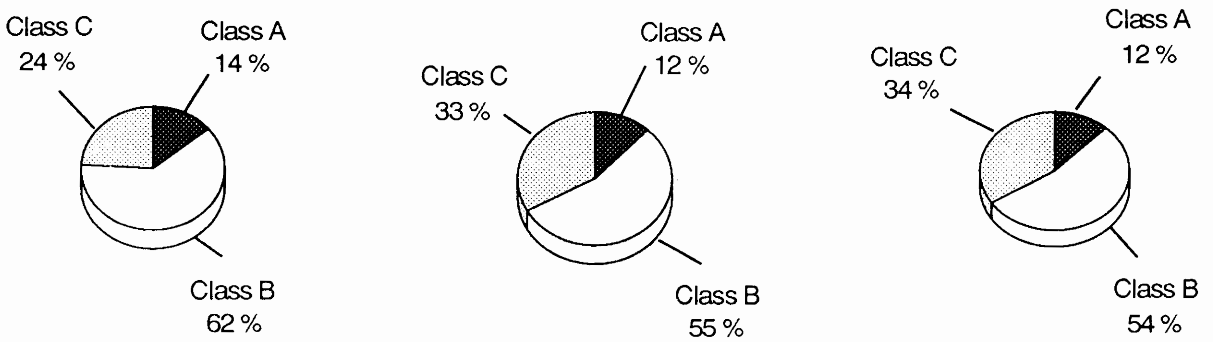


FIGURE 7

SLUDGE QUALITY OF DTWs
PERCENTAGE OF DTWs BY SLUDGE CLASS



WITH INDUSTRY | OVERALL | WITHOUT INDUSTRY

NOTE: **Although the above figure exclude the 254 smallest domestic treatment works for which determinations have not been made, the above figures account for 99% of the state's sludge production.**

4. Statewide Capacity Analysis:

This section provides an overview of projected sludge generation in the year 2000 and existing and planned capacity necessary to achieve in-state disposal self-sufficiency by the end of 1999. A step-by-step approach has been utilized to distinguish between existing and planned capacity through use of various management modes and technologies currently in operation.

Table 22 lists the existing permitted operations and agreements that are part of the existing sludge management infrastructure. These operations must be used to the maximum extent possible to resolve immediate and long-term sludge management needs. While this table provides individual permitted sludge management capacities, Table 9 references permitted wastewater treatment capacity at all DTWs across the state, which indicates a maximum generation of approximately 2,554,127 dp/d or 466,105 dt/y. This figure will be used as a baseline of needed management capacity due to the extreme difficulty of forecasting future sludge generation rates at this time. Changes in the PVSC service area alone, due to discharge modifications by Garden State Paper Company, Inc. and Marcal Paper Mills, Inc. as noted earlier, demonstrate the high degree of variability that can affect sludge production. The 466,105 dt/y figure will be utilized as a liberal estimate of generation for the purposes of this statewide capacity analysis and the goal of planning to achieve self-sufficiency, since contingency needs for downtimes and in-state capacity use by out-of-state generators are not considered. Future sludge generation rates are neither drawn from, nor intended, to provide a basis for individual DTW system planning and design efforts.

STEP A: As a fundamental assumption in this analysis, it has been assumed that capacity currently permitted at sludge incinerators, composting facilities, and alternate innovative technology facilities will remain in operation throughout the planning period until and after 2000. The following summarizes permitted capacity by management mode:

MANAGEMENT MODE	PERMITTED DAILY CAPACITY (dp/d)	THROUGHPUT CAPACITY (dt/y)	RESIDUAL * (dt/y)
Composting	147.5	53,838	0
Alternative Mgmt.	408.0	148,920	0
Incineration	311.0	113,515	34,055
TOTALS	866.5	316,273	34,055

* Assumes 30% ash by weight after combustion.

STEP B: As of 1992, approximately 9,940 dt/y of permitted capacity for sludge land application has been approved in New Jersey. The department further projects that the application of additional pretreatment programs, establishment of permanent household hazardous waste collection facilities across the state, and education of citizens on proper management of liquid wastes, will result in cleaner sludges and greater opportunities for land application. Only 46% of New Jersey's sludge falls in Class A or B quality categories, which are predominantly the sludges most amenable to land application practices, although some Class C sludges are currently land applied on a more limited duration basis. About 55% of all Class A and B sludges generated are managed via beneficial use. Assuming a statewide objective of increasing land application by 50% over current rates, it can be projected that approximately 14,910 dt/y of sludge will be land applied by 2000. From these estimates, 14,910 dt/y can be further deducted from the capacity shortfall of 149,832 dt/y, to indicate a remaining shortfall of 134,922 dt/y.

STEP C: The critical final step in the analysis is to project the planned capacity and operational dates for new capacity on a statewide basis. In the case of sludge, this primarily translates to projects embodied in JCDs entered by four of the six former ocean dumpers with the USEPA and DEPE. The following summarizes each major generator, the planned management mode, an estimate of its planned capacity using sludge production projection at maximum permitted wastewater plant flows and the planned operational date. These projections were developed to provide consistency between the baseline of needed management capacity and the management capacity planned to be developed by major DTWs, and as such should not supplant individual DTW planning and design efforts. The MCUA project is not listed here since it is already operational and was included in the permitted capacity summary in Step A above. Further, the RVSA negotiated a JCD revision to allow for use of existing in-state beneficial use capacity. Therefore, it is probable that no new in-state capacity will be developed by RVSA.

GENERATOR	MANAGEMENT MODE	PLANNED CAPACITY (dt/y)	DATE
BCUA	Alkaline Stabilization	21,900	1995
JMEU	Thermal Drying/Pelletization	9,855	1997
LRSA *	Composting	4,380	1996
PVSC **	Beneficial Use (77%) Other Disposal (23%)	124,100 36,500	1998
TOTAL		196,735	

* Presently negotiating a revised JCD to allow contract beneficial use. Therefore, LRSA's planned composting capacity may not be developed.

** This figure represents the PVSC, CAC's recommendation that 340 dt/d of PVSC's sludge production can be managed through beneficial use. The other 23% of PVSC sludge production must be marketed beyond the 50 square-mile marketing area identified or managed through disposal strategies.

From these estimates of planned capacity, the total figure of 196,735 dt/y can be deducted from the statewide shortfall of 134,922 dt/y to demonstrate the feasibility of achieving self-sufficiency in the next seven years. This results in a projected excess capacity of 61,813 dt/y as seen below.

STEPS A - C EQUATION SUMMARY	
Sludge Production at DTW Permitted Capacity	466,105 dt/y
Less DTW Aggregate Existing Production Throughput (Composting, Alternative Management, Incineration and Land Application	- 331,183 dt/y
Subtotal	134,922 dt/y
Less Planned Capacity of DTWs Under JCDS	- 196,735 dt/y
Projected Excess Capacity	61,813 dt/y

Policy Discussion: From the above analysis of the projected availability of existing capacity (316,273 dt/y), planned capacity (196,735 dt/y), primarily as embodied in the JCDs and expanded land application (14,910 dt/y), New Jersey would actually become self-sufficient in disposal capacity in 2000. For this to occur, pretreatment and improvements in sludge quality will be critical, as well as diligent oversight of JCD implementation schedules.

From a broad policy perspective, in line with Sections B.3.,5.,6. and 7., the DEPE's objective will be to reduce dependence on existing sludge incinerators and increase beneficial use and land application. Much of the on-site generated and customer sludge currently processed at existing incinerators is of suitable quality for land application. As opportunities increase over time for land application and beneficial uses of sludge, it is anticipated that sludge management economics will drive DTWs to beneficial management of their sludge production.

It also must be stressed that the assumptions used in the above analysis represent, in particular, achievement of all scheduled timeframes for the implementation of long-term management projects identified within the JCDs for the four noted major generators. This will be an ambitious, yet achievable goal, to which the department is committed. However, it can not be overstated that a concerted effort on the part of all involved parties will be necessary to bring current plans to fruition.

TABLE 22

NJDEPE PERMITTED SLUDGE MANAGEMENT AGREEMENTS AND OPERATIONS

TABLE 22

FACILITY	PERMIT NUMBER	TYPE OF MANAGEMENT (201 GRANT NO.)	PERMITTED [2] CAPACITY (dp/d)
Atlantic County			
Atlantic Co. UA	37812	Incineration (C340344-01)	48,000
Buena Boro MUA	0021717	Composting	1,000
Hammonton WWTP[1]	0025160[1]	Incineration thru Agreement with: ACUA	2,028
Bergen County			
Northwest Bergen County UA	65736	Incineration (C340687-05) (non-operational)	28,000
	80629	Incineration	48,000
Burlington County			
Applied Land Sciences	0052621	Land Appl., Storage & Lime Stabilization	7,452
Applied Land Sciences	0054305	Land Appl., Storage & Lime Stabilization	2,466
Burlington City	0024660	Reed Beds (non-operational)	5,600
Pemberton Twp. MUA	0050415	Land Application	3,644
Mack McKenzie Inc.	0057801	Land Appl., Storage & Lime Stabilization	5,753
Burlington County Composting Project	0082741	In Vessel Composting (planned)	110,000
Beverly City SA	0027481	Reed Beds	1,700
Johnstone Training Center	0027375	Reed Beds	100
New Lisbon Devel. Center	0021768	Reed Beds (under construction)	659
Mt. Holly SA	0024015	Wet Air Oxidation (340251-01)	29,000
Camden County			
Camden Co. MUA MOA w/Philadelphia	NA[7]	Composting	40,000
Camden Co. MUA	0026182	In-Vessel Composting (under const)	100,000
Camden Co. MUA	71228	Incineration	16,400
Ancora Psychiatric Hosp.	0021962	Reed Beds	412
Cape May County			
Caprioni's Sewer Serv.	0098884	Land Appl. & Lime Stabilization	986
Cape May Co. MUA	0059986	In-Vessel Composting (C340661-06)	40,000
Woodbine Devel. Center	0021172	Reed Beds	542
Cumberland County			
Cumberland Co. UA	0052167	Land Application	4,658
	0052175	Land Application	3,781
	0081949	Land Application	1,918
Millville SA[1]	0029467	Incineration thru Agreement with: ACUA	9,200
Landis SA	0025364	Land Application	10,630
Essex County			
Passaic Valley SC	0021016	Wet Air Oxidation (C340369-02)	1,152,000
Essex Co. Hosp. Ctr.		Reed Beds	38

TABLE 22			
FACILITY	PERMIT NUMBER	TYPE OF MANAGEMENT (201 GRANT NO.)	PERMITTED[2] CAPACITY (dp/d)
<u>Gloucester County</u>			
Gloucester Co. UA	8642	Incineration (C340284-01)	34,000[3]
	NA[6]	Incineration (under constr.)	72,000
<u>Hudson County</u>			
Hoboken-Weehawken-Union City SA[1]	0026085	Alkaline Stablization through Agreement with Agorganic	32,531
Bayonne Military Ocean Terminal	0020257	Reed Beds	2,000
Secaucus MUA[1]	0025038	Incineration thru Agreement with: TBSA	5,530
<u>Hunterdon County</u>			
Lambertville SA	0098426	Land Application (C340527-01) (non-operational)	2,329
Readington-Lebanon Sewerage Authority	0099864	Land Application	219
Salvation Army-Camp Tecumseh	0023001	Reed Beds	30
Clinton STP[1]	0020389	Incineration thru Agreement with: SBRSA	2,000
Arrow Mill[1]	0067229	Incineration thru Agreement with: SBRSA	11
<u>Mercer County</u>			
Stony Brook RSA	51279 51280	Incineration (C340400-02)	192,000[4]
Mercer Co. IA	0067083	Oil-Immersion Dehydration (C340416-08) (under construction)	222,000
East Windsor MUA[1]	0023787 0067211	Incineration thru Agreement with: SBRSA	9,955
Educational Testing Service	0022110	Incineration thru Agreement with : SBRSA	148
<u>Middlesex County</u>			
Middlesex Co. UA	0080713	Advanced Alk. Stabilization	576,000
Old Bridge Board of Education	0022306	Reed Beds	30
Jamesburg Training Ctr.	0028479	Land Application (non-operational)	1,836
<u>Monmouth County</u>			
Middletown Twp. SA	0025356	Composting (C340685-01)	10,000
Bayshore RSA	9055	Incineration (C340462)	36,000[3]
	NA[6]	Incineration (under construction)	54,000
Marlboro Psychiatric Hosp.	22586	Reed Beds	2,300
Western Monm. UA	0083933	Reed Beds	4,535
Borough of Roosevelt[1]	0022918	Incineration thru Agreement with: SBRSA	203
Three G's of Freehold	NA[6]	Gasification (under construction)	290,000

TABLE 22			
FACILITY	PERMIT NUMBER	TYPE OF MANAGEMENT (201 GRANT NO.)	PERMITTED [2] CAPACITY (dp/d)
Morris County			
Pequannock-Lincoln	22806	Incineration (C340354-01)	72,000 [3]
Park-Fairfield SA	NA[6]	Incineration (under construction)	72,000
Parsippany-Troy Hills	45873	Incineration	84,000 [3]
Rockaway Valley[1] Regional SA	45874	(C340333-01)	84,000
	0022349	Incineration thru Agreement with: Wayne DPW	10,000
Musconetcong SA	0027821	In-Vessel Composting (under construction)	8,000
Morris Twp. DPW[1]	0024911	Incineration thru Agreement with: TBSA	8,405
	0024929		2,216
Florham Park SA[1]	0025518	Incineration thru Agreement with: TBSA	50
Plains Plaza[1]	0026514	Incineration thru Agreement with: TBSA	600
Washington Twp. Schooley's Mtn.	0023493	Reed Beds	5,176
Hanover SA	0024902	Incineration thru Agreement with: ParTroy	
Madison-Chatham SA	0024937	Alkaline Stabilization with Agorganic	4.206
Ocean County			
Ocean County UA	0029408	Oil-Immersion Dehydration (C-340714-03)	100,000
Passaic County			
Wayne Twp. DPW	13471	Incineration	40,000 [3]
	13472	(C340392-01)	40,000
Ringwood Plaza[1]	0032395	Incineration thru Agreement with: TBSA	22
		Incineration thru Agreement with: TBSA	
West Milford MUA[1]	0027669	Incineration thru Agreement with: TBSA	1,484
	0026174		
	0027685		
	0027677		
	0051098		
	0028541		
Wanaque Valley RSA[1]	0053759	Incineration thru Agreement with: TBSA	2,856
Ringwood Board of Education	0029432	Incineration thru Agreement with: TBSA	37
	0034169		45
Ringwood Acres[1]	0027006	Incineration thru Agreement with: TBSA	
Pompton Lakes[1]	0023698	Incineration thru Agreement with: Wayne	4,337
Salem County			
Pennsville SA	0021598	Composting	2,000
Ash Lane Farms	0073806	Land Appl., Lime Stabl. & Storage	4,740
Woodstown STP[1]	0022250	Land Appl. thru Agreement w/: Ash Lane Farms	740
Somerset County			
Somerset Raritan Valley SA	5410	Incineration	33,600 [3]
	35182		71,200
North Princeton Devel. Ctr.	0022390	Reed Beds (under construction)	1,445
Sussex County			
Sussex County MUA	0053350	Composting (C340406-05)	24,000
Union County - None			

FACILITY	PERMIT NUMBER	TYPE OF MANAGEMENT (201 GRANT NO.)	PERMITTED [2] CAPACITY (dp/d)
TABLE 22			
Warren County			
AgOrganic, Inc.	0050512	Land Appl., Lime Stab. & Storage	4,055
		Advanced Alkal. Stabilization	220,000
Phillipsburg[1]	0024716	Incineration thru Agreement with: TBSA	5,310
		Par Troy	1,930

FOOTNOTES:

1. Generator SMPs were accepted pursuant to the requirements of the SSMP. These facilities/operations identified are to be considered a part of the existing infrastructure and must be included as part of DSMPs unless it can be demonstrated such facilities and operations are not operated and maintained in accordance with all applicable health and environmental standards.

2. Daily capacities are based on existing permit limits.

3. Incinerator used to provide backup capacity or will be used to provide backup capacity upon completion of incinerator under construction.

4. Capacity includes that of both incinerators because they are permitted to operate at the same time.

5. 201 plan has been approved, but has not been implemented.

6. Incinerators that have been issued permit to construct but have not been issued a final permit number.

7. Composting occurs in Philadelphia under permit issued by PADER. Distribution of resultant product regulated by NJPDES permit no. NJ0026182.

NOTE: This table supersedes 1987 SSMP Table 6-1.

From the above summary of presumed continued availability of existing capacity in 2000, total projected throughput capacity of 316,273 dt/y can be deducted from total projected generation of 466,105 dt/y to leave a capacity shortfall of 149,832 dt/y.

D. INTERRELATIONSHIP OF STATE AND FEDERAL PROGRAMS

1. Termination of Ocean Dumping

Prior to 1991, approximately half of New Jersey's municipal sewage sludge was disposed of in the ocean. Ocean disposal was largely regulated through the federal government, as disposal activities occurred beyond the state's three-mile territorial limit. In 1971, New Jersey passed legislation in order to attempt to aggressively regulate ocean dumping through the state Clean Ocean Act, but federal legislation in 1972 preempted the state's initiative. The federal Marine Protection, Research and Sanctuary Act of 1972 authorized the USEPA to review, grant and enforce permits for all dumping of sewage sludge into the marine environment.

Since the late 1950's, there were periodic waves of concern about the environmental impacts of ocean dumping due to periods of high algal growth, low dissolved oxygen levels, and appearance of sediments. In the summer of 1976, a massive fish-kill incident occurred, with an area of severe oxygen depletion due to algal growth that spread from Sandy Hook to Avalon, a distance of about 100 miles. Although later investigations identified several natural contributors to the incident, the widespread perception was that ocean dumping had been a major factor contributing to the algal growth.

Due to high levels of public concern, Congress voted in 1977 to impose a 1982 deadline for ending ocean dumping. However, a federal court ruled in 1981 that Congress did not intend to end all ocean dumping and it prevented enforcement of the ban with regard to sewage sludge.

New Jersey remained concerned about long-term environmental impacts of ocean disposal. In 1982, a committee was created within the Department of Environmental Protection (now DEPE) to formulate an alternative strategy for handling wastes being dumped in the ocean. The Committee on Ocean Waste Management was formed to coordinate the programs and policies of the department on practices and alternative methods of waste disposal that affected the ocean and near-shore coastal environment.

In the late 1980's, incidents of floating debris and bacterial pollution forced a number of beach closings escalating public concern about ocean dumping to new heights. In 1987, the sludge dump site located 12 miles from Sandy Hook was closed, and a new site off the continental shelf, 106 miles from shore, was opened. In July 1988, the New Jersey Ocean Sludge Dumping Elimination Act (N.J.S.A. 58:10A-44) was passed requiring the cessation of ocean disposal of sewage sludge by New Jersey sewage authorities by March 17, 1991. Later in 1988, Congress passed the Ocean Dumping Ban Act, making it unlawful for any sewage authority to dispose of sewage sludge in the ocean after December 31, 1991. All six New Jersey sewage authorities that had been using this mode of disposal ceased ocean dumping as of March 17, 1991.

The Ocean Dumping Ban Act established fees for ocean disposal prior to the 1991 deadlines and civil penalties for dumpers that continue dumping after the deadline.

In New Jersey, half of the funds from these fees and penalties went into the "Clean Oceans Fund", from which monies were annually disbursed back to the ocean-dumping authorities for implementation of land-based alternatives. All of this money has been disbursed as of 1992. The other half of the fees and penalties went into a special account in the Wastewater Treatment Trust State Revolving Fund to be used in financing low-interest loans for future projects to be undertaken by the ocean dumpers.

2. Judicial Consent Decrees for Former Ocean Dumping Authorities

As discussed earlier, six New Jersey sewerage authorities were still utilizing ocean disposal in the 1980's: Bergen County Utilities Authority, Joint Meeting of Essex & Union Counties, Linden-Roselle Sewerage Authority, Middlesex County Utilities Authority, Passaic Valley Sewerage Commissioners, and Rahway Valley Sewerage Authority. Following passage of state and federal laws to end ocean dumping, these authorities were placed under court orders to ensure the phasing out and termination of ocean dumping. The JCDs for each authority were negotiated and signed by the DEPE, New Jersey Office of the Attorney General, USEPA, U.S. Justice Department, and the respective authority. Each included a timetable for termination of ocean dumping and implementation of both interim and long-term sludge management plans, with key milestones to be met by the authorities.

At the time the JCDs were negotiated in 1988-89, five of the six authorities expected to use incineration as their long-term sludge management option. The MCUA was the only authority to originally select a beneficial use program. Due to increasing public concern about incineration, and a growing consensus that beneficial use of sewage sludge was a realistic long-term management option, the remaining authorities began to consider beneficial use options. RVSA was first to renegotiate its JCD to reflect a beneficial use management strategy. Three of the remaining four have modified their JCDs to abandon incineration and adopt beneficial use as their long-term management strategies. PVSC, the largest of the facilities, is now conducting a beneficial use study and analysis to determine to what extent it can move toward beneficial use management.

3. Current Grants and Research Initiatives

Current Research:

Until recently, most research relating to sludge issues was conducted at the federal level. During the 1980's, a statewide assessment of sludge quality was undertaken, and research was conducted to determine the background levels of various sludge constituents in New Jersey soils. With the emergence of a commitment to implement beneficial uses, the DEPE has taken several steps to engage research staff, both within the DEPE and externally, in research efforts to address key issues in beneficial use management at the state level.

a. State and Federal Standards Research:

As described under Section B.8 earlier, the DSR has been actively engaged in the development of a set of standards reflecting the latest scientific evidence relating to sludge contaminants. To coordinate research efforts relating to sewage sludge standards, the DSR created a Technical Standards and Research Committee (TSRC), including both DEPE scientific staff and research and technical professionals from organizations outside the DEPE. Members of the TSRC were selected based on their expertise in scientific and technical issues relating to the beneficial use of sludge. An intensive effort was made during 1991 and 1992 to prepare a set of recommendations for four key sludge contaminants: cadmium, copper, lead and pathogens. The second draft of this set of recommendations has been completed and is being reviewed by the department.

b. Sampling and Analysis Research:

The DEPE Bureau of Radiation and Inorganic Analytical Services (BRIAS) contracted with the Bureau of Pretreatment and Residuals to validate the Sludge Quality Assurance Regulations (SQAR) methods for the analysis of metals and other inorganic parameters. While a statewide assessment of laboratory interpretations of SQAR methods and estimates of attainable laboratory detection levels has been initiated, due to the magnitude of the task, the DEPE is considering contracting for the continuation of this assessment. Information from this survey project will eventually enable determination of commercial laboratory detection levels for various compounds. Initial emphasis will be on cadmium, copper and lead such that a comparison between proposed ultimate sludge standards and laboratory capabilities can be made. Efforts are under way with the National Institute for Standards and Technology to produce an industrial sludge reference materials as part of the validation study.

c. Sludge Application Site; Field Research:

DSR has initiated a multi-part research project with the NJAES that will assess metals levels in the soils and ground water at sites in Ocean County where liquid sludge had been applied for three years beginning in 1973. Comparisons will be made for plots that were cleared, as well as for wooded plots. This study (Fields, et al.) offers the opportunity to observe the long-term effects following cessation of sewage sludge application to permeable, sandy soils. A report will also be prepared based on 1992 and 1993 data comparing the vegetation from one of the wooded sludge application sites with that at its respective wooded control site. Data from these studies should address some of the initial concerns raised by Pinelands Area citizen groups and the Pinelands Commission. Funding for the study is being provided through past state appropriations.

d. Memorandum of Agreement with the Pinelands Commission:

In January 1993, the DEPE and the Pinelands Commission finalized negotiation of a Memorandum of Agreement (MOA) to formalize a framework to coordinate the review procedures and controls proposed for the use of sludge and SDP on the lands within the Pinelands Area. In addition to limiting applications in the Pinelands Area, the MOA outlines an ecological research and monitoring program to assess the impact of various land applications of composted sludge in the Pinelands Area. Following the completion of this research and monitoring program, the DEPE and the Pinelands Commission may modify the MOA, as appropriate, based on the research results. As of the printing of this document, the DEPE was attempting to locate an appropriate funding source for the ecological research and monitoring program.

e. **Review of Scientific Literature on Fate and Transport:**

NJAES will be conducting a scientific literature review and critical analysis of the fate, transport, and biological pathways of sludge constituents resulting from application of sludge and sludge products to land, in various media, plants, soil microflora and fauna, animal organs and products, and aquatic life. Comparisons will be made between sludge constituents and constituents in fertilizers, soil amendments, and organic materials such as animal manures and plant residues. Sludge constituents to be investigated include nutrients, heavy metals, pathogens, pesticides, volatile, semi- and non-volatile organics, and radionuclides.

Future Research:

Part of the original mandate of the TSRC was to prepare a list of additional research needed regarding beneficial uses of sludge. This proposed list of research topics will be a component of the final version of the report "Technical Standards for Beneficial Use of Sewage Sludge in New Jersey," which will also summarize recommendations for standards. Following is a summary of the areas of research deemed to be of highest importance by the TSRC.

- Resolution of ambiguity in SQAR methods pertaining to whether a laboratory analyzes sludge based on an arbitrary sample size and then adjusts for percent solids, or determines percent solids first and then analyzes for a sample that would be equivalent to one gram of solid. Currently, SQAR data reveals discrepancies in sample detection limits of several orders of magnitude, due in part to this ambiguity.

- Determination of long-term fate and transport of metals in sludge-amended soils over time, with an emphasis on deep soil cores, ground water sampling, native plants, and resident wildlife indicators.

- Comparison of sludge products with commercial fertilizers and soil additives, in terms of long-term impacts on the soil and environment.

- Evaluation of background levels of metals in soils from New Jersey farms.

- Study to obtain adsorption/desorption coefficients and release rate constants for metals in sludge or sludge/soil mixtures to the aqueous phase, to predict potential for leaching of metals.

- Investigation of sludge contaminant sources through a detailed mass balance analysis of point and non-point sources of contaminants through a single sewerage system. The second part of the study would develop a theoretical framework to predict long-term fate of pollutants through beneficial uses of sludge, for the purpose of developing guidance for optimal industrial pollution prevention strategies.

- Measurement of radionuclides in sludges from DTWs throughout New Jersey.

- Study of bioavailability of metals in sludge/soil by direct human ingestion, and uptake by wildlife, including deer, and farm animals.

- Studies of plant uptake of metals over time and with changes in soil chemistry.

- Development of surveillance methods for sludge-exposed humans and animals. Criteria need to be developed for the proper design and implementation of appropriate surveillance systems to obtain useful, meaningful data.

- Review of characteristics of other beneficial use technologies, including alkaline stabilization, in terms of potential environmental impacts.

In addition, a request for proposal has been issued by the DEPE for a research project investigating alternative technologies for sludge and SDPs. This would include a complete literature review and assessment as well as actual demonstration of a beneficial use technology or application of technology transfer.

The DEPE welcomes input on these and other research topics that would be strategically useful in moving toward beneficial use.

At present, the DEPE is attempting to identify potential funding sources for the continuation of this much needed research. In the past, little federal funding was available for state-sponsored research of this type. Recognizing the urgent need for research supporting beneficial use initiatives, the USEPA has begun over the past year to authorize funds for state-sponsored research relating to development and marketing of sludge beneficial use products.

As part of its new research emphasis, the USEPA has initiated a major research program to support a model beneficial use strategy in the New York-New Jersey region. Funds from USEPA, in conjunction with the Cooperative State Research Service of the U.S. Department of Agriculture, will be allocated through a consortium of governmental and academic institutions including Rutgers, DEPE, the New York Department of Environmental Conservation, Cornell University, NJIT and representatives from the agricultural community, environmental groups, municipalities and bankers. The goal of the effort will be to identify those factors inhibiting beneficial use, and strategies for overcoming them, through several research, demonstration, public education and risk assessment studies. Areas of research currently under consideration include applications of sludge and sludge compost in environmentally sensitive areas and assuring sludge quality from both analytical and methodological perspectives.

The DEPE has formally requested to participate in this regional USEPA funding program, and future funding programs at the federal level. In addition, state funding through the New Jersey Recycling Fund and NJPDES permit program is being explored for the purpose of supporting sludge-related research.

E. PROGRAMMATIC BACKGROUND

1. Historical Overview of 1987 Statewide Sludge Management Plan

Sewage sludge management is a relatively recent development in the history of human waste management. In primitive societies, human wastes were simply deposited in holes dug in the ground. In early cities, human waste was often dumped into ditches that ran along streets, resulting in odors and numerous health problems. With the rise of modern sanitation in the late 1800's, sewer lines were laid to carry the waste away. The waste still was released untreated directly to the environment, but in less populated areas.

As concern about the health and environmental impacts of raw sewage grew, the first municipal treatment facilities were built. The first treatment facilities relied primarily on mechanical separation of the solid and liquid portions of wastewater, achieving a "primary" level of treatment. Later, a biological treatment phase was added to the process, utilizing high concentrations of bacteria to break down and digest the waste matter, producing a sludge composed of cell masses and organic by-products of this microbial digestion. Such biological treatment raised wastewater treatment to a "secondary" level.

Modern wastewater treatment facilities provided for a cleaner discharge into waterways, but they also created large amounts of sludge to manage. During the years preceding the 1970's, the public became increasingly concerned about the health and environmental impacts associated with improperly controlled sludge management, which for the most part, constituted open dumping on land or in the ocean. Adverse impacts to water supplies, recreational facilities and fisheries, as well as odors, were among the public concerns.

Congress and the New Jersey Legislature reacted by enacting several pieces of legislation. These included the New Jersey Solid Waste Management Act (SWMA), originally passed in 1970 and periodically amended, and the Federal Marine Protection, Research, and Sanctuaries Act (MPRSA) of 1972. The SWMA established guidelines for proper operation and maintenance of landfills, and amendments to the MPRSA placed a ban on ocean dumping to begin in 1991. It became apparent that the addition of sludge to landfills resulted in increased environmental problems. Rainfall percolating through or running off of a landfill picks up contaminants from wastes deposited there, and can carry them into ground and surface waters. Although the addition of a plastic lining, and leachate collection and treatment system can prevent contamination of water, the addition of sludge to the landfill significantly adds to the volume of leachate that must be handled. Similarly, landfills produce methane through the anaerobic decomposition process occurring within the landfill, and sludge contributes significantly to methane production. If not properly vented and controlled, methane is a potential source of fire, explosion and air pollution. Untreated sludge also adds to odor problems at landfills.

Due to concerns about environmental impacts, 1976 amendments to the SWMA began to place restrictions on landfilling of bulk liquids and hazardous waste.

There was some confusion at the time as to whether the category of "bulk liquids" included sludge and septage. Then-Attorney General John J. Degnan advised the department, in a letter of November 20, 1979, that sludge and septage would be considered bulk liquids and therefore, in accordance with the 1976 amendments, could only be disposed of in landfills with liners and leachate collection systems.

At the same time, the number of landfills that met state requirements for operation began to drop rapidly. In 1970, there were approximately 400 landfills operating in New Jersey, many of which accepted sludge. Many of these reached their capacity, and many were closed by the department for environmental reasons. As of 1981, only 75 remained open for disposal of sludge.

Sludge disposal in landfills was further constrained by the Pinelands Management Plan, Sections 6-704 and 6-705 (later codified as N.J.A.C. 7:50-6.74) that prohibited the disposal of solid waste and sludge generated outside the Pinelands in Pinelands landfills (effective January 14, 1981). As of 1980, there were 43 active landfills in the Pinelands Area, and approximately a dozen of these accepted a total of 52 million gallons per year of sewage sludge and septage. None of the landfills had a leachate collection system or liner as of 1980. Because of the nature of the soils in the Pinelands Area, and the fact that the entire Pinelands Area was a ground water recharge area, the decision was made to exclude solid waste and sludge from outside the Pinelands. Enforcement of the Pinelands exclusions forced sludge generators to seek more distant disposal sites at higher costs.

Due to heightened concern throughout the state about landfill disposal of sludge, additional amendments to the SWMA in 1980 called for the cessation of landfill disposal of sludge by March 15, 1985 and the disposal of septage in landfills by March 15, 1981, except in cases of emergency as determined by the department.

In June of 1981, the closure of several major landfills to sludge generators resulted in the beginning of what came to be known as the "Statewide Sludge Crisis." The crisis lasted several years, during which time the department worked actively with authorities in finding alternatives to landfill disposal.

In February 1982, the department mailed a notification to sludge generators that in accordance with N.J.A.C. 7:14A-2.5(a)15 and 7:14A-3.13(a)15, of the New Jersey Pollutant Discharge Elimination System (NJPDES) regulations, all generators would be required to cease landfilling sludge by March 15, 1985, and would be required to submit a plan for termination of sludge disposal in landfills.

As of the summer of 1984, 30% of New Jersey's sludge was still disposed of in landfills, 56% was disposed of in the ocean, 6% was land applied, 4% was incinerated, and 4% was disposed of through other or unidentified means. Of the 30% that went into landfills, 90% of this went to two major landfills, Parklands in Bordentown (Burlington County) and Kinsley Landfill, Inc. in Deptford Township (Gloucester County). On August 14, 1984, the Parklands Landfill was closed to sludge disposal, due to department action. On October 11, 1984, Kinsley notified its customers it would reach the capacity permitted under its state permit and would close on October 28, 1984. The closure of these two landfills precipitated a sludge management crisis.

Through the early 1980's, the department, anticipating the 1985 end of landfill disposal, encouraged the authorities to move toward land application of sludge, since this was perceived as the most environmentally sound management alternative to landfill disposal. However, the permitting of sites elicited an outpouring of opposition from local residents, who were frightened of potential impacts on health, the environment and real estate values. Public hearings were accompanied by heated and often hostile testimony opposing sludge application, and a flood of lawsuits hamstrung program efforts. In the end, less than a dozen land application sites were permitted.

As of March 15, 1985, sewage treatment facilities were no longer allowed to use any of the state's landfills for sludge disposal. This requirement was specified in the 1980 amendments to the SWMA (N.J.A.C. 13:1E-42), and incorporated in the NJPDES regulations (N.J.A.C. 7:14-2.5). Since this date, the generators of all sewage sludges have been precluded from utilizing landfills except in DEPE defined emergencies and where it is demonstrated the generators are moving toward acceptable long-term alternatives in accordance with an ACO. With the exception of the Ocean County Utilities Authority and the Cape May County Municipal Utilities Authority, the sludge generators succeeded, with assistance from the DEPE, in finding alternatives to landfills within a short period after the March 15, 1985 deadline. The Ocean County and Cape May County authorities continued to landfill sludge for a few years, under ACOs. However, most of the formerly landfilled sludge was diverted to out-of-state landfills and to incinerators in the state. It was not transferred on a large scale to utilization in land application and production of soil amendments, as had been hoped, due to the tremendous local opposition to permitting of sludge application sites.

The problem of diminishing sludge management options was intensified as sludge volume and contaminants increased due to improvements in wastewater treatment. The higher the level of wastewater treatment, the more sludge created in the treatment process, and the higher the concentration of metals and other contaminants in the sludge. Under the requirements of Section 201 of the Clean Water Act of 1972, New Jersey's construction grants program (CGP) provided $2.6 billion in federal grants for the construction of facilities to improve wastewater treatment through the 1970's and 80's. In New Jersey, the grants were often used to extend sewage treatment facilities into rural and suburban areas. A policy decision was made that many small treatment plants posed a greater enforcement problem and were a greater threat to water quality than larger regional facilities. Therefore, large regional systems were favored.

In essence, the first years of the CGP greatly increased the quality of wastewater treatment, and correspondingly, the volume of sludge for which New Jersey had to find management options. New Jersey had only one sludge management project on the CGP priority list in 1974. The bulk of New Jersey's sludge management projects did not begin to appear on the priority list until 1980, shortly before the CGP was sharply cut back. Thus, very few sludge management projects received federal grant funding, while the volume of sludge increased dramatically due to federally funded improvements in wastewater treatment.

As long as ocean dumping and landfill disposal were legal options, there was little motivation for DTWs to invest in expensive sludge treatment facilities. However, as these options were banned, DTWs became aware that sludge facilities would have to be constructed to accommodate their sludge management needs. At the same time, federal grants were no longer available for such construction.

Recognizing that, as of 1984, New Jersey still needed $4 billion for legally mandated wastewater treatment improvements, including those relating to sludge management, the state established the Wastewater Treatment Trust to provide low-interest loans to local governments. A number of DTWs have begun to seek funding assistance from the Trust for sludge management projects. As of the early 90's more than 20 sludge management projects were on the priority list for loans through the Trust. In 1992, a total of $91.4 million in loans was awarded to three sludge management projects: 1) $53 million for a sludge composting facility in Burlington County, 2) $31.8 million for an incinerator for Bayshore Regional Sewerage Authority, and 3) $6.6 million for an incinerator for Two Bridges Sewerage Authority. For fiscal year 1993, Burlington County is seeking an additional $34 million for a leachate collection system for its municipal solid waste landfill operation and supplemental funding for the sludge compost facility.

Wastewater treatment improvements in the last two decades were driven by increasingly stringent legislation to protect water resources. As of July 1, 1988, all wastewater treatment facilities were required by federal law to treat at secondary levels (in which 85% of pollutants are removed from the effluent), or to be on a strict enforcement schedule for achieving this level. On that date in 1988, 121 wastewater treatment facilities in New Jersey had not yet achieved secondary levels and were placed on ACOs to achieve compliance within a specified timetable. As of July 1993, only 4 plants still had not succeeded in reaching secondary levels.

Sewage sludge management has again become a major environmental and economic issue in recent years, due to increasing volume and narrowing options for management. On March 17, 1991, the ocean dumping of sludge was banned in New Jersey (see previous section on ocean disposal). The six authorities that had managed their sludges through ocean disposal, which represented approximately half of New Jersey's total sludge volume, were placed under JCDs that required the development of long-term land-based sludge management alternatives. In the interim, most of the former dumpers are currently shipping their sludges to out-of-state landfills. This solution is not permitted as a long-term option, in part because it is anticipated that federal legislation may eventually place a ban on such interstate shipments of waste.

In response to concerns about sludge management options, Rutgers University's Agricultural Experiment Station and the New Jersey Institute of Technology initiated two conferences in 1990 designed to bring together those with technical expertise related to currently available sludge management options, to build consensus among key constituencies in sludge management and present recommendations to the DEPE. The recommendations from the conferences emphasized: greater support for "beneficial uses" that utilize the nutrient value and organic matter in sludge to improve soil, reduced reliance on incineration, and a stronger pretreatment program to reduce industrial contaminants.

In November 1990, the DEPE produced a white paper presenting information on the potential utilization of beneficial use sludge management alternatives as a method to manage New Jersey's sludge production. In February 1991, the DEPE convened representatives of 18 key organizations, to participate in a Sludge Management Policy Working Group. The purpose of the working group was to continue the consensus building process, and to produce recommendations to the DEPE that could serve as the basis for a new policy emphasizing beneficial use. A summary of recommendations from both consensus building efforts are presented in Table 23. The working group's recommendations reinforced those of the previous conferences, emphasizing increased reliance on beneficial uses in sludge management, strong pretreatment programs, and developing markets for SDPs.

Table 23, below is a list of recommendations representing points of greatest agreement among the three sets of recommendations, endorsed by at least two of the three consensus-building efforts in 1990 and 1991.

TABLE 23

RECOMMENDATIONS RELATING TO SLUDGE MANAGEMENT POLICY

RECOMMENDATIONS	I	II	III
Promote beneficial uses of waste materials	X	X	X
Strengthen pretreatment requirements	X	X	X
Minimize reliance on incineration	X		X
Emphasize source reduction & pollution prevention		X	X
Develop markets and market incentives		X	X
Develop appropriate standards		X	X
Encourage diversity of management options		X	X
Strong partnership among all levels of government		X	X
Financial assistance for projects other than disposal		X	X

I. Two conferences in July and October 1990 on "Municipal Sludge Management: Current Problems, Future Possibilities."
II. Sludge Management Policy Working Group, February 1991.
III. Emergency Solid Waste Assessment Task Force; final report published August 1990.

The work of the working group was recognized by Governor Florio on October 29, 1991, in a letter commending its efforts. The letter summarized the recommendations of the working group and stated that, "These principles are the core of an environmentally and economically sound sludge policy . . . I endorse them wholeheartedly and look forward to continuing the process that the working group began."

Review of state policies with regard to reliance on incineration of solid waste was not limited to sludge. In August of 1990, the Emergency Solid Waste Assessment Task Force was convened in response to an executive order from Governor Florio to examine the state's solid waste options. The task force produced a final report in August 1990 calling for an emphasis on reuse, recycling, composting, source reduction and regionalization. Although sewage sludge was not specifically addressed in this report, sludge management is addressed in the SWMA and is affected by the state's overall solid waste management strategy.

Utilizing recommendations from the 1990 conferences, the Sludge Management Policy Working Group and the Solid Waste Assessment Task Force, the DEPE prepared an interim guidance document to specify the key policy changes reflecting an increased emphasis on beneficial uses as the preferred management option for sludge management. This guidance document, released in April 1992, is the basis of this SSMP Update.

Although not all outstanding issues have been resolved, it is anticipated that improved sludge quality, new quality assurance technologies, and a concerted public education and public participation program will make it possible to gain public support for beneficial uses. It is only with active public support that the state will be able to fully develop acceptable long-term sludge management capabilities and move forward to a responsible, balanced and integrated sludge management program emphasizing beneficial use.

2. Institutional and Legal Framework

The reader should refer to Section F. Part 2. for a listing of the relevant statutes, regulations and guidelines pertaining to sewage sludge.

F. SLUDGE MANAGEMENT PLAN IMPLEMENTATION PROCEDURES AND RELATED INFORMATION

In Section B of this SSMP Update, the department identifies general policy statements, as well as additional planning requirements the district or their designee must comply with when developing a sludge management plan (SMP). Sections A, C, D and E provide the reader with a historical review of sludge management in New Jersey and current inventories and data systems utilized to administer the sludge program. Section F provides the specific implementing procedures and related information originally set forth in the 1987 SSMP that a district or its designee needs to complete their SMP.

Much of the information presented in the original 1987 SSMP concerning SMP preparation and implementation is still relevant, and either has evolved and been updated, or is still valid in its original form. Also, recognizing DTW familiarity with the 1987 SSMP format, the department is retaining the same basic formatting of the 1987 SSMP in order to facilitate access to the information contained in this section. Section F is comprised of Parts 1 through 6 that generally contain information under the same topics as in the 1987 SSMP.

Part 1. <u>Introduction</u>:

I. Background and Use of Section F:

Section F of the SSMP Update is designed to address in further detail:

- The needs of solid waste management districts, or their designees, that are mandated to develop SMPs for their districts/facilities;
- The needs of sludge generators that are mandated to properly manage the sludge they produce or face penalties under the state Water Pollution Control Act (WPCA);
- The needs of sludge management alternative operators that must obtain the required permits for sludge management activities; and
- The needs of the general public concerned both with protection of public health and the environment.

Section F. Part 1. provides:

- A summary of the major revisions/deletions to the 1987 SSMP resulting from implementing the department's beneficial use sludge management policy;
- An agency orientation resulting from the restructuring of the department;
- The purpose of this SSMP Update and the authority under which the department

operates;

- The general definitions of sludge and septage; and

- Identification of responsibilities for resolving sludge management problems.

II. Summary of Revisions/Deletions to the 1987 SSMP:

A. Part 1

- The 1987 SSMP described in detail the DEPE's public participation efforts to facilitate public awareness and understanding of the plan. As these efforts were only relevant to producing the 1987 SSMP, this section has been deleted from the SSMP Update. It should be noted, that although not exclusively discussed in a public participation section, this SSMP Update cites the DEPE's continued efforts to include the general public in the formulation of public policy.

- The 1987 SSMP described in great detail the "Solid Waste District Responsibilities." Section B.2. of this SSMP Update describes the additional option that allows districts to delegate absolute sludge planning responsibilities to all sludge generators (or other agencies) in the district.

B. Part 2

- The list of applicable legislation provided in Section II of Part 2 has been amended, incorporating additional legislation and regulations promulgated after the publication of the 1987 SSMP.

- Section B.3. of this SSMP Update, which describes the sludge management hierarchy reflecting a preference for beneficial uses, amends the broad and "Clean" sludge policy that appeared in Part 2 of the 1987 SSMP.

- Section B.8. of this SSMP Update, which describes how sludges can be blended under strict product testing requirements, amends the 1987 SSMP "Clean" sludge policy.

C. Part 3

- The inventories of sludge management alternatives discussed in the 1987 SSMP are outdated. In Part 3, the reader is advised to refer to the inventories in Section C of this SSMP Update.

D. Part 4

- In Part 4 of the 1987 SSMP, existing facilities and operations were listed in each of the management alternatives discussed. This information is provided through the inventories reported in Section C of this SSMP Update.

- Section II.B (Pathogen Reduction of Part 4-I) of the 1987 SSMP, is amended to conform with the criteria established in 40 CFR Part 503.

- Section II.D (Generic Sludge Quality Determination) of the 1987 SSMP, is amended. In order to obtain a Generic Sludge Quality Determination, generators should contact the department and request a copy of the "Wastewater Treatment Plant Operations Statement" and for non-domestic sludge generators a copy of the "Request for Determination of Residual Quality Suitability to Land Apply Industrial Residuals".

- Section III.B. (Distribution Program) of the 1987 SSMP, is amended to be consistent with 40 CFR Part 503. Additional amendments are discussed in Part 4-VI of this SSMP Update.

- Part 4-II; (Land Application) specifically General Practices and Permit Process sections of the 1987 SSMP, is amended based on 40 CFR Part 503.

- Part 4-III (Composting and Distribution) of the 1987 SSMP, is amended to cover only composting. Also, Part 4-III-V (Permitting and Regulatory Process) is amended based on 40 CFR Part 503.

- Part 4-VI (Ocean Disposal) of the 1987 SSMP is deleted. Based on state and federal legislation, ocean disposal of sewage sludge is no longer a management alternative available to DTWs. Part 4-VI of the SSMP Update is now entitled, Sewage Sludge Distribution. Furthermore, Part 4-III of the 1987 SSMP that discussed sewage sludge distribution is amended based on 40 CFR Part 503 and is incorporated into Part 4-VI of this SSMP Update.

E. Part 5

- While the general financing concepts presented in Part 5 of the 1987 SSMP may be still relevant, the financial industry has changed significantly in the last six years. Therefore, although Part 5 is largely outdated, no significant changes are being made at this time. As indicated in the preface of this Part, the generator should contact a financial consultant to determine the most appropriate financial strategy to address the generator's needs.

F. Part 6

- Table 6-1 in the 1987 SSMP, listing DEPE approved sludge and septage management facilities and operations, is updated with Table 22.

- Unless the district chooses to delegate ultimate planning authority to DTWs within their district, there is no change in the implementation requirements discussed in this Part. Regardless of the district's planning decision, DTWs must comply with the implementation requirements for individual sludge generators identified in this Part in addition to the requirements identified in Section B of this SSMP Update.

III. Agency Orientation:

In order to assist the reader, the 1987 SSMP identified departmental programs responsible for issuing various permits required to operate a sludge management facility. While this originally provided useful guidance to those responsible for development of sludge generator plans, over the years, the department has evolved and matured, thereby requiring extensive restructuring. Additionally, in 1991, with the goal of becoming a fully integrated department, restructuring continued along functional (i.e. permitting, enforcement, remediation) rather than media-specific lines. As a result of this restructuring, many of the department's programs have been renamed and/or are part of other division-equivalent organizations. As questions arise, it is suggested the reader contact the identified program below to determine the appropriate bureau/office to address an inquiry.

OLD ORGANIZATION	REPLACED BY
Division of Water Resources Water Quality Management Element Bureau of Municipal Waste Permits Bureau of Pretreatment and Residuals Residual Management Program/Section	Wastewater Facility Regulation Program (WFRP)
Division of Waste Management	Division of Solid Waste Management (DSWM)
Division of Environmental Quality Air Pollution Control Program Bureau of New Source Review Air Quality Engineering and Technology Element Bureau of Air Quality Management	Air Quality Regulation Program (AQRP)
Construction Grants Administration	Municipal Wastewater Assistance Program(MWAP)

Lastly, it is to be noted that the Department of Environmental Protection (DEP) has merged with the Board of Public Utilities (BPU) to become the Department of Environmental Protection and Energy (DEPE). Any reference to the department henceforth should be understood to refer to the DEPE.

IV. Purpose and Authority:

As mandated by the amendments to the state Solid Waste Management Act (SWMA) N.J.S.A. 13:1E-1 et seq. (effective 1978), it is the intent of the SSMP to evaluate the nature and the extent of the sludge management problems affecting New Jersey's domestic and publicly operated treatment works and to develop an orderly program for resolving those problems. The 1978 amendments to the state SWMA require the state to develop a strategy to provide for the maximum processing practicable of all sludges generated in the state. The SSMP must strive toward reuse and resource recovery to the maximum practicable extent (N.J.S.A. 13:lE-2b.(7)) and must establish the goals, standards and criteria by which sludge management plans (SMP), developed by solid waste management districts and local sludge generators, shall be equitably evaluated for approvability. This SSMP Update is intended to continue to satisfy that requirement.

The specific authorities and responsibilities delegated to the department, pursuant to the SWMA, include the following:

- N.J.S.A. 13:lE-4, not only specifically authorizes the department to supervise solid waste collection and disposal facilities or operations, but authorized the department to require any solid waste collection or disposal operation to conform with approved solid waste management plans, under threat of penalty or loss of operation authority.

- N.J.S.A. 13:lE-6(a)1, allows the department to determine the most efficient, sanitary and economical way of collecting, disposing of and utilizing solid waste;

- N.J.S.A. 13:lE-6(a)2, authorizes the department to formulate and revise rules and regulations concerning solid waste collection, transportation and disposal;

- N.J.S.A. 13:lE-6(a)3, requires the department to develop, promulgate and revise (at least once every two years) a statewide solid waste management plan;

- N.J.S.A. 13:1E-6(b), empowers the department to develop a joint program and to cooperate with solid waste management districts in the development of combined approaches to solid waste management and resource recovery programs; and

- N.J.S.A. 13:lE-24, provides for department review, modification, rejection or approval of solid waste management plans developed pursuant to the SWMA.

The Water Quality Planning Act (WQPA) N.J.S.A. 58:llA-7c(5) also requires the incorporation of sludge management planning in the Statewide Water Quality Management Plan (SWQMP). This SSMP Update is intended to satisfy that requirement and shall become a component of that SWQMP.

The SSMP Update is intended to address those waste types, as defined in N.J.A.C. 7:26-2:13 concerning solid waste classification, classified as ID 12, dry sewage sludge; ID 73, septic tank clean-out wastes; and ID 74, liquid sewage sludge. However, the SSMP Update also addresses permitting for land application of some vegetative and liquid food processing wastes (ID 23, 25 and 72) that are determined to be of suitable quality. The Wastewater Facilities Regulation Program (WFRP) has been given jurisdiction over these ID classifications as a result of Administrative Order 36 and Policy Memorandum 28.

It should be noted that the management of grit and screenings, sand-bed residuals, and incinerator ash is not specifically addressed in this SSMP Update. These residuals are controlled by the state and district solid waste management plans. In the past, the waste flow rules have designated appropriate management facilities for these residuals. Generally speaking, the waste flow rules have directed these residuals to landfills. However, since it is the mandate of the SWMA to implement reuse and recycling alternatives, Section F. Part 4-VII (Innovative and Alternative Technologies) of this SSMP Update addresses some alternative management methods, which may be implemented for management of these residuals when they are of suitable quality.

V. Definitions:

The term "sludge" is commonly misunderstood by the public. Domestic sewage sludge is wasted microorganisms and precipitates that have settled out of the liquid processing train, and "skimmings" generated during treatment of wastewater at domestic and publicly operated wastewater treatment works (POTW).

There is a common misconception that sludge is raw human waste, which is not the case. At the head of the wastewater treatment plant, grit, sand, and other untreatable components are settled and screened to be disposed of separately as grit and screenings. The raw waste is then processed through primary, or primary and secondary treatment modules where it is fed upon by a community of microorganisms (predominately bacteria and fungi). The resulting biological solids and treatment additives, such as flocculants and stabilizers, are settled out and referred to as "sludge."

Sludge builds up on the bottom of treatment plant modules called clarifiers. These modules are generally designed to slow the rate of flow through the treatment plant so that solids settle to the bottom and clarified effluent flows over the top across weirs. These settled solids, termed sludge, are removed periodically in properly operated treatment plants. If the sludge is not pulled from the bottom of these clarifiers, it builds in thickness until it takes up an increasingly larger portion of the clarifier volume. When the sludge build-up becomes too thick, the sludge "blanket" may reach the top of the weirs and the sludge itself may begin to flow out of the treatment plant and effluent quality is impaired.

The nature of wastewater treatment is, the higher the level of treatment, the more sludge produced. For example, a primary treatment plant will remove 65% of the influent suspended solids and 20 to 40% of the influent biological oxygen demand (BOD) of the raw sewage coming into the plant. For every 100 dp/d of sludge produced through primary treatment, if that same plant is upgraded by addition of an activated sludge module to remove 95% of the BOD from the influent sewage, 330 dp/d of sludge would be produced. Each additional level of treatment will create still greater sludge volumes.

When sludge is pulled from a sludge digester or a treatment plant clarifier, it can range from one to seven percent solids. Sludge is in fact very liquid, almost entirely water. It is commonly dewatered by specialized equipment at treatment plants to between 10% and 30% solids, or more, and then has the appearance of thick mud.

The term "septage" is defined as the combination of liquid and solid residues resulting from the storage or treatment of water-borne domestic waste in individual subsurface on-site treatment systems (the most common of which is the septic tank). Like sludge, septage consists of a wide range of chemical constituents and is therefore subject to the same quality controls as sludge.

To further assist the reader, a detailed glossary of technical terms is included at the beginning of this SSMP Update.

VI. Responsibilities for Sludge Management Problem Resolution:

Resolution of the sludge management problem is dependent on the successful coordination of the responsibilities of the state, the solid waste management districts, the 201 planning areas, the sludge generators (treatment plants), and the general public. This subsection of the SSMP Update identifies the various responsibilities of each of these groups and describes how those groups must integrate their responsibilities to resolve the sludge management problem in New Jersey.

Solid waste management districts were created under the SWMA and mandated the responsibility to develop district solid waste management plans which, as of the 1978 amendments, include district sludge management plans (DSMP). These plans must conform with the standards, goals and criteria set up in the SSMP.

201 facilities plans are required under both sections 201 and 208 of the federal WPCA amendments of 1972 and 1977, and are developed for municipal or regional sewage treatment works. The plans are required prior to construction of wastewater treatment

plants with federal funding. 201 facilities plans are strictly limited to publicly operated treatment works.

Areawide Water Quality Management (AWQM) planning, created under section 208 of the federal WPCA amendments of 1972 and 1977, develops a comprehensive strategy for all the water quality problems of a particular geographic area. AWQM planning evaluates all potential sources and types of water pollution, including but not limited to sewage treatment plants.

A. State Responsibilities

1. Planning

The state DEPE has responsibility for development and adoption of the SSMP, as discussed previously under Section F. Part 1-IV, Purpose and Authority, and consistency determinations related to statewide and adopted DSMPs. This SSMP Update identifies the magnitude of the sludge problem, both existing and future, and establishes a number of alternative approaches to be employed in resolution of the sludge problem. The department is also mandated under the federal Air Pollution Control Act to develop a statewide implementation plan to attain air quality standards, that also relates to sludge incineration facilities. The department additionally has the responsibility to determine whether a DSMP is consistent with the statewide water quality management program plan, including approved AWQM plans.

2. Permitting and Approvals

In addition to statewide planning responsibilities, the state is responsible for certifying its approval (rejection or modification are other options) of the DSMP and approving AWQM plans. Statewide planning under the SWMA and the WQPA establishes the larger parameters for the state's operation as a permitting agency. Consistency with approved AWQM plans and department approved DSMPs is a prerequisite to state permitting of sludge projects. Sludge projects can be distinguished from plans in that projects actually implement plans. The department will not review permit applications for projects once a DSMP is certified, unless the project is consistent with the DSMP.

The range of possible sludge projects is broad and invariably falls under the jurisdiction of one or more state permitting programs (i.e., New Jersey Pollutant Discharge Elimination System (NJPDES) permits, Air permits, or Solid Waste permits). These permit programs are the public's assurance that the project impacts will be controlled and will not adversely affect the environment or the public health. The permit programs set the operational and construction limits on the project. Decisions on permit approval are made on strictly technical grounds, that is whether the project is able to meet the regulatory requirements. While the state will hear emotional issues during the permit process, permit determinations must be technically based in order to be legally enforceable.

3. Enforcement

Once a project is permitted by the state, be it for a sludge operation or a treatment plant, the state is responsible for enforcing the terms of the permit. Also if a project is implemented without a permit, the state is responsible for enforcing the requirement to obtain a permit.

Enforcement against improper sludge management can take many forms. The public typically envisions state enforcement action as that taken against an illegal sludge dump site. Illegal dumps are often found at treatment plants that have not budgeted for legal sludge management at a permitted site. Enforcement action can also be taken against a treatment plant desiring to increase flows or upgrade treatment, if that plant has not contracted or budgeted for sludge management at the increased volumes of sludge. In such a case, permits may be denied to extend collection systems or to expand plant capacity. All new discharge permits issued by the department require the treatment plant to have a contractual arrangement for sludge management on file with the WFRP at all times. Failure to comply with this requirement subjects the facility operators to enforcement action as a violation of the permit. Enforcement also protects the public from operational violations and from violations of air and water quality standards.

4. Project Implementation

There is a common misconception that the state is responsible for implementing sludge or other waste management projects. Under present state statutes, the state is not responsible for initiating or funding sludge project implementation. However, the state provides guidance to responsible agencies and identifies impediments to project implementation.

B. Solid Waste District Responsibilities

A general description of district responsibilities is presented below.

1. Planning

Under the state SWMA, solid waste management districts are mandated the responsibility to develop DSMPs that conform with the standards, goals and criteria established by the SSMP Update. These DSMPs must identify the district's plan for managing existing and projected sludge volumes and identify the projects necessary to manage the residuals generated by district facilities. The districts also share responsibility with the AWQM agencies for cross adoption of sludge plans and for AWQM plan and DSMP consistency.

2. Permitting and Approvals

The solid waste management districts have no permitting authority over sludge projects. However, the state SWMA provides for district inclusion of sludge projects in the DSMP subject to department approval. When the department approves a DSMP, a full permit cannot be issued for a sludge project unless the project is fully consistent with the DSMP.

3. Enforcement

The solid waste management districts have no unique enforcement authority over sludge facilities/operations or sludge generators except as set forth in N.J.S.A. 13:lE-1 et seq. However, county health departments, which are another arm of county government, may be delegated enforcement authority over solid waste facilities under the County Environmental Health Act.

4. Project Implementation

The solid waste management districts are mandated under the SWMA to implement SMPs that have been approved by the Commissioner pursuant to this SSMP Update.

C. Areawide Water Quality Management Agency (AWQM) Responsibilities

A general description of AWQM agency responsibilities is presented below.

1. Planning

Under the WQPA, the AWQM agencies are responsible for development of a plan to manage a wide range of water quality impacts. Since improper sludge management poses a threat to water quality, sludge management is an integral part of AWQM planning.

2. Permitting and Approvals

The AWQM agencies have no permitting authority over sludge projects, however, the AWQM plan must allow for the sludge project, or the project may be determined to be inconsistent with the AWQM plan and, therefore, not permittable.

3. Enforcement

AWQM agencies have no enforcement authority over either sludge facilities/ operations or sludge generators.

4. Project Implementation

Although AWQM agencies have no power to implement sludge projects, 201 agencies as implementing agencies of the AWQM plan, do have the power of project implementation. These agencies are generally considered sludge generators and are discussed below.

D. Sludge Generator Responsibilities

Every treatment plant is a sludge generator whether the treatment plant discharges to ground or surface water. These entities may or may not be designated 201 planning agencies and they may be privately or publicly owned. Dependent on the specific legal limitations applicable to the owner of the treatment plant, (e.g. sewer department, sewer authority or utilities authority) the legal authorities of the sludge generator may vary. However, there are certain general responsibilities that apply to all sludge generators as discussed below.

1. Planning

Every treatment plant must plan for legal management of the sludge generated by the treatment process. NJPDES regulations (N.J.A.C. 7:14A-3.13(a)15) required sludge generators to submit a plan to assure landfill disposal was terminated by March 15, 1985. The deadline for submittal of these plans to the department was March 6, 1982.

Every sludge generator was responsible for proper planning and management steps to assure sludge quality suitable for management alternatives other than landfilling after March 15, 1985. Furthermore, the department placed sludge generators on notice by letter dated March 12, 1982, they would be responsible for proper management of sludge and that they must include plans for proper management in the budgeting and operation of their treatment plants. This letter outlined the regulatory requirements for proper sludge management and the costs of various management alternatives at that time. It advised generators that failure to adequately budget for sludge management would not be accepted as a defense against enforcement action in cases of improper sludge management.

2. Permitting and Approvals

Sludge generators have approval authority over acceptance of additional sewage flows that could create sludge management problems for the facility. These approvals take into consideration both quality and quantity of the flows to the treatment plant. Treatment plants must carefully evaluate additional flows to determine if it will be possible to manage the sludge generated by those flows. Accordingly, treatment plants must make decisions concerning pretreatment requirements and the capacities of their approved sludge management site.

Sludge generators do not, however, have permitting or approval authority over the implementation of sludge management projects.

3. Enforcement

Sludge generators have enforcement authority over their own pretreatment ordinance requirements and flow volume limitations. These are the only aspects of sludge management over which the generator has approval authority. Because the sludge generator has no approval or permitting authority over implementation of sludge projects, the generator has no enforcement powers over the construction or operation of sludge projects.

4. Project Implementation

Every sludge generator has the authority to implement a sludge management project to address the handling and management needs of its treatment plant. Specifically, every treatment plant has the authority to secure necessary approvals or permits for the implementation of its own sludge management facilities or operations.

E. Public Responsibilities

It is difficult and often politically unpopular to address the public's responsibilities for proper sludge management. There is a tendency for the public to view sludge management as a problem created by treatment plants that must be resolved by treatment plants. And the public usually demands the problem be solved somewhere else, i.e. not in my back yard. The public frequently forgets that the ultimate responsibility for the generation of sludge rests with the individual residents of the state. Whether connected to a sewerage system or a septic system, the end product of the treatment of human waste is sludge. As discussed in the previous section on the definition of sludge, the higher the level of wastewater treatment the needs of public and environmental protection needs demand, the larger the volumes of sludge produced. Therefore, although the public has not been charged with direct responsibilities for planning, permitting or implementation of sludge management facilities, the public has been charged with these responsibilities indirectly through its governmental agencies at the local and state levels. The public is granted certain enforcement authorities under the citizen suit provisions of the Clean Water Act, Resource Conservation and Recovery Act, Clean Air Act and the Environmental Rights Act. And, perhaps just as importantly, the public is charged with the responsibility for paying for sludge management facilities and services through either taxation or user charges, or both.

Public acceptance of responsibility for generation and resolution of the sludge problem is paramount to finding and implementing solutions. Where the public refuses to accept these responsibilities, but insists on viewing sludge problems as someone else's problem, solutions are difficult, if not impossible to establish. In New Jersey, most particularly, we have run out of remote areas and environmentally sound sludge management solutions must be found within our regional living spaces.

Understanding this responsibility, the public is better equipped to offer constructive assistance to the treatment plants and governmental agencies charged with direct responsibility for resolving the sludge problem. This means that the public must participate in the selection and implementation of realistic, and affordable sludge projects and must not permit politics and emotionalism to obstruct sound technical evaluation and decisions.

F. Integration of Responsibilities

As can be seen by this review of responsibilities, there is no centralized agency with full responsibility for resolving the sludge management problem in New Jersey. Rather, resolution of the sludge problem must be achieved through careful orchestration of all the various responsibilities at each level. The sequence of the planning, permitting and implementation responsibilities at each level is important and warrants some discussion.

It is most urgent that statewide and district sludge management planning be completed as a first priority of the sludge management program. Secondly, district plans and AWQM plans for sludge management must be reconciled, brought into conformance with each other, and mutually adopted. Thirdly, using the standards, goals and criteria established in Part 6 of this SSMP Update, the state must review and make a determination on certifying approval of the DSMPs into this SSMP Update. Subject to department certification of district plans, all applications for sludge management projects should be submitted to the DEPE to determine consistency with the statewide and district plans. Prior to department approval of the district plans, the department will proceed on a case-by-case basis when reviewing applications for sludge management projects.

Throughout these processes, the public will be involved both directly and indirectly through their government agencies. It is clear the public wants clean water and the convenience and public health protection that modern plumbing and wastewater treatment provide. Therefore, the cooperation of the public is fundamental to the planning, siting, and implementation of the facilities and operations to manage the sludge produced by wastewater treatment systems. Without the cooperation of a responsible public, the sludge problem will never be resolved.

Part 2. Applicable Legislation, Regulations and Policy:

I. Introduction:

Regulations pertaining to the management of municipal sludge are located in various sections of federal law, federal regulations in the Code of Federal Regulations (CFR) and New Jersey statutes and administrative codes. At the federal level, regulations emphasize the role of state and local governments in successful planning, construction and operation of facilities, and practices for sludge management. The role of the state agency and local governments is critical to proper implementation of federal programs and is mandatory for states such as New Jersey that are delegated responsibilities by the USEPA. This section lists applicable statutes and regulations specifically affecting sludge management planning in New Jersey and defines overall New Jersey policy on land-based sludge management. Where statutes and regulations are mentioned throughout this SSMP Update, all amendments thereto are also included.

II. Applicable Legislation, Regulations and Guidelines:

A. Statutes

1. Federal

a. Clean Water Act (CWA), 33 U.S.C. §1251 et seq.

b. Resource Conservation and Recovery Act (RCRA), 42 U.S.C. §6901 et seq.

c. Marine Protection Research and Sanctuaries Act (MPRSA), 33 U.S.C. §1401 et seq and 16 U.S.C. §1431 et seq.

d. Clean Air Act (CAA), 42 U.S.C. §7401 et seq.

e. Safe Drinking Water Act of 1975 (SDWA), 42 U.S.C. §300f et seq.

f. National Environmental Policy Act of 1969 (NEPA), 42 U.S.C. §4321 et seq.

g. Toxic Substances Control Act of 1976 (TSCA), 15 U.S.C. §2601 et seq.

h. Comprehensive Environmental Responsibility Compensation and Liability Act (CERCLA), 42 U.S.C. §9601 et seq.

2. State

a. New Jersey Water Pollution Control Act (WPCA), N.J.S.A. 58:lOA-1 et seq.

b. New Jersey Water Quality Planning Act, N.J.S.A. 58:lla-1 et seq.

c. Pretreatment Standards for Sewerage etc., N.J.S.A. 58:11-49 to 58

d. Solid Waste Management Act (SWMA), N.J.S.A. 13:lE-1 et seq.

e. Solid Waste Utility Control Act of 1970, N.J.S.A. 48:13A-1 et seq.

f. Air Pollution Control Act, N.J.S.A. 26:2C-1 et seq.

g. Right to Farm Act, N.J.S.A. 4:lC-1 et seq.

h. Agriculture Retention and Development Act, N.J.S.A. 14:lC-11 et seq.

i. County Environmental Health Act, (CEHA), N.J.S.A. 26:3A-21 et seq.

j. Realty Improvement Sewerage and Facilities Act, N.J.S.A. 58:11-23 et seq.

k. Sewerage Authority Law, N.J.S.A. 40:14A-1 et seq.

l. Environmental Rights Act, N.J.S.A. 2A:35A-1 et seq.

m. Pinelands Protection Act, N.J.S.A. 13:18A-1 et seq.

n. Coastal Area Facility Review Act, N.J.S.A. 13:19-1 et seq.

o. Solid Waste Utility Control Act of 1970, N.J.S.A. 40:13A-1 et seq.

B. Regulations

1. Federal

a. Solid Waste Disposal Facility Criteria, 40 CFR Part 257 and 258; Federal Register, October 9, 1991.

b. National Pollution Discharge Elimination System (NPDES) Sewage Sludge Permit Regulations, State Sludge Management Program Requirements, 40 CFR, Parts 122, 123, 124, 125 and 501, May 2, 1989.

c. Federal Construction Grants Regulations, 40 CFR, Part 35, Subpart E; Federal Register, Sept. 27, 1978.

d. Air Regulations, 40 CFR, Part 60 and 61.

e. Ocean Dumping Regulations and Criteria, 40 CFR, Parts 220-229.

f. Hazardous Waste Regulations, 40 CFR, Parts 261-268.

g. Industrial Pretreatment Regulations, 40 CFR, Part 413.

h. Polychlorinated Biphenyls Manufacturing, Processing, Distribution in Commerce and Use Prohibitions, 40 CFR 761-761.79.

i. Underground Storage Tank Regulations, proposed April 17, 1987, Federal Register, p. 12662-12864.

j. Standards for the Use or Disposal of Sewage Sludge, 40 CFR Parts 257, 403 and 503, February 19, 1993.

2. State

a. New Jersey Pollutant Discharge Elimination System Regulations (NJPDES), N.J.A.C. 7:14A.

b. Sludge Quality Assurance Regulations (SQAR), N.J.A.C. 7:14-4.

c. Surface Water Quality Standards, N.J.A.C. 7:9-4.

d. Ground Water Quality Standards, N.J.A.C. 7:9-6.

e. Air Pollution Control Regulations, N.J.A.C. 7:27.

f. The County Environmental Health Standards of Administrative Procedure and Performance, N.J.A.C. 7:lh.

g. Standards for Individual Subsurface Sewage Disposal Systems, N.J.A.C. 7:9-2.1 et seq.

h. Division of Waste Management Regulations, N.J.A.C. 7:26.

i. Treatment Works Approval Regulations, N.J.A.C. 7:14A-12.

j. Underground Storage Tank Regulations, N.J.A.C. 7:14B-1 et seq.

k. State or Areawide Water Quality Management Plans.

C. Guidelines

1. Federal

The following federal guidelines apply to the various sludge management practices.

- USEPA, 1980. Classifying Solid Waste Disposal Facilities, A Guidance Manual SW-828.

- USEPA, 1979. Process Design Manual for Sludge Treatment and Disposal. USEPA Center for Research Information. USEPA-625/1-79-011.

- USEPA, 1978. Process Design Manual: Municipal Sludge Landfills. USEPA-625/1-78-010. SW-705.

- USEPA, 1978. Sludge Treatment and Disposal. Technology Transfer. Vol. 2. USEPA-625/4-78-012.

- USEPA, 1989. POTW Sludge Sampling and Analysis Guidance Document. Office of Water Enforcement and Permits.

- USEPA, 1978. Applications of Sludges and Wastewaters on Agricultural Land: A Planning and Educational Guide. Office of Water Program Operations. MCD-35.

- USEPA, 1977. Municipal Sludge Management: Environmental Factors: Technical Bulletin. Office of Water Program Operations. MCD-28. USEPA 430/9-77-004.

- Guidelines, Establishing Test Procedures for Analysis of Pollutants (40 CFR, Part 136).

- USEPA Technical Bulletin MCD-28-Municipal Sludge Management: Environmental Factors, October 1977. This bulletin provides comprehensive background information on land application of sludges and other disposal alternatives. It was instrumental in the writing of New Jersey's "Guidelines".

- USEPA Process Design Manual Land Application of Municipal Sludge, USEPA-625/1-83-016, October 1983. This manual summarizes nation-wide information concerning land application of sludges.

- USEPA Guidance for Writing Case-by-Case Permit Requirements for Municipal Sewage Sludge, USEPA 505/8-90-001, May 1990. This document is a compilation of state and federal requirements, management practices and USEPA recommended permit conditions for sewage sludge use and management practices.

2. State

The following New Jersey state guidelines apply to the various sludge management practices. These are subject to periodic updating. Contact the Residuals Management Section of the WFRP for the most current versions.

- DEP, Division of Water Resources, 1984. Guidelines for the Land Application of Residuals.

- DEP, Divisions of Waste Management and Water Resources. Guidelines for the Preparation of an Application for Solid Waste and Domestic Sewage Sludge Co-Composting Facilities.

- DEP, Division of Water Resources, Guidelines for the Land Application of Residuals to Landfills as Final Cover Amendment.

- DEP, Division of Solid Waste Management, Guidelines for the Preparation of an Application for Resource Recovery Facilities.

- DEPE, Bureau of Air Quality Engineering; Technical Manual No. 1406; Sludge Incinerators.

- DEPE, Bureau of New Source Review: Technical Manual No. 1304; Wastewater and Sewage Sludge Treatment Operations.

- DEPE, Sludge Management Policy Guidelines.

III. New Jersey Policy on Land-based Sludge Management:

A. Policy on Conversion of Sludge and Septage to Waste Class 27

The department will not accept the conversion of waste classification ID 12, 73, or 74 residuals to ID 27 for the purpose of creating a landfillable material. Where conversion to ID 27 is accomplished through treatment and processing, every effort must be made to develop a resource recovery, reuse or recycling alternative for the end product.

B. Policy on Storage of Sludge

1. Permanent On-site Facilities for Short-term Sludge Storage

The department issues permits and approvals for short-term, on-site, permanent, structural sludge storage components to provide management flexibility for winter months when land application is not permitted, and to serve as a component of a contingency plan if regular management is temporarily interrupted. The department considers storage the responsibility of the sludge generator as an integral component of proper treatment plant management. Permitted storage facilities are inspected with the same regularity as other permitted sludge management facilities and must be emptied for inspection and maintenance. Storage beyond the structural, permitted capacity of the facility will be subject to enforcement action unless approved by the department.

2. Emergency On-site Storage of Sludge

The department may approve emergency on-site storage in extraordinary cases when, on the department's determination, no other viable alternative is available. The WFRP makes the determinations on all emergency storage requests. Strict compliance schedules for the implementation of an alternate sludge management method will be incorporated in emergency approvals. Permitted storage operations are regularly inspected for permit compliance.

3. Storage and Transfer of Sludge and Septage

It is the department's policy to encourage the siting of permitted transfer stations for residuals. The department issues NJPDES permits for transfer stations used for short-term storage of sludge or septage. These facilities serve as a central depository for truckloads of sludge or septage. In this way, many small trucks can be dispatched to remote areas to collect septage or sludge from small generators, and fewer large, more economical, trucks are needed to haul the accumulated residuals to a STP with septage receiving capabilities or to other management facilities, thereby minimizing hauling costs.

C. DEPE Policy on Agricultural Utilization of Sludges

Land application of sludges under controlled, permitted conditions has many beneficial effects for agriculture. Supplying nutrients (nitrogen and phosphorus in particular) to crops, improving soil physical properties and increasing soil organic matter content, all at low cost to the farmer, are several advantages of reusing this material at farms.

The use of sewage sludge as fertilizer is described in the Soil Conservation Service (SCS) technical guide, and the N.J. Cooperative Extension Service at Rutgers University lists sewage sludge application as a farm management practice in the publication entitled "Production Recommendation for N.J. Field Crops". In addition, the State Soil Conservation Committee (SSCC) of the NJDOA, will provide land suitability inventories and evaluations and soil and crop management systems to farm operators who propose to use organic wastes determined to be safe by DEPE for such use for crop production. As practiced in New Jersey, the SCS works with the permit applicant in developing agricultural conservation plans, addressing erosion control and crop management for each land application site. All NJPDES permits issued for distribution and land application of sludge activities include a provision requiring the permittee to implement a USDA-SCS farm plan where required prior to any application.

The state of New Jersey recognizes the economic importance of agriculture, as well as the aesthetic and social value of open spaces in such a densely populated state, and has enacted legislation to protect and preserve farming and farmland in New Jersey (See the Agriculture Retention and Development Act, N.J.S.A. 4:lC-11 et seq. and the Right to Farm Act, N.J.S.A. 4:lC-1 et seq.). The "Report of the Blueprint Commission on the Future of New Jersey Agriculture", stated that "it is imperative that the vast quantities of biodegradable agricultural and municipal wastes being generated in New Jersey be utilized and recycled whenever possible." Further, the SSCC has endorsed agricultural land application of sludge that has been determined to be safe when such sludge is applied in accordance with an agricultural conservation plan.

Consistent with the legislative mandate under the SWMA, the department has taken a strong position favoring resource recovery, reuse and recycling of sludge. Therefore, it is the policy of the department that land application of sludge as a fertilizer for farming activities and as a soil amendment for landfill reclamation be encouraged.

D. Policy on Program Responsibility for Sludge Management

Responsibility for regulation of sludge management is distributed among several governmental agencies. The permitting and compliance monitoring of thermal reduction sludge management facilities is the responsibility of the Air Quality Regulation Program (AQRP) under the authority of N.J.S.A. 26:2C-1 et seq. The AQRP also has responsibility to regulate air emissions associated with other sludge management facilities.

Administrative Order 36 was issued by DEP Commissioner Robert Hughey and became effective February 17, 1983. This order designates the Division of Water Resources as the regulatory agency in charge of land treatment and composting of residuals. The order empowers the DWR (now the WFRP) to act on behalf of the department under the authorities of both the SWMA and the WPCA.

New Jersey has adopted a number of sludge management regulations pursuant to its authority under the state WPCA (N.J.S.A. 58:10A). Specifically, under N.J.A.C. 7:14A-12.1 et seq., the WFRP regulates the issuance of treatment works approvals (TWA) for all treatment works as defined under N.J.A.C. 7:14A-1.9. These include all structures associated with, among other things, sludge processing, treatment and storage facilities. Further, based on the general conditions included in all NJPDES permits for sewage treatment plants, the WFRP is responsible for assuring that all treatment plants comply with sludge management planning requirements. Under N.J.A.C. 7:14-4.1 et seq., the New Jersey sludge quality assurance regulations, the WFRP monitors sludge quality, quantity and ultimate management modes. As an extension of the many sludge management programs administered by the WFRP, the department determined that the WFRP was the most appropriate agency to administer the statewide sludge management planning program including review of district sludge planning submissions. Accordingly, the WFRP has been charged with overall programmatic responsibility for the statewide sludge management program.

E. Policy on Septage Management

There are currently two management alternatives available for septage: discharge into a sewage treatment plant and land application. It is departmental policy to encourage management of septage through treatment at a sewage treatment plant. Through management in this manner, septage is introduced at the head of the treatment plant, subjected to the same treatment process as sewage and, as a result, ultimately contributes to the sludge generated by the plant. To mitigate against possible adverse impacts on the treatment process, it is the department's policy to encourage evaluation of modifications to the plant which might include grit removal, preaeration, flow equalization and odor control. Where septage is to be managed through land application, the department's policy on sludge quality and stabilization will be applied to septage.

Part 3. Existing Conditions:

The inventories identified under Part 3 of the 1987 SSMP have been either revised and included in this SSMP Update or are outdated and are no longer relevant due the promulgation of the federal Part 503 regulations and/or policy changes discussed in this SSMP Update. The reader should refer to Section C of this SSMP Update for information related to existing conditions at sludge management facilities.

Part 4-I. Introduction to Part 4:

I. Format of Part 4:

Part 4 of this SSMP Update is comprised of subparts as follows:

I. Introduction

II. Policy

III. Technical Aspects/General Practices

IV. Environmental Impacts

V. Applicable Legislation and Regulations

VI. Permitting and Regulatory Process

VII. Sources of Information and Guidance

This format for presenting the information in this section was developed to aid the reader in understanding the mechanics of each sludge management alternative, the rationale for the regulations relating to each sludge management alternative, and the process involved in obtaining a permit. Each "Introduction" section gives the history of the alternative and sets forth some general considerations. Next, the "Policy" section conveys to the planner and the sludge generator the department's policy concerning the alternative. The "Technical Aspects/General Practices" section describes in simple terms how the alternative works. The technical section is followed by the "Environmental Impacts" section, which identifies and explains each of the environmental impacts that must be controlled. Each of the alternatives has possible environmental impacts that must be controlled through a permit. The "Applicable Legislation and Regulations" section follows, describing the tools the public and regulatory agencies have available to them for controlling the previously discussed environmental impacts. The "Permit Process" section then describes the process for obtaining a permit.

II. Criteria for Management Alternative Selection:

The selection of a management alternative is guided primarily by the nature of the residual to be managed. Therefore, prior to selecting an alternative, it is necessary to assess the degree of pathogen reduction and the quality of the residual.

The following sections address the various properties of residuals that must be considered when selecting a management alternative.

A. Dewatering Constraints on Alternative Selection

Table 4-I-1 summarizes the need for dewatering sludge, before customers process it through to various types of existing management alternatives, to help sludge generators evaluate their dewatering equipment needs.

TABLE 4-I-1

DEWATERING REQUIREMENTS
FOR EXISTING NEW JERSEY SLUDGE MANAGEMENT ALTERNATIVES

	LIQUID	DEWATERED
Land Application	X	X
Composting		X
Incineration	X	X
Although sludge is dewatered before composting, some composting facilities have sufficient dewatering capacity to accept liquid customer sludges.		
Although sludge must be dewatered before incineration, most sludge incinerators are only equipped to accept liquid customer sludges.		

B. Pathogen Reduction Constraints on Alternative Selection

1. The degree of pathogen reduction necessary must conform to the criteria established in 40 CFR Part 503.

2. Pathogen-free residuals: Pathogens are not of concern in dealing with some residuals such as food processing wastes, since there has been no contact with human wastes. Such residues may be eligible for inclusion in distribution programs where they meet quality criteria.

C. Generic Sludge Quality Determinations

In order to evaluate the suitability of a particular treatment plant's sludge for a specific management mode before time, money and effort are invested pursuing permits for a management mode that might be precluded by poor sludge quality, the department performs sludge quality determinations on individual sludges and issues, where appropriate, generic sludge quality determinations. Such determinations are only required when a management operation or generator desires to blend residual materials for beneficial use that exceed the sludge quality limitations for a particular management operation.

Treatment plants and/or management operations wishing to obtain a generic sludge quality determination are required to submit the following information:

1. For requests to process specific generators, a "Wastewater Treatment Plant Operator's Statement" or for non-domestic sludge generators, a "Request for Determination of Residual Quality Suitability to Land Apply Industrial Residuals".

2. For requests to process specific generators, analyses conducted in accordance with the SQAR for the previous 12-month period. All data shall be analyzed for mean, median and range for each parameter.

   Additional residual quality analyses may be required by the department if deemed necessary, through evaluation of past SQAR reports or other relevant information concerning residual quality, such as information on industrial discharges into the system that might contribute constituents not normally detected or evaluated under the SQAR program. The department shall exercise technical discretion in applying appropriate standards.

3. For blending requests, a process schematic on how complete blending of residuals will be achieved as well as technical documentation on achievement of sludge quality limitations (including mass balance calculations) must be provided.

D. Screening and Comminution Needs

In addition to quality and stabilization concerns, screening and comminution may be required of some residuals prior to management through land application to remove non-biodegradable components.

If residuals are properly treated, non-biodegradables are generally not present, being removed by screening processes at the treatment plant. However, in the case of older facilities with no preliminary treatment components or in the case of septage, these non-biodegradable products may be present so the residuals must be processed to remove them prior to management through land application. This preliminary treatment is not required if management is through incineration, because the plastics are burnable.

III. Distinction Between Land Application Program and Distribution Program:

The department provides two opportunities for resource recovery and reuse through agricultural, horticultural, and nursery uses: 1) the land application program; and 2) the distribution program. Both of these programs require a NJPDES permit, and both protect ground water quality through site evaluation, sludge quality monitoring, application rates and crop control. The distinction between the two programs hinges on the requirements for letters of permit exemption and permits imposed on the processing facility and the application site.

A. Land Application Program

Under the land application program, a specific site is evaluated for its suitability for long-term land application of sludge. The unsuitable portions of the site are eliminated and a NJPDES permit is issued for the qualifying portions of the site. The permit ties sludge application rates to the nutrient requirements (fertilizer needs) of the crop, and restricts the types of crops that can be grown.

In its simplest terms, the land application program provides for long-term site permitting. (For further information see Section F.Part 4-II).

B. Distribution Program

Distribution programs are conducted pursuant to N.J.A.C. 7:14A-10.8. The department issues a NJPDES permit to the sludge processing facility/operation which includes, among other things, conditions imposed on an approvable distribution program. Sites to which sludge is distributed will require, at most, letters of permit exemption prior to the receipt of sludge.

Under the distribution program a specific sludge or sludge-derived product is evaluated for its suitability for distribution. These permits effectively transfer much of the regulatory responsibilities for land application of sludge to the permitted sludge generator processor. Other materials, such as food processing wastes may also qualify. The processing facility is issued a NJPDES permit requiring that the sludge quality be maintained and establishes distribution requirements for the material generated by the facility. The application rate is generally based on the nutrient concentration (fertilizer value) of the particular material.

Constraints on distribution will reflect the degree of pathogen reduction, vector attraction reduction and sludge quality achieved consistent with 40 CFR Part 503.

IV. Scope of the Management Alternatives:

Sludge management alternatives are continuously evolving and new concepts are constantly under development. This section presents a wide range of management alternatives, but it does not presume to present all available options. In fact, one of the responsibilities of the statewide sludge management program is the evaluation of new sludge management proposals. The alternatives presented in this document represent those alternatives that have been in most common usage or that, in the experience of the department, appear to have promise for future implementation. As the field evolves, additional alternatives may be incorporated into this SSMP Update. It is important that planners and sludge generators not interpret this list as restrictive, but rather, as a starting point.

Part 4-II. Land Application:

I. Introduction:

Prior to the development of commercial chemical fertilizers in the early part of the 20th century, animal wastes, human wastes and sludges were land applied for their nutrient value to crops. Land application remains a common practice throughout the world. With the marketing of commercial fertilizers, the use of manures and sludge was largely supplanted. Many sludges were then disposed of in landfills or in the ocean, but the closing of landfills and the elimination of ocean dumping created the need for environmentally acceptable management systems to handle the sewage sludge generated in New Jersey.

Land application of sludge is an agricultural process in which nutrients contained in the sludge are used to grow approved crops. Organic matter from sludges improves the tilth of the soil. Moreover, in some instances, the water contained in sludge is beneficial to the crop system. In general, nutrient release from sludge is not as rapid as from water soluble chemical fertilizer. Therefore, there is a reduction in the leaching of nutrients into ground and surface waters when compared to equal amounts of applied chemical fertilizer. Land application is not to be confused with landfilling, in which sludge is merely buried without utilization of its nutrient recovery potential.

When considering land application, it is important to remember that the quality and stabilization criteria discussed in this Part and in Section F. Part 4-I apply to all residuals managed through land application. In addition to these concerns, pretreatment to remove unsightly non-biodegradables is required for septage prior to land application. However, when evaluating modes of septage management, it must be stressed it is departmental policy to encourage management of septage through introduction at the head of an STP with septage receiving facilities. Through this method of management, septage is treated the same way as sewerage and is ultimately managed as the resultant sewage sludge.

The department has been actively involved in regulating land application for over a decade. Based on this experience, supported by the findings and risk assessments conducted as part of adoption of the federal technical sludge standards (40 CFR Part 503), the department intends to move away from the time-intensive approach now utilized for the permitting of direct land application sites to a less permit intensive distribution program for all sewage sludges as outlined in Section F. Part 4-VI. Such a policy shall enable the department to spend less time on issuance of site-specific land application permits and more time monitoring compliance and working with the permittees and farmers on proper management practices.

The conditions of this Part will remain applicable to operations permitted under the existing program. The department will propose modification to the NJPDES regulations (N.J.A.C. 7:14A) necessary to effect a broader sewage sludge distribution program, at which time, existing permittees will have the option of seeking permits and approvals to operate under the modified program format.

II. Policy:

The department has articulated its desire to establish a sludge management policy that provides for the sound environmental management of sludge as a resource. Throughout this SSMP Update, the department has emphasized its preference for beneficial-use sludge management alternatives.

III. Technical Aspects/General Practices:

A. General Parameters of Sludge Applications

There are numerous methods of applying residual materials to land. Each method has advantages and disadvantages (according to the particular circumstances under which it is used) the department must control through permit conditions. All methods must be in accordance with the following in order to gain DEPE approval:

1. **Uniform Application** - As with any soil amendment, sludge must be applied uniformly and at a controlled rate in order to accurately assess nutrient value and other impacts of sludge amendments. It is this requirement that differentiates approved sludge application from agricultural residue spreading or from waste dumping in the past.

2. **Designated Area** - Sludge must be spread in designated areas only. The characteristics of a site are studied in detail to ensure against the occurrence of the mobility problems described below. A plot plan sealed by a professional engineer or licensed surveyor is required for each site. It must accurately designate the application areas. Application outside of designated areas is considered a violation of the permit.

3. **Mobility** - Residual materials must be applied in a manner that avoids movement of surface materials by erosion or runoff, incomplete renovation and leaching. This requirement guards against off-site accumulation or concentration of sludge constituents in low lying areas.

4. **Prohibitions** - Sludge may not be applied to saturated soils, frozen soils or snow-covered soils.

5. **Suitable Crops** - Only crops recommended by the department may be grown on sludge-amended fields.

6. **Suitable Residuals** - Only residuals that satisfy criteria for land application quality and applicable stabilization requirements may be land applied.

B. Specific Methods of Application

The basic objective is to immobilize the residual material in an aerobic environment where the breakdown of organics, inactivation of pathogens, and utilization of nutrients can occur. This can be accomplished by surface application on cropped or fallow land or by sub-surface injection as described below:

1. Surface Application and Incorporation

This method is frequently used for applying residuals on agricultural soils. The department requires the residual be incorporated (plowed, harrowed, tilled, etc.) generally within 24-48 hours, if the land is not vegetated with an established crop. Careful attention should be given to incorporation requirements, because the potential for significant runoff to occur is the greatest immediately following the surface application of sludge. The method of incorporation must be chosen with erosion control in mind. Cropping should follow incorporation as soon as possible in order to stabilize the soil and utilize sludge nutrients.

Although surface application and incorporation is widely used, it requires careful attention to site characteristics and operational details. The permit application should address these points.

2. Sub-surface Injection

Sludges with up to about 10% solids content may be injected into the soil at shallow depths. Advantages of this technique are as follows:

a. Odors are reduced to a minimum;

b. Surface vegetation can remain relatively intact;

c. Runoff and erosion potentials are greatly reduced; and

d. A wider range of site characteristics and greater operational flexibility are possible.

Although the specially constructed equipment used for subsurface injection can be prohibitively expensive for a small-scale operation, costs can be reduced by leasing equipment, sub-contracting, or improvising with existing equipment (e.g., slurry tank pulled by a tractor).

3. Surface Application Without Incorporation

Residuals in the form of liquid sludge may be spread on the surface without incorporation provided there is greater than 75% vegetative cover in the form of an established crop and infiltration to prevent lateral movement of solids and/or leachate. Advantages of surface application include:

a. Surface conditions (solar radiation, temperature flux, competition, desiccation) are hostile to most pathogens and accelerate renovation;

b. Problems related to tillage (erosion, compaction, etc.) are avoided; and

c. There is a minimum impact on routine farm operations.

In order to address the potential problems of some pathogens remaining viable (albeit, in very low numbers) at the surface for periods of time public access, odor control, and grazing restrictions are more stringent for operations that do not include incorporation, than for operations which do incorporate the sludge after spreading. To avoid contact between sludge and the edible portion of a crop, residuals should be applied immediately after harvest. No grazing by domestic animals, whose products are consumed by humans, may take place for four weeks following application of sludge to pastures.

4. Direct Mixing to Create Final Landfill Cover

Residuals may be mixed directly with material to be applied to a landfill as final cover before spreading. This method of application is for use on landfills only and is to be used only if the final cover is not already in place.

The residuals are physically mixed with the cover material in amounts that do not exceed the amounts applied using any of the previously described methods of application.

5. Other Methods

Other methods of sludge application may be considered. The department will regulate these other methods on a case-by-case basis.

IV. Environmental Impacts:

A. General

The land application of sludge in agricultural programs produces measurable environmental benefits. Specifically, the cation exchange capacity of soil is increased, water holding capacity is improved, soil texture and tilth are improved and vital plant nutrients are returned to the soil. However, adverse environmental impacts of sludge farming can result from improper application or substantial over-application of poorly stabilized or low quality sludge such that overland runoff, odor production, or leaching of mobile sludge constituents to ground water occurs. If not incorporated into the soil or retained by surface vegetation, sludge can be carried by surface runoff and concentrate in low-lying areas or reach bodies of water. Over-application of poorly stabilized sludge can also result in odor production. If sludge is applied in greater quantities than the soil system can treat at one time, leaching and toxic reactions by plants and soil organisms can occur. Leaching of the mobile constituents is more likely if sludge is incorrectly applied to sandy, permeable soils. In general, though, the ability of sludge contaminants to leach through columns of acceptable soil composition has been greatly overestimated by opponents of the land application method. Research and practice indicate that sludge application compares quite favorably with other forms of crop fertilization, and in many respects, surpasses chemical fertilizers.

Some opponents argue that land application operations can be subject to a catastrophic, unforeseeable pollution incident. In a controlled operation, the opposite is true. As practiced under an NJPDES permit, the adverse environmental impacts are avoided through continuous monitoring of multiple complementary testing systems. Consider the accumulation of a metal such as copper, for instance. Sludge quality analyses are submitted quarterly by the permittee showing copper levels in the sludge. Application records are submitted quarterly showing cumulative copper added to date and ground water monitoring reports are required on a quarterly basis. Soil testing would reveal any changes in soil copper concentration. Finally, the crops act as an indicator for many contaminants, and may exhibit plant toxicity symptoms if applications exceed plant tolerances.

Sludges contain widely varying amounts of organic and inorganic components. The organic components are eventually broken down, incorporated into the soil plant system as soil humus, or removed by volatilization or downward movement. Inorganic constituents, such as metals, are retained more tightly by soil binding processes, and can accumulate over time to levels that can affect plants and humans. For this reason conservative limits have been placed on the cumulative amounts of metals that may be applied to soil. The limits are set so that irreversible changes do not occur in the soil/plant system that would limit future land use capabilities. Operation of a site in compliance with these permit limits prevents accumulation of elements in plants to levels that could be harmful to humans or plants.

Suitable soils and crops are essential components of a successful land application program for sludge. Soil has the capacity through its physical, chemical and biological characteristics to "treat" sludge and render it not only innocuous in the environment, but beneficial in the short and long-term. The up-take of certain nutrient components from the sludge both benefits the crop and removes these components from the soil-water system. Sludge provides nutrients and water, both essential to plant growth, and organic matter which improves soil structure and productivity. Some sludge, however, may also contain non-beneficial and potentially harmful components including excessive metals and pathogens. Metals can be absorbed by plant roots and in excess can be toxic to sensitive crops or accumulated in food chain crops. It is for this reason that the department and USEPA have established quality criteria for land-applied sludges. Complete sludge stabilization, proper loading rates, appropriate soils and crops, and public access restriction are necessary in order to maximize benefits, while negating the possible concerns related to land application of sludge. These concerns for nutrient, metals, and pathogen control are discussed in more detail below.

B. Pathogen Impacts

Sludge stabilization reduces the pathogen content. The higher the degree of stabilization performed, the greater the pathogen reduction. Before land application, sewage sludge must be treated by an applicable stabilization process.

Additionally, soil acts to filter pathogens from percolating water. The rate of liquid flow through soils is largely related to soil texture or particle size distribution. Generally, the finer the soil texture (i.e. the greater the percentage of silt and clay as compared to sand), the slower the rate of water flow. Fine textured soils provide greater filtration of pathogens and greater retention time of liquids. Soil biota, especially in the shallow aerobic layer of the soil, compete with or prey upon sludgeborne pathogens. The pathogens, which are mainly adapted to an anaerobic (oxygen free) environment, are reduced or destroyed when exposed to an alien and hostile aerobic soil environment. Pathogen reduction is not enhanced in water saturated soils where there is a minimal depth to water table or where the soil is excessively clayey or impermeable. In addition, the carbon-based food source of many pathogens does not exist below the surface soil horizons thereby decreasing their survival rate below this soil layer.

C. Metals Impacts

The impact of metals in sludge is primarily a function of two factors, cation exchange capacity (CEC) and pH.

CEC - The negatively charged particles of the soil, the clay and organic matter, which adsorb the positively charged metals contained in sludge, make up the soil CEC. The ability of soils to remove the positively charged metals from the soil solution is a function of the CEC. The higher the CEC, the greater the adsorptive capacity of soil. Therefore, the higher the percentage of organic matter and clay in the soil, the greater the ability of the soil to adsorb metals. The addition of organic material to the soil through the land application of sludge and SDPs increases soil CEC, and so, decreases leaching of metals to the ground water.

pH - The mobility of metals is pH dependent; as the pH decreases below 6.5, the solubility of metals increases and therefore their mobility increases. Maintaining soil pH at or above 6.5 decreases plant uptake on solubilized metals. With time, chelation and precipitation decrease the concentration of metals in interstitial ground water and they become less available to plants.

It should also be noted, that many metals found in sewage sludge are essential micronutrients and therefore, may enhance plant growth.

D. Nutrient Impacts

The phosphorus and potassium content of soils can be elevated and maintained at high levels while nitrogen tends to convert to the nitrate form. Nitrates are highly mobile in water and can leach through the soil to ground water if not taken up by crops. For this reason, the application rate of sludge to the soil-crop system is not permitted to exceed the crop need for nitrogen (i.e., the crop nitrogen requirement). Soil permeability affects the rate of nitrate leaching. Excessively sandy soils promote leaching, since permeability is generally rapid. At the nitrogen "agricultural application rate", the sludge should supply 100% of the crop's need for phosphorus but will not satisfy the crop's need for potassium, therefore addition of potassium by another means is required.

V. Applicable Legislation and Regulations:

A. Statutes

1. Federal

a. Clean Water Act, 33 U.S.C. §1251 et seq.

b. Resource Conservation and Recovery Act, 42 U.S.C. §6901 et seq.

2. State

a. New Jersey Water Pollution Control Act, (N.J.S.A. 58:lOA-1 et seq.)

b. New Jersey Water Quality Planning Act, (N.J.S.A. 58:llA-1 et seq.)

c. New Jersey Solid Waste Management Act, (N.J.S.A. 13:lE-1 et seq.)

d. Right to Farm Act, (N.J.S.A. 4:lC-1 et seq.).

e. New Jersey Air Pollution Control Act, (N.J.S.A. 26:2C-1 et seq.)

B. Regulations

1. Federal

a. Standards for the Use or Disposal of Sewage Sludge, 40 CFR Part 257, 402 and 503, February 19, 1993.

b. Polychlorinated Biphenyls Manufacturing, Processing, Distribution in Commerce and Use Prohibitions, 40 CFR 761 (1978).

2. State

a. New Jersey Pollutant Discharge Elimination System (NJPDES), N.J.A.C. 7:14A.

b. Sludge Quality Assurance Regulations (SQAR), N.J.A.C. 7:14-4.

c. Surface Water Quality Standards, N.J.A.C. 7:9-4.

d. Ground Water Quality Standards, N.J.A.C. 7:9-6.

e. Air Pollution Regulations, N.J.A.C. 7:27.

VI.(1) Permitting and Regulatory Process for Agricultural Application:

A. Discussion

Land application of sewage sludge has been the object of exhaustive research and experimentation. The NJPDES permit program not only reflects this research and experience, but also reflects New Jersey's unique experience with ground water and surface water quality. The restrictions placed on sludge application in New Jersey are considered conservative. Sludge metals concentrations are limited in order to permit long-term use of a site, and nutrient loadings are limited to the uptake requirements of the cropping system. Under such limitations, land application is primarily an agricultural process and secondarily, a means to manage sludge.

The entire land application permitting process evaluates environmental impacts, and, thereafter, the permit institutes a ground and surface water monitoring program to continue to assess the environmental impacts, determine future loading rates, and ensure that the system is functioning as designed.

The application of sludge to the land is regulated by the department through the NJPDES permits. Permit conditions include operating procedures that aim to eliminate potential negative impacts while attaining maximum benefits. The permits include monitoring and reporting requirements in order to assess impacts.

In the permit application, the applicant must show that the proposed land application operation will be in accordance with the intent of state and federal guidelines and regulations. More importantly, the applicant must become familiar with the operation and design of the system in order to land apply sludge safely and competently.

B. Permit Process

The procedures to obtain a NJPDES permit for land application of sludge are set forth at N.J.A.C. 7:14A-10.8. The basic steps are summarized as follows:

1. Pre-application Conference

The purpose of this conference is to review the information gathered during a preliminary site evaluation, discuss the scope and magnitude of the proposal, and point out the potential problems with the site and operation. The applicant is also informed of the submission requirements, which may be modified to reflect the conditions specific to the proposed operation. The applicant is provided with the necessary forms for submitting a draft permit application and an explanation of the submission requirements. This conference is designed to resolve problems before they arise by helping the applicant understand the permitting process and by providing the applicant with the necessary guidance beforehand.

2. Permit Application and Review Procedure

If a formal permit application is submitted, it must contain the information required in N.J.A.C. 7:14A-10.8, including: soil descriptions obtained by on-site borings, a crop management plan, engineered plot plan, potable well inventory, methods for determining the approximate application rate, and record keeping and monitoring provisions. If the department determines the permit application is in conformance with federal and state requirements, a draft permit is then developed.

Notice of issuance of the draft permit is made public and comments solicited. If a public hearing is scheduled, a minimum of thirty days is provided between the issuance of the public notice and the public hearing. Public comments are received during the 30-day notice period and at the public hearing. At the close of the public comment period and after the public hearing, the department evaluates comments received and issues a final permit incorporating, where appropriate, the comments received. A final permit becomes effective 30 days after issuance unless an adjudicatory hearing is held.

C. Permit Controls

Permit conditions are related to the impact that land application of sludge might have on public health and on ground and surface water quality. Concerns arise from the potentially detrimental characteristics and quality of sludges, namely, heavy metals, industrial organic content, pathogens, and offensive odors. Land application of sludge can be carried on in an environmentally safe manner by adhering to a management scheme that includes controls of certain parameters, namely: sludge quality analysis, application of sludge at agricultural rates, application of properly stabilized sludge, monitoring of ground water and soils, and odor control.

1. Sludge Quality

Sewage treatment plants seeking acceptance of their sludge at a specific land application operation must comply with the policy on sludge quality and requirements to obtain a Generic Approval Letter.

2. Application Rates

a. Federal criteria and state guidelines based on water quality concerns and toxicity to plants define acceptable limits for certain soil and water quality parameters. Loading rates of sludge, both annually and cumulatively, as well as the lifetime of the site for sludge application, must be determined on the basis of these prescribed limits as part of the permit system.

b. Sludge nitrogen is usually the limiting nutrient in applied sludges. The limits established for nitrogen loading are determined by crop nitrogen requirement and residual soil nitrogen.

c. For the heavy metals, cumulative loading levels have been developed pursuant to 40 CFR 503. All past metals loadings shall count toward the cumulative loading levels. This shall include the requirements to include molybdenum and selenium loadings to date.

d. The quantity of sludge allowed to be land applied is determined by the parameter that first reaches the limiting amount. In general experience, this has been a plant nutrient related limitation, specifically nitrogen. It is conceivable that a heavy metal could be the limiting constituent for sludges with considerable heavy metals concentrations. However, in most cases the department would not permit land application of a sludge that would be limited in application rate due to its heavy metal, PCB or other limiting contaminant content.

3. Control of Soil pH

As a condition of a NJPDES permit the permittee must maintain the soil at a pH greater than or equal to 6.5 to reduce potential metal migration. Generally, the soils of New Jersey exhibit a pH of less than 6.5, and therefore, must be adjusted to greater than or equal to 6.5 with the addition of the appropriate amount of lime or equivalent.

The soils monitoring program as outlined by the permittee and department will test the pH level to ensure pH is adjusted and maintained.

4. Monitoring

The monitoring program for soils and ground water is designed to be consistent with the potential impacts of the proposed operation. Normally, ground water monitoring wells are required on sites used for repeated sludge applications. The monitoring frequency and parameters to be tested for by a New Jersey certified laboratory are specified in the permit. The purpose of such monitoring is to determine any increase in those parameters controlled by the "Water Quality Standards". Soil analyses are also required to determine metals and nutrient levels in the soil on the site that affect sludge application rates and the lifetime of the land application site.

D. Stabilization of Sludge

Sludges must be stabilized prior to land application in order to avoid problems caused by odors and pathogens. Odor control is a major public concern especially if there are residents in close proximity to the site. Pathogens (micro-organisms that can lead to disease) are an important health consideration. Federal criteria for disease control are found in 40 CFR Part 503.

E. Site Evaluation

As set forth in NJPDES regulations (N.J.A.C. 7:14A-10.8), sites for the land application of sludge must be evaluated for their suitability on the basis of their soil characteristics, geology, surface topography, characteristics of water resources and surrounding land use prior to permitting. The site must be large enough to provide buffer zones surrounding application areas. In specific cases, the conditions outlined in the "Guidelines for the Land Application of Residuals" may be made more or less stringent depending on the scope of the proposed project. The department's foremost concern is water quality and protection of public health in any site evaluation.

The site evaluation primarily analyzes soil factors as they relate to the suitability of the site for sludge application. Specifically, permeability, soil drainage, flooding frequency, slope, and depth to ground water and to bedrock are evaluated to determine sludge renovation and mobility. The evaluation should be performed by a certified soil scientist or an individual with qualifications in soil classification. It should be based on field observation, described in terms of USDA soils descriptions, and supplemented by data from soil survey reports where applicable. An appropriate selection of soils would be deep, well-drained, loamy soils that are not subjected to frequent flooding.

F. Agricultural Conservation Plans (ACP) and Crop Management Plans

Crop management is essential to the sound and efficient land application of sludge. Crops have an annual need for fertilizer. The amount of fertilizer a crop requires depends on the specific crop grown, the soil type, and the yield goal. Sludge application rates are determined to satisfy the needs of the particular crop thereby guaranteeing that the nutrients supplied in the sludge will be used by that crop. The crops must also function to control soil erosion and sludge and/or water runoff. This overland movement could result in surface water contamination or contribute to lake eutrophication. As a result of these concerns, all permits for land application of sludge include a requirement that the permittee seek certification of an ACP by the local soil conservation district prior to any application of sludge to each of the fields of a site.

The farming industry in some cases allows substantial trade offs, particularly in the form of erosion, in order to produce crops economically. It is important for applicants to realize beforehand that such practices are not acceptable with sludge application. It will often be necessary for a farmer to tighten up cropping and erosion control practices in order to apply sludge under a state permit.

It is most often agricultural land that is selected for application of sludge. This is because the crops have a need for the nutrients contained in the sludge. As each crop is harvested, the valuable nutrients are taken from the soil system and must be replenished to meet the needs of the next year's crop. Sludge is, therefore, a valuable resource. Additionally, a farm operation usually has the equipment to incorporate and utilize the sludge, and the qualities that make land highly productive also make it desirable for land application of sludge. These qualities include minimal slopes, balanced soil texture (loams), moisture holding capacity, aeration, good infiltration and intermediate permeabilities.

G. Storage

Storage installations are essential to operational flexibility at land application sites. For details on storage requirements refer to Section F. Part 4-IX.

VI.(2) Permitting and Regulatory Process for Landfill Reclamation:

A. Discussion

There are hundreds of landfills in the state registered with the Division of Solid Waste Management (DSWM) that are in various stages of operation or closure however, the majority are rapidly approaching capacity or are already closed. Pursuant to N.J.A.C. 7:26-1 et seq., landfills in the state should have submitted closure and post-closure plans, as well as engineering designs to the DSWM. As part of a closure plan, the owner or operator is responsible for establishing cover vegetation on the landfill to control surface runoff and erosion and to improve the general aesthetics of the site.

Using sludge and SDPs as a soil amendment to establish landfill cover vegetation constitutes a beneficial resource recovery method of sludge management. Application of sludge and SDPs enhances soil properties such as structure, cation exchange capacity, and moisture retention capability, all conditions that may be limiting factors in establishing vegetation.

Before a NJPDES permit to apply sludge or compost to the final cover material of a landfill can be issued, the closure plans must be received and approved by the DSWM. Once DSWM approval is secured, the WFRP can approve residuals application, in one of three ways, to the landfill in closure operations.

1. If a health risk or environmental degradation is imminent because a sewage treatment plant has no viable means of otherwise managing of its sludge, the department will consider the issuance of an emergency NJPDES permit for the use of residuals as an amendment to final cover for 180 days. Sludge must be stabilized prior to application and be of acceptable quality.

2. The WFRP will consider a full five-year NJPDES permit for the use of residuals as an amendment to final cover. Sludge must be stabilized prior to application and be of acceptable quality.

3. If compost or other form of sludge is proposed for use as an amendment to final cover and a NJPDES permit has been issued for approved land application plans or distribution activities, further permits are not required as outlined in Section F. Part IV-6 of this section. All treatment plant, NJPDES processing and distribution permits allow a facility to distribute its sludge without obtaining permits for each site. The WFRP requires only the submittal of an Application Site Information Sheet and a written letter of approval for the site from the WFRP. The DSWM will require approvable closure plans be submitted prior to compost application.

   A NJPDES permit, either full or emergency, will allow as many sludge applications as necessary to establish an adequate vegetative cover with consideration of water quality. The rate of application will be established on a case-by-case basis, but will most often be based on the nutrient requirements of the existing or proposed vegetation. Higher rates than those of the nutrient requirements will be considered on an individual basis since sludge quality, in terms of potential contaminant concentrations, is often less of a constraint on landfills than on agricultural lands due to the nature of a landfill. Also, the use of poor quality sludges will be considered in landfill reclamation projects since the area will not be used for food crop production, and thus metal uptake by the established vegetation is not a concern.

B. Permit Process

The procedures to obtain a NJPDES permit for the land application of sludge are set forth at N.J.A.C. 7:14A-10.8. The basic steps are summarized as follows:

1. **Pre-application Conference**

A pre-application conference is strongly recommended to help establish coordination among representatives of the landfill, the sewage treatment plant, and the appropriate offices of the department.

2. **Permit Application and Review Procedure**

a. The permit application procedures for using sludge as an amendment to vegetate a landfill are as follows:

1) Submittal of the engineering and design closure plans that include the use of sludge for vegetative soil amendment, to the DSWM with a cover letter requesting approval for implementation. This request must be signed by the landfill operator, or his duly authorized representative. The plans must bear a licensed professional engineer's signature and seal. A completed copy of an application for the Land Application of Residuals to Landfills as Final Cover Amendment must accompany this request. This application must be signed by the applicant and the engineer. If closure plans have previously been submitted to the DSWM, amended plans reflecting the utilization of sludge must be submitted. Copies must also be submitted to the municipality in which the landfill is located, to the appropriate county solid waste management district coordinator, and to the applicable soil conservation district manager. Duplicates of each of the above documents must be simultaneously submitted to the WFRP.

2) When the DSWM determines the closure plans are adequate, notice will be forwarded to the applicant, the landfill operator (if the landfill operator is not the applicant) and the WFRP. This notice from DSWM will be incorporated into the application for the NJPDES permit.

3) When the WFRP determines that the application is adequate and receives the closure-plan Notice of Approval from the DSWM, the WFRP will issue a 180-day emergency or draft NJPDES permit. Copies will be sent to the DSWM, the municipality, the solid waste management district, and the local soil conservation district.

4) When, during any of the above steps, one of the agencies, WFRP or DSWM, notes a deficiency, that agency will notice the applicant and send a copy of the deficiency notice to the other agency. Applicant's responses shall be submitted to both agencies.

b. The procedures for using sludge or SDP from an approved distribution program for the establishment of vegetation in the closure of the landfill are as follows:

1) Submittal of the closure engineering and design plans which include the use of sludge or SDPs as a soil amendment for vegetation to the DSWM with a cover letter requesting approval for implementation. This request must be signed by the landfill operator, and the plans must be signed and sealed by an engineer. A copy of an Application Site Information Sheet for use of sludge or SDP generated by a sewage treatment plant possessing a NJPDES distribution permit must accompany this request and be signed by the landfill operator. If the original closure plans submitted to the DSWM did not include the utilization of sludge or SDP, new plans must be submitted. Copies of this request must be submitted to the same parties named in Step 1 for sludge. Duplicates of the above are concurrently submitted to the WFRP.

2) When the DSWM determines the closure plans are adequate, notice will be forwarded to the landfill operator, the distribution permit-holder, and the WFRP.

3) When the WFRP determines that the site information sheet is adequate, and receives the closure-plan approval from the DSWM, the WFRP will notify the landfill operator of approval to proceed. Copies will be sent to the DSWM, the sludge or SDP distributor, the municipality, the solid waste district, and the soil conservation district.

4) Coordination between the applicant and the agency must follow the same procedure as outlined in item a.4 above.

c. In the event that sludge or SDP is to be stored during the period for which it is to be utilized in the final cover operations at the landfill, the following additional steps must be taken (see Section F. Part 4-IX for information on storage):

1) If dewatered sludge is to be stored on-site at the treatment plant on a proposed pad or impervious surface, a 90-day storage permit(s) will have to be secured. 90-day permits may be issued back-to-back for the duration of the landfill cover permit. On-site storage permits may also be considered for storage of liquid sludge in existing tanks at the treatment plant. It must be noted that stored sludge must be stabilized prior to its use on the landfill. If lime stabilization is to be used, the sludge must be stabilized immediately prior to land application at the landfill and provisions for the stabilization must be incorporated into the NJPDES permit. Provisions must be included in storage permits for odor control, access limitations, leachate collection and run-off control. Storage permits

may be obtained through the WFRP.

2) If sludge storage is to be installed at the treatment plant or at the landfill, a NJPDES permit and a TWA will probably be required.

3) If an impermeable barrier (with provisions for leachate collection, run-on/run-off and odor control, etc.) is to be installed at the landfill to store dewatered sludge, installation of the pad will be included as part of the NJPDES permit for use of sludge.

4) If SDP is to be stored on-site at the landfill, no additional permits are required since this is covered by the NJPDES permit for material distribution.

C. Permit Controls

Permit controls serve to alleviate potentially adverse impacts to public health or water quality. The conditions of individual permits reflect the specific circumstances of each site. Concerns arise from the potentially detrimental characteristics of some sludges. Permit conditions control application rates and practices as well as sludge quality in an effort to safeguard environmental quality. Land application of sludge can be carried on in an environmentally sound manner through adherence to permit conditions.

1. Application Rates

a. Federal criteria and state guidelines define acceptable limits for certain soil and water parameters based on water quality concerns and potential toxicity to plants. Maximum loading rates for specific metals based on these prescribed limits, must be considered when establishing application rates for sludge.

b. Nitrogen is often the limiting nutrient in sludges considered for land application. Nitrogen limits are determined by the nitrogen requirements of the proposed vegetative species and residual soil nitrogen. However, when being used to establish landfill vegetation, sludge can be applied at up to twice the nitrogen requirements of the cover species, because it is being used to create more favorable growing conditions in the soil over the hostile landfill conditions; it is not applied merely to meet the nitrogen requirements of the cover vegetation as is the case in agricultural application.

c. Cumulative loading limits for metals have been developed pursuant to 40 CFR Part 503. Use of these limits prevents any adverse affects which could otherwise occur when doubling the application rates.

Although the quantity of sludge allowed to be applied to establish landfill vegetation is usually determined by the quantity of nitrogen in the sludge, it is conceivable that a heavy metal may be the limiting factor if the sludge has considerable heavy metal concentrations. In most cases however, the NJDEPE would not approve such a sludge for land-application purposes.

2. Monitoring

The purpose of soil monitoring is to determine metal and nutrient loadings in the soil on the site. Sampling will be required periodically for the duration of the permit. Ground water monitoring wells should already be in place as part of the closure plan for the landfill.

3. Operational Review of Design and Engineering

Before a permit will be issued, the landfill must apply to the Bureau of Landfill Engineering, DSWM for approval of engineering and design modifications. WFRP must receive a copy of the approval before a NJPDES permit can be issued to use sludge as amendment to the final cover material of a landfill.

D. Stabilization of Sludge

As with agricultural application, sludges must be stabilized prior to application to a landfill to establish vegetation in order to avoid problems associated with odors and pathogens. Odor control is important in gaining public acceptance especially if the landfill is located near residential areas. Pathogens (micro-organisms that can lead to disease) are an important health consideration. Federal criteria for pathogen reduction are found in 40 CFR Part 503.

The federal criteria are regarded by New Jersey as minimum standards. There may be other factors warranting increased treatment or restrictions for any particular project.

E. Landfill Evaluation

Landfills proposed for sludge application to final cover will be evaluated for their suitability based on cover characteristics, topography and surrounding land features.

No borings into the cover material will be required, but cation exchange capacity, pH, and depth of the cover material must be determined. All of these influence the rates of sludge application.

Topographic characteristics, primarily slope conditions, are evaluated and used in determining application methods. An area of less than 12% slope is preferable to minimize runoff and erosion which can result from improper application of residuals. Other concerns are proximity to surface waters, adjacent land uses and adequate area for buffer zones.

The landfill evaluation should be written by an individual with qualifications in soil science and should be based on field observation.

F. Vegetative Cover

The primary objective of sludge application on landfills is to establish vegetation on a closed landfill in an effort to control erosion and runoff, not crop production. Under no circumstances are crops intended for human consumption to be grown on a landfill using sludge.

Individual species grown should be chosen on the basis of several specific characteristics. Tolerance to extremes is advantageous, especially to drought conditions since soils used as landfill cover are often well drained. A medium deep rooting species is also favorable. Very deep roots are undesirable because they may not have sufficient soil in which to root. Shallow rooting species are also undesirable, because they do not serve to control erosion as well. Rapid germination and fast growth are favorable plant characteristics to ensure the area is vegetated and stabilized as soon as possible.

VII. Sources of Information and Guidance:

In addition to the information and guidelines provided by DEPE, there are many other important planning resources available. A generator of sludge that needs to contact the farm community in order to locate and plan a land application operation will find the agencies discussed below to be important sources of information and guidance. Agencies that play a role in designing farmland programs include the New Jersey Department of Agriculture, the Soil Conservation Service (SCS) and the Cooperative Extension Service.

The U.S. Department of Agriculture, and the local soil conservation districts provide SCS soil survey reports for most counties in New Jersey. These reports are a primary planning tool, because they contain soil maps and a detailed description of soil types as they relate to land use.

In addition, it is the policy of the SSCC, in cooperation with the SCS and local soil conservation districts, to provide the technical assistance necessary for developing soil and crop management systems to farm operators who anticipate using residuals. Soil conservation agency personnel have aided farmers who choose to utilize sludge by assisting in on-site soils descriptions and by preparing agricultural conservation plans that address crop management and erosion control.

The New Jersey Cooperative Extension Service is centered at Rutgers University and has offices in each county. The extension service will analyze soil samples for crop nutrients and other parameters, recommend fertilizer rates and provide crop management guidance. Such information is published each year by the extension service in "Production Recommendations for Field Crops". Crop fertilizer needs are a basis for calculating sludge application rates, and the DEPE uses extension service recommendations over other sources.

An immense volume of literature has been published concerning the land application of sludges and related topics. There are numerous publications by the USEPA and many states have published guidelines that may be useful to New Jersey planners. Below is a partial list of the more relevant documents available.

It should be noted that the requirements and methods of each state differ in many respects, even though the basic concepts are similar. The attitudes and policies of other states reflect the environmental and social conditions unique to each state, and are not always in accordance with those of New Jersey.

A. Guidelines

1. DEP Guidelines for the Land Application of Residuals (1984).

2. DEP Guidelines for the Application of Residuals on Landfills for Final Cover Amendment (1985).

3. Guidelines for the Application of Wastewater Sludge to Agricultural Land in Wisconsin. Technical Bulletin No. 88. Department of Natural Resources, Madison, Wisconsin (1975).

4. Ohio Guide for Land Application of Sewage Sludge, Bulletin 598 (revised). Cooperative Extension Service, Ohio State University, Columbus, Ohio. (1979).

5. Land Application of Wastes, an Educational Program, Cornell University. Ithaca, New York. (1978).

B. USEPA Publications

1. Municipal Sludge Management: Environmental Factors, MCD-28, USEPA 430/977-004.

2. Application of Sludges and Wastewaters on Agricultural Land: A Planning and Educational Guide, MCD-35.

3. Municipal Sludge Management: USEPA Construction Grants Program. An Overview of the Sludge Management Situation, (April, 1976) USEPA-430/9-76-009.

4. Application of Sewage Sludge to Cropland: Appraisal of Potential Hazards of the Heavy Metals to Plants and Animals, MCD-33, USEPA-430/9-76-013.

5. Cost of Lands Preading and Hauling Sludge from Municipal Wastewater Treatment Plants - Case Studies, Solid Waste Management Series SW-619, USEPA/530/SW-619. (1977).

6. A Guide to Regulations and Guidance for the Utilization and Disposal of Municipal Sludge, 48 pgs. (September, 1980) MCD-72. USEPA 430/9-80-015.

7. Process Design Manual for Land Treatment of Municipal Wastewater, 600 pgs. (October, 1977) USEPA 625/1-77-008.

8. Technical Report - Environmental Changes from Long-Term Applications of Municipal Effluent, 32 pgs. (June, 1978) USEPA-430/9-78-003.

9. Process Design Manual for Land Application of Municipal Sludge, (October, 1983) USEPA 625/1-83-016.

10. USEPA Operations Manual for Sludge Handling and Conditioning, (USEPA-420/ 9-78-002).

11. Land Application of Municipal Sewage Sludge for the Production of Fruits and Vegetables: A Statement of Federal Policy and Guidance, USEPA, USFDA and USDA, (SW-905) 1981.

C. Agricultural Services Publications

1. Agricultural Waste Management Field Manual, USDA, Soil Conservation Service, August, 1975.

2. Rutgers Production Recommendations for Field Crops., Published annually by the New Jersey Cooperative Extension Service.

3. Standards and Specifications, Technical Guide, Section Four, USDA, Soil Conservation Service, September, 1979.

4. Criteria and Recommendation for Land Application of Sludges in the Northeast, Pennsylvania State University Agricultural Experiment Station, Bulletin 851, March 1985.

D. Other

1. Agricultural Use of Sewage Sludge, Monmouth County Planning Board Publication. 109 pages. (1981).

Part 4-III. Composting:

I. Introduction:

Composting alone is not a method of ultimate sludge management, but rather, a management alternative that creates a new product more readily utilized in a resource recovery mode than conventionally stabilized sludge. Composted sludge conforms to USEPA's criteria for sludges that have undergone a Class A pathogen reduction. Satisfaction of these criteria enable compost distribution for public use under many circumstances.

Composting is defined as a biological decomposition of the organic constituents of waste under controlled conditions. Controlled conditions allow for elevation and subsequent decrease in temperature in compost piles as a result of the growth of a thermophilic microbiological community with subsequent die-off of organisms and pathogen kill. The result is a highly stable product suitable for use as a soil amendment in agricultural practices, that with minimal requirements is suitable for distribution to the public, landscapers, nurseries and other horticultural users.

II. Policy:

The department has articulated its desire to establish a sludge management policy that provides for the sound environmental management of sludge as a resource. Throughout this SSMP Update the department has emphasized its preference for beneficial use sludge management alternatives.

III. Technical Aspects/General Practices:

A. General Discussion

Three basic processes used to compost sewage sludge are: windrow, static pile, and mechanical composting. Although composting can be accomplished in non-enclosed facilities, the department generally requires composting be performed in covered facilities to protect the piles from the elements, especially moisture, and to control particulate emissions (dust, microbial spores) and odors. The department requires that all new composting projects or modifications to existing projects provide for enclosure of the composting process.

Due to the high odor potential, anaerobic composting of sludge is strongly discouraged by the department. For this reason, currently all engineered compost systems in New Jersey are aerobic (requiring the presence of oxygen/ air) processes. Oxygen must be supplied to the composting mass to meet demands imposed by organic decomposition. As a result of the biological activity, heat, carbon dioxide (CO_2) and water are produced during the process. Depending on the characteristics of the feed substrate, composting temperatures can reach such elevated levels that biological activity can actually be impeded. Hence, air must be supplied not only to meet the stoichiometric oxygen demands, but, also, to remove products of biological activity (i.e., heat, moisture and CO_2). In order to facilitate the movement of air through the composting mass, the sludge is mixed with a bulking agent prior to aeration. A bulking agent is an organic or inorganic material of sufficient size to provide structural support and maintain air space when added to the wet sludge. If the bulking agent is organic, an increase in the quantity of degradable organics can produce a finer product. Some of the bulking agents that have been used are woodchips, shredded tires, tree trimmings, pelleted refuse, peanut shells, sawdust, straw, peat, and rice hulls.

The equipment used for mixing sludge with the bulking agent plays an important role in determining the structure of the composting mass. Therefore, selection of mixing device plays a very important role in the design of the aeration system. The sludge bulking-agent mixer should produce a mix having a porosity of at least 40% that does not result in the formation of sludge balls.

A variety of techniques can be employed to compost. Although the details of these techniques vary, the basic principles governing the composting process remain unchanged. Systems that use reactors are popularly termed "mechanical", "enclosed" or "in-vessel" compost systems; those which do not, are often termed "open" systems. Typical open systems include windrow and static pile composting, however these open systems can be covered and protected from the elements to improve processing.

The composting mass, whether the system is enclosed or open, is subject to a curing period following the active aeration or reactor phase.

During the curing period, oxygen can be supplied through forced aeration, or through natural convection. The curing of the compost is normally carried-out by making piles 10 to 15 feet high.

Following the curing period, the composted material is typically processed through a screening operation, depending on the kind of bulking material used and the ultimate use of the compost product. The economics of using some of the bulking agents, such as woodchips or shredded tires, generally demand the bulking material be screened and recovered for reuse. The screening also helps to produce a finely graded product that is more marketable than the compost mixed with woodchips. Screening is a critical unit operation in the composting process, therefore, the selection of the screening equipment deserves careful consideration.

B. Composting Methods

1. Windrow Composting

Windrow composting is an unconfined process that relies on natural ventilation with frequent mechanical mixing of the piles to maintain aerobic conditions. It is desirable to provide roofed structures covering the windrow piles. The mixture to be composted is stacked in long parallel rows or windrows. The cross section of the windrow may be trapezoidal or triangular, depending on the characteristics of the mobile equipment used for turning the pile. The width of a typical windrow is 15 feet and the height is three to seven feet. A bulking agent is mixed with the wet sludge cake to facilitate aerobic composting and handling. The quantity of bulking agent is adjusted to maintain a mixture solids content of 40 to 50 percent.

As a result of the biological decay process, temperatures in the central portion of the windrow reach as high as 150°F (65°C). Operating temperatures may be maintained at 140°F (60°C) for as long as ten days. A high temperature throughout the pile for a sufficient time is important to control pathogens. A satisfactory degree of stabilization is indicated by a decline in temperature to about 113° to 122°F (45° to 50°C). The windrows are turned at least once every three days, for a total active composting period of three weeks; this aids aeration and moves outer compost to inner pile areas. The pile is then flattened to a 12-inch layer and harrowed for drying to greater than generally 65% solids. The material is then removed from the windrow area and stockpiled for an additional 30 days for curing purposes. After curing, the compost is screened, if the bulking agent is to be recovered, and distributed.

2. Aerated Static Pile Composting

An aerated static pile system was developed in order to eliminate many of the land and handling requirements of windrow composting. This system consists of the following steps: mixing sludge with the bulking agent, construction of the composting pile, active composting, screening of the composted mixture, curing and storage. The static pile method differs from windrow composting in that it provides a forced air supply to the pile, thereby eliminating the need for turning. Several methods have been developed for pile aeration; either drawing air from outside the pile inward or blowing air from within the pile outward or a regime that alternates between the two.

In most cases, woodchips or a similar bulking agent are placed on the composting pad. The aeration system is then constructed and covered by more woodchips to prevent the perforated aeration pipes from clogging with compost. Wood chips (bulking agents) and sludge are then mixed to achieve a minimum total solids content of 40%. The sludge-woodchip mixture is then laid down to form the compost pile. Generally, a filter material such as finished compost, is applied over the compost pile and, if the aeration system is designed to pull outside air into the pile, filter material may also be placed over the exhaust outlet of the blower system to absorb potential odors emitted by the composting material. Positive aeration may eliminate the need for exhaust air filtering. The advantages of aerated static pile composting include shortened processing time, better control of temperature and aerobic conditions, and reduction of odor risks.

3. Mechanical Composting

Mechanical composting is accomplished inside an enclosed basin or container. Mechanical systems are designed to minimize odors and control environmental conditions such as air flow, temperature, and oxygen concentration. The percent solids, aeration and pathogen reduction requirements are similar to aerated static pile composting; the primary differences among mechanical composting systems are the methods of controlling the process. For example some systems provide aeration by dropping material from one level to the next, other systems tumble the compost in a rotating cylinder for aeration. In most systems multiple screw conveyors and blowers are used for forced bottom aeration and stirring. In some systems heat and/or water may be added to the composting mass at critical times to increase biological activity and keep the composting reaction continuing at optimal rates. Although the product may be stabilized in a shorter time period, this type of composting may require longer curing times depending on the system.

4. Other Composting Processes

The science and technology of sludge composting is rapidly evolving. Process variations are continually being developed by both operators and researchers. Discussion of all possible composting variations is not possible within the scope of this document. Process variations that have been the subject of research include composting staged in batches with separate microbial seeds for each stage, increasing air flow through compost piles and increasing carbon supplies.

IV. Environmental Impacts:

If improperly designed, constructed or operated, the process of composting can produce leachate from the composting and curing pads, odor problems, particulate and dust pollution, and a potential for spreading pathogens including spores of certain fungi. Proper design, construction, and operation will negate adverse environmental impacts. If composting is performed in violation of regulatory requirements, compost could produce environmental impacts. The permit process is designed to eliminate these problems. Each of the possible impacts associated with uncontrolled composting of sewage sludge is discussed in detail below.

A. Environmental Impacts from the Composting Operation

Impacts discussed in this section will include all those potentially associated with beginning the composting operation, actually processing the compost, and preparing it for distribution.

1. Leachate from Composting

In the operation of a composting facility, leachate is produced that can contain elevated levels of nitrogen, suspended solids and other contaminants. This impact is addressed in permit controls for unconfined composting operations such as uncovered windrow or static pile methods. In these situations, rainfall can produce leachate. Curing areas, which are usually unconfined, are also addressed by such permit controls. Confined operations and covered static pile or windrow operations eliminate or greatly reduce the leachate volumes and are strongly encouraged by the department. Mitigation of the potential leachate problems is usually achieved by proper drainage, collection and treatment facilities at the composting operation.

2. Odors

Odors can be generated by composting facilities if they are not properly designed or operated, and be aggravated by improper siting. Generally composting will generate mild musty odors confined to a few hundred feet of the compost piles when aerobic conditions are maintained throughout the operation. However, if sludge from soured digestion is used, or if anaerobic conditions occur, odors can quickly become a problem. Unpleasant odors can also be generated around the vents of blowers in static pile operations if not properly operated. Some facilities have experienced odors during periods of high rainfall or during incidences of poor mixture control and/or inefficient mixing. Proper operation of mixing equipment, maintenance of aerobic conditions and correct bulking agent to sludge ratios mitigate most of the odor problems. If aeration is negative air flow, the exhaust outlet of the blower system in static pile operations should be covered with an odor absorption material such as finished compost. Confined and unconfined operations can be covered to greatly reduce odor potentials due to rainfall. Odors from composting should not be offensive in areas of human use or occupancy.

3. Dust and Particulate Impacts

The handling of compost has the potential for producing large amounts of dust and particulate matter especially during periods of conveyor operation, pile turning, or screening. Generally, in any area where the compost is falling, dust will be produced. In dry or windy areas dust generation can be a problem. Wetting compost piles and tripping points on conveyors, using covered conveyors and vehicles for transporting compost, and constructing wind breaks, all mitigate the potential for dust generation.

4. Pathogens

The public has voiced concern regarding growth of pathogens in or on composting material. Many common pathogens borne by wastewater are present in raw sludge. Some studies have indicated that high levels of total coliform, salmonella, viruses, and parasitic ova can be present in raw sludge before stabilization and composting. The temperatures achieved, during the first ten days of operation in properly maintained compost piles, result in rapid reduction in the number of pathogens. The destruction of most pathogens is achieved during active composting and only very low levels of pathogens, which are of no public health concern, have been found in the majority of final compost samples.

Aspergillus fumigatus, one of the most common forms of fungus in the world, has been isolated in air samples from several composting operations. This fungus grows in self-heating organic matter such as hay, leaves, woodchips, composting refuse and composting sewage sludge. The number of airborne spores of A. fumigatus rarely exceeds 500 per cubic meter in background air. By comparison, spore concentrations in the hay storage area of a farm have been noted as high as 21 million per cubic meter.[1] The highest levels of aerospora in composting facilities is associated with the screening operations. Levels have been recorded from 2533 to 5000 CFU/cubic meter during screening operations. The levels quickly return to background when the screening process ceases. Additionally, aerospora transport seems to be insignificant beyond 150 meters.[2]

A. fumigatus is a secondary pathogen and will ordinarily only colonize severely damaged respiratory tissue. For this reason, individuals with a history of lung

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[1]Oliver, William M., "The Life and Times of Aspergillus fumigatus," Comp. Sci./Land Util., March/April, 1979, pp. 36-39

[2]Kothary, Mahendra H., J.D. MacMillan, T. Chase, Jr., "Sludge Composting and Utilization: Destruction of Salmonella and Airborne Levels of Aspergillus fumigatus," N.J. Ag. Exper. Station, Project No. 01500.

ailments should not work at composting operations.

B. Environmental Impacts from the Distribution of Compost

The potential impacts discussed in this section include only those relating to the uncontrolled utilization of compost. These potential impacts are essentially the same as those associated with uncontrolled land application of sludge (see Section F. Part 4-II) and are not applicable to a properly conducted distribution program.

1. Nitrogen Contamination of Ground Water

In any situation where fertilizers or soil amendments will be incorporated into the soil, such as incorporation of manures, commercial fertilizers or compost, there is the potential for some of the nitrogen contained in the amendment to leach into the ground water at the application site. Compost typically contains one to three percent nitrogen, most of which is in the organic form and unavailable for crop or vegetative uptake. When compost is applied to a soil, the organic nitrogen is mineralized to ammonia and nitrified to nitrate, which is readily utilized by vegetation. Should the compost be applied to the soil at a rate exceeding the nitrogen requirements of the vegetation, the leaching of inorganic nitrogen (in the mobile nitrate ion form) to ground water could occur. Thus proper loading rates for compost must not exceed the nitrogen requirement of the crop.

2. Heavy Metal Contamination of Ground Water

As with nitrogen, where compost is incorporated into the soil in an uncontrolled manner, the potential exists for heavy metals in the compost to be leached into the ground water below the application site. This is because most of the heavy metals contained in wastewater (nickel, cadmium, zinc, lead, copper, mercury, chromium) are conserved by sludge microorganisms. Although most of the metal ions are chemically bound within sludge, some mobile ions will be present. Under certain conditions, such as low pH conditions, many mobile ions may be present and leaching can occur. The soil has the ability to chemically bind these ions as the leachate passes through it. This is known as the cation exchange capacity. If the soil's capacity to accept ions is surpassed by heavy loading rates over a long period, or if low pH conditions occur in the soil, leaching of heavy metal ions into the ground water could occur. Again, these impacts are avoided by adherence to proper compost application rates.

3. Pathogens

Pathogens occur in sewage sludge and could potentially be introduced into the environment if not properly managed. As discussed earlier, composting, when properly managed, achieves temperatures that destroy virtually all pathogenic organisms and renders a finished product essentially free of pathogens.

4. Odors

Odors have been reported during land application of composts and SDPs. Generally, these odors are less intense than odors associated with agricultural applications of manures. The odors are not an environmental or public health problem and they dissipate rapidly after application.

V. Applicable Legislation and Regulations:

A. Statutes

1. Federal

a. Resource Conservation and Recover Act of 1976, 42 U.S.C. §6901 et seq.

b. Clean Water Act of 1977, 33 U.S.C. §1251 et seq.

2. State

a. New Jersey Solid Waste Management Act, N.J.S.A. 13:E-1 et seq.

b. New Jersey Water Quality Planning Act, N.J.S.A. 58:llA-1 et seq.

c. New Jersey Air Pollution Control Act, N.J.S.A. 26:2C-1 et seq.

d. New Jersey Water Pollution Control Act, N.J.S.A. 58:lOA-1 et seq.

B. Regulations

1. Federal

Standards for the Use or Disposal of Sewage Sludge, 40 CFR Part 257, 403 and 503, February 19, 1993.

2. State

a. New Jersey Pollutant Discharge Elimination System (NJPDES), N.J.A.C. 7:14.

b. Sludge Quality Assurance Regulations (SQAR), N.J.A.C. 7:14-4.

c. Air Pollution Regulations, N.J.A.C. 7:27.

d. Treatment Works Approval Regulations, N.J.A.C. 7:14A-12.1 et seq.

VI. Permitting and Regulatory Process:

A. General

The permits relating to the composting operation include the NJPDES permit, the TWA, the Permit to Construct, Install or Alter Air Control Apparatus or Equipment, and the Certificate to Operate Air Control Apparatus or Equipment.

B. Regulation of the Compost Operation

1. Permits Required

a. Permits through the WFRP:

1) Construction of a sludge composting operation requires a TWA from the WFRP.

2) Processing of compost requires a NJPDES permit. All monitoring reports on the composting process and compost quality must be submitted to the department as part of the operating report requirements. Distribution conditions are included in these permits.

b. Permits through the AQRP:

Composting operations are also required to comply with certain requirements of N.J.A.C. 7:27-1 et seq. regarding any air pollution control apparatus. Generally air emission permits will be required for point source emissions (e.g. vents or stacks) and for open conveyors. To obtain a list of these requirements the applicant should contact the AQRP, Engineering and Technology Element, Bureau of New Source Review.

2. Controls on the Compost Operation

The department must review analyses done on all sludges to be composted to determine if that sludge is suitable for the proposed distribution/ utilization approach. Various environmental controls have been instituted to govern the types of sewage sludge suitable for composting, the rates at which the product may be land applied, the types of sites where the product may be applied, and the monitoring required for application areas. Each is discussed below.

a. Sludge Quality

Sewage treatment plants seeking acceptance of their sludge at a specific composting operation must comply with the policy on sludge quality and requirements to obtain a Generic Approval Letter.

b. Compost Testing

Due to the variable nature of sludge, the constituent levels of the compost must be periodically analyzed once a compost facility is on-line. The testing of additional constituents may be required based on the quality of the sludges being processed at the facility and the distribution/utilization approach.

The department reserves the right to obtain and analyze samples of the compost product for constituent quality, pathogen density, etc.

c. Record Keeping

The following plant records must be maintained at the composting operation for a minimum of five years or as otherwise specified, and copies must be sent to the WFRP on a monthly, quarterly or biannual basis (depending on the size of the facility):

1) Sludge quality monitoring results and quantities accepted from all specifically approved sludge sources;

2) All SDP quality monitoring results;

3) All required temperature monitoring of the sludge treatment process;

4) An inventory of SDP production and distribution per month; and all applicable user site information forms; and

5) The fertilizer registration issued by the NJDOA, if applicable.

d. Processing Requirements

The following processing requirements have been developed to produce a compost product that complies with federal requirements as a Process to Further Reduce Pathogens (PFRP) as listed in 40 CFR Part 503 and to minimize operational problems associated with the composting process. Some compost operations are incapable of meeting all these requirements. Any discrepancies between the processing and design conditions of specific technologies and these requirements will be addressed on application for permits.

1) Percent Solids

It is recommended that aerated static pile, windrowing and in-vessel composting systems achieve as a minimum, 40% solids in the mixture of sludge and wood chips prior to commencing composting. This percentage may vary if other bulking agents are used. Finished compost should achieve at least 60% solids at the end of active composting. Where other composting processes are proposed, the department may consider variations in these requirements.

2) Temperature Achievement

The following temperature schedules must be achieved within the composting mass.

a) Aerated Static Pile

The composting mass must attain a temperature of 55°C or greater for at least 3 consecutive days during the composting period.

b) Windrowing Systems

The composting mass must attain a temperature of 55°C or greater for at least 15 consecutive days during the composting period.

c) In-vessel Composting

The composting mass must achieve a temperature of 55°C or greater for at least three consecutive days.

d) Other Composting Processes

Where other composting processes are proposed, the department will entertain requests for variations in time and temperature requirements. For process variations, acceptable temperature achievement will be determined by the stability of the composted end product and odor control.

3) Material Handling

Development of an accurate materials balance is essential for proper design and operation of a compost process. Moisture considerations (percent moisture of both sludge and bulking agent) can have a dramatic affect on the size (and cost) of the operation as well as the ability to compost efficiently. Experience has shown the optimum moisture content of a sludge/bulking agent mixture when it enters the active composting process is 60%. The amount of bulking agent needed to attain this optimum ratio increases significantly as the solids content of the sludge decreases.

In addition, the following material handling requirements must be used to achieve a suitably stabilized material.

a) Aerated Static Pile

It is recommended that the sludge remain in the active (aeration) phase for a minimum of 21 days in a pile not to exceed seven feet in height. In order to attain maximum marketability, at the end of the active phase the material should be cured for a minimum of 30 days in a stockpile (not to exceed 10 feet in height).

b) Windrowing Systems

It is recommended that the sludge remain in the active composting phase for a minimum of 21 days. The height of the pile must be compatible with the equipment used for turning the material. The material in windrows must be turned at least once every three days during the active composting period. In order to attain maximum marketability, the active composting phase should be followed by a curing period of at least 30 days.

c) In-vessel Composting

The sludge must achieve 55°C or greater for a minimum of three consecutive days. The material must be subsequently cured in a stockpile. The curing period for the material depends on the type of composter used, but in order to attain maximum marketability should not be less than 30 days.

d) Other Composting Processes

Where other composting processes are proposed, the department will entertain requests for variations on material handling requirements where written justification is presented to, and accepted by, the department. For process variations, acceptable material handling will be determined by the stability of the composted end product, odor control, and process ability to meet requirements for a PFRP under 40 CFR Part 503.

4) Aeration Requirements

a) Aerated Static Pile

The viability of all composting is dependent, in part, on assuring appropriate oxygen supply to meet microbial demand. Forced or mechanical aeration of static and in-vessel systems, and turning of windrow systems are both used to address this requirement. Aeration is also used as a means to control temperatures in the composting mass. While temperature elevation to greater than 55°C for a minimum of three consecutive days is required to destroy pathogens, temperatures in excess of 65°C may be associated with destruction of the beneficial composting microbial action. Disruption of the biological composting process has occurred when temperatures were allowed to rise above 65°C followed by dramatic temperature drops and increased odor production. To control these occurrences, the department requires the following of aeration designs for all aerated static pile systems:

i) Aeration equipment must be designed to deliver, as a minimum, 350 cubic feet per minute per dry ton of composting mass;

ii) Separately powered and controlled equipment is required for every 3200 cubic feet of composting mass; and

iii) A thermocouple controlled temperature feedback aeration system must be designed to maintain pile temperatures between 45°C and 65°C.

b) Windrowing Systems

Aeration of these compost piles is achieved through pile turning. (See Section B.2.d.3(b) of this Part).

c) In-vessel Systems and Other Compost Processes

Aeration in these compost systems is highly individualized with many different potential processes currently in existence, however the department favors high rate aeration consistent with requirements for aerated static pile as discussed above.

e. Process Monitoring

In order to determine the progress of the composting process it is imperative that the process be monitored for temperature. The following monitoring program has been developed to produce a compost product that meets the requirements for PFRP under 40 CFR Part 503.

1) Aerated Static Pile

Temperature monitoring must start on the second day after the pile has been set up. Temperatures must be recorded at least once every day to determine if temperatures of 55°C have been attained for three consecutive days (72 hour period) in compliance with the definitions of thermophilic composting in 40 CFR Part 503. If these temperature requirements are not achieved at all the probe locations within 21 days of pile set-up, the cause for the failure must be identified and corrected. Even if the above criterion of 55°C or above for three days has been met during the early stage of composting, the pile must be monitored daily through the 15th day to verify continued pile activity (the temperature at this time should be greater than 45°C). To prevent microbial die-off and associated odors temperatures must be maintained below 65°C by regulating air flow through the piles.

a) Individual Pile Mode

Temperatures must be recorded at three locations in the pile (one on each side and one midway between the length) according to the schedule given above. All the monitoring points must be located on a vertical plane passing through the center of the base width. At opposite ends, the probe must be located four feet above the ground and two feet horizontally from the surface of the pile. In the center, the probe must be located two feet from the top surface of the pile.

b) Extended Pile Mode

Temperatures must be recorded at three locations (one in the middle and one on each end) on every new section of pile added per the schedule given above. The location of the monitoring points must be the same as that for the individual pile mode.

2) Windrowing Systems

Temperatures must be taken at the core of the pile at least once every day for each 30 linear feet of the windrows. Temperatures must be recorded before turning the windrow. Monitoring must continue until temperatures of 55°C or above have been recorded for 15 consecutive days at every monitoring point.

3) In-vessel Composting

A temperature monitoring approach must be tailored to the proposed composting system. The approach must be able to verify that the compost is maintained at an operating condition of 55°C or greater for three consecutive days (72-hour period). Reductions in temperature attainment and monitoring requirements may be approved by the department. However, a specific temperature monitoring program would have to be developed to ensure attainment of federal requirements as a Process to Significantly Reduce Pathogens as listed in 40 CFR Part 503.

If temperature and/or monitoring requirements are reduced, the facility's distribution conditions may be made more stringent (i.e. compliance with a twelve-month public access restriction may be necessary, some crops or uses may not be allowed, etc.).

4) Other Composting Processes

Process monitoring for other types of composting processes will be determined on a case-by-case basis after thorough evaluation of the process by the department.

VII. Sources of Information and Guidance:

USEPA "Process Design Manual: Sludge Treatment and Disposal." Center for Environmental Research Information. Cincinnati, OH 45268 Technology Transfer USEPA 625/1-79-011, 1979.

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Higgins, Andrew J., Lewis Goldshore, and Marsha Wolf, Sludge Composting and Utilization: Risk Assessment: Technical and Legal Issues, New Jersey Agricultural Experiment Station, New Brunswick, NJ 08903, 1983.

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Frumkin-Rosengaus, Michelle, George H. Nieswand, and Mark E. Singley, Sludge Composting and Utilization: The Siting of Sewage Sludge Composting Sites, New Jersey Agricultural Experiment Station, New Brunswick, NJ 08903, 1981.

Kothary, Mahendra H., James D. Macmillan, and Theodore Chase, Jr., Sludge Composting and Utilization: Destruction of Salmonella and Airborne Levels of Aspergillus fumigatus, New Jersey Agricultural Experiment Station, New Brunswick, NJ 08903, 1982.

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Part 4-IV. Thermal Reduction:

I. Introduction:

Thermal reduction (TR) reduces sludge volume by exposing it to heat. The extent of reduction can range from the removal of a portion of the moisture content to as high as a reduction of 90% of the input sludge (to a sterile ash) through combustion (dependent on the mineral content of the sludge).

In places where land application is not viable due to scarcity of available land, or if sludge is not of suitable quality, TR may offer a more acceptable management mode with the possibility of extracting useful energy or other useable resources in the process.

II. Policy:

The department recognizes the role of existing TR facilities in sludge management and encourages, but does not require, existing facilities to meet conditions relating to maximum practical use of resource recovery procedures. However, for new or expanded thermal reduction facilities, resource recovery designs should be incorporated.

The suitability of a sludge for thermal reduction is dependent on the design of the TR facility as well as sludge quality. Therefore the AQRP makes determinations concerning sludge suitability associated with specific thermal reduction facilities.

III. Technical Aspects/General Practices:

A. Multiple Hearth

The multiple hearth furnace is the most widely used sewage sludge incinerator in the United States. A typical multiple hearth furnace consists of a circular steel shell surrounding a number of hearths. Dewatered sludge enters from the top and travels down through the furnace from hearth to hearth by rotary action. The temperature in the central part of the furnace is maintained at 1500°F or higher. In New Jersey, the exhaust gases must be filtered through a scrubbing device to control air pollution. After-burning equipment is usually needed for odor and air pollution control.

B. Fluidized-bed Reactor

Fluidized-bed reactors are the second most commonly used method of sewage sludge thermal reduction in the United States. A fluidized-bed reactor is a vertical steel cylinder with a bed of hot sand. Combustion air flows up through the bed of sand at a rate high enough to fluidize the sand. Dewatered sludge is injected into the fluidized sand bed where it is burned at 1400°F-1800°F. The sludge ash is carried out the top with the exhaust gases, and is removed by the air pollution control system.

C. Starved Air Combustion

In the starved air combustion (SAC) mode less air is added to the combustion reactor than is required for complete combustion. Therefore, SAC is incomplete combustion. An afterburner is needed to burn the combustibles remaining in a gas stream. Essentially, SAC is a two-stage process of reduction followed by oxidation in the afterburner. Conversion of conventional incinerators to the starved air mode requires the addition of an afterburner, modification of stack emission control equipment and, generally, a drier sludge cake in order to effectively achieve auxiliary fuel savings.

D. Co-incineration

Co-incineration is a method of thermal reduction that combusts sludge with refuse (or refuse-derived fuel, coal, etc.) to reduce the need for gas or oil auxiliary fuel. Most co-incineration modes are autogenous (self-burning) due to the increased percentage of organic solids which are available for combustion. Starved air combustion or pyrolysis can be employed in the co-disposal mode as well and generally emit less particulates and require less fuel than conventional incineration.

E. Sludge Drying and Subsequent Land Application or Burning

Heat or flash drying is a variation of the thermal reduction process. In contrast to incineration, heat dried sludges are subjected to lower temperatures, which do not destroy all organic matter. The process also does not completely evaporate the moisture in the sludge. The moisture content is dependent on sludge characteristics, and the design and operation of the dryer. Heat drying produces a product which can be used as a fuel in coal fired boilers, or a fertilizer product that retains plant available nitrogen. Where a fertilizer end product is desired, operation must be designed to achieve pathogen reduction requirements pursuant to 40 CFR Part 503.

IV. Environmental Impacts:

A. Air Pollution Emissions

Emissions into the atmosphere from the thermal reduction of sludge can include suspended particles (dust of incombustibles and unburned carbon), fumes, and gases. The gases include sulfur dioxide, nitrogen oxides, carbon monoxide, hydrogen chloride and hydrocarbons. Heavy metals, depending on their volatility, can be part of the suspended particulates, fume and gaseous emissions.

Air pollution control apparatus requirements are made very stringent to mitigate possible environmental impacts. The emitted particles, in addition to their contribution to haze formation and their possible toxic content, may carry harmful, absorbed gases to lung tissue.

Certain heavy metals, such as mercury, lead, and cadmium and their compounds are difficult to control with conventional scrubbers, as are the gases and vapors of organic origin. The organic component, in addition to possible toxic or carcinogenic effects, can also have an objectionable odor.

B. Water Pollution Discharges

The air pollution control equipment of a sludge incinerator may upset the treatment plant operations if a scrubber is used and the scrubber liquor is discharged to the plant. A scrubber effluent discharge to a treatment plant or a water body must be approved by the WFRE. In some cases settling and separation of solids or other treatment may be required. In most cases scrubber water is returned to the head of the treatment works where it should be introduced at a design rate that does not affect the ability of the treatment plant to meet effluent limitations.

In addition to quality concerns associated with scrubber liquor, the increased quantity of liquid resulting from the scrubber must be considered. The sewage treatment plant must be capable of handling the increase in flow in order to avoid hydraulic upset.

C. Ash Management

In addition to the air emissions and scrubber discharges created by thermal reduction facilities, these facilities also create a solid product that must be managed. In most cases, this solid product is an ash which is landfilled. When landfilling is the ultimate fate of incinerator ash, there may be concerns about the impacts of leachate generated by such activities. Section F. Part 4-V addresses the environmental impacts of landfilling in general. Those impact concerns are applicable to the landfilling of ash. Section F. Part 4-VII, Section III.D.3. addresses alternate utilization processes for this residual.

V. Applicable Legislation and Regulations:

A. Air Emissions

1. Statutes

a. Federal

1) Clean Air Act, 42 USC § 7401 et seq.

The Clean Air Act (CAA) most recently amended in 1990, provides the basis for:

- National Ambient Air Quality Standards (NAAQS) in section 109;
- State Implementation Plans (SIP) in section 110;
- New Source Performance Standards (NSPS) in section 111;
- National Emission Standards for Hazardous Air Pollutants (NESHAP) in section 112;

- Prevention of Significant Deterioration (PSD) Regulations in sections 160 through 169;

- Requirements for Non-attainment Areas (Emission Offset Rules) in sections 171 through 192; and

- Good Engineering Practice (GEP) Stack Height in section 123.

Most of the Code of Federal Regulations concerning the CAA are now enforced by the New Jersey Air Pollution Control Program of the Air Quality Regulation Program. This includes NESHAP, NSPS, and PSD, by delegation or by means of the state's regulations which are part of the SIP. Note that in some cases these state regulations may encompass more or be more stringent than the corresponding federal regulation. (See Section B. which follows.)

2) Resource Conservation and Recovery Act of 1976 (RCRA), 42 USC §6901 et seq.

3) Toxic Substances Control Act of 1976 (TSCA), 15 USC §2601 et seq.

b. State

1) Air Pollution Control Act, N.J.S.A. 26:2C-1 et seq.

2) Solid Waste Management Act (SWMA), N.J.S.A. 13:1E-1 et seq.

3) Water Pollution Control Act, N.J.S.A. 58:1OA-1 et seq.

2. Regulations

a. Federal

1) Standards for the Use of and Disposal of Sewage Sludge, 40 CFR Parts 257, 403 and 503.

2) New Source Performance Standards (NSPS).

3) National Emission Standards for Hazardous Air Pollutants (NESHAP).

4) Prevention of Significant Deterioration (PSD).

5) Polychlorinated Biphenyls (PCB'S).

6) Good Engineering Practice (GEP) Stack Height.

b. State

1) Prohibition of Air Pollution (N.J.A.C. 7:27-5).

2) Permits and Certificates (N.J.A.C. 7:27-8).

3) Sulfur in Fuels, Control and Prohibition of Air Pollution Caused by the Combustion of Fuel (N.J.A.C. 7:27-9).

4) Sulfur in Solid Fuels (N.J.A.C. 7:27-10).

5) Incinerators (N.J.A.C. 7:27-11).

6) Ambient Air Quality Standards (N.J.A.C. 7:27-13).

7) Control and Prohibition of Air Pollution by Volatile Organic Compounds (N.J.A.C. 7:27-16).

8) Control and Prohibition of Air Pollution by Toxic Substances (N.J.A.C..7:27-17).

9) Control and Prohibition of Air Pollution from New or Altered Sources Affecting Ambient Air Quality in Non-attainment Areas (Offset Rule) (N.J.A.C. 7:27-18).

10) Treatment Works Approval Regulations (N.J.A.C. 7:14A-12.1 et seq.).

11) Division of Solid Waste Management Rules (N.J.A.C. 7:26-1 et seq.).

B. Leachate and Liquid Discharges

Liquid discharges are controlled by the federal WPCA, and NJPDES regulations govern all discharges including scrubber discharges. The responsibilities imposed by the WPCA have been delegated to New Jersey, which operates its discharge control program under the state WPCA and NJPDES regulations. All modifications to treatment plants require review and approval by the WFRP. Therefore, modifications to return leachate and liquors to the treatment process require TWAs to construct and operate these modifications.

C. Landfilling of Ash

Prior to the disposal of sewage sludge incinerator ash in a New Jersey landfill, the ash must be sampled, analyzed and classified to determine if it is non-hazardous industrial waste (ID 27) or hazardous waste. If classified as non-hazardous industrial waste, the ash may be disposed of at the landfill designated by the state waste flow rules (N.J.A.C. 7:26-6) to accept this waste type from the municipality in which the incinerator is located. Waste ash classified by the Hazardous Waste Regulation Program (HWRP) as hazardous must be managed in accordance with New Jersey's hazardous waste rules (N.J.A.C. 7:26-1, -7, -8, -9, -10, -11, -12). The HWRP, may be contacted for information regarding testing protocol for waste classification. For designated disposal facility information, the solid waste coordinator for the county where the waste was generated should be contacted.

D. Alternative Uses of Ash

Ash is not required to be disposed in landfills. If more suitable resource recovery uses exist, the department encourages use of these alternatives. Some ashes are suitable for interim or daily landfill cover, or for other uses (contact DSWM for more information). Other ashes may be candidates for metals extraction. Incinerator operators are encouraged to develop alternatives that are consistent with the resource recovery, reuse and recycling goals of the SWMA.

VI. Permitting and Regulatory Process:

For the purposes of this SSMP Update, the discussion of the permitting and regulatory process for thermal reduction facilities focuses primarily on the Air Quality Regulation Program (AQRP).

A. Permitting Process

1. Air Emission Permits

As referenced in Section F. Part II, the department has developed technical manuals for permitting specific types of air sources. These manuals, Sludge Incinerators and Sewage Sludge Treatment Operations are intended to provide guidance for the requirements for air emission permits. For information concerning these manuals, please contact the Office of Permit Information and Assistance at (609) 292-5548.

a. Co-disposal With Municipal Solid Waste

A sewage sludge incinerator is defined as an incinerator in which sewage sludge and auxiliary fuel are fired. Auxiliary fuel is fuel used to augment the fuel value of sewage sludge. This includes, but is not limited to, natural gas, fuel oil, coal, gas generated during anaerobic digestion of sewage sludge, or municipal solid waste (MSW) (not to exceed 30 percent of the sewage sludge and auxiliary fuel together by dry weight). Auxiliary fuel does not include hazardous wastes.

As mentioned above, auxiliary fuel may be MSW if the MSW is less than 30% by weight (dry-weight basis) of the material, including sewage sludge, fired in the sewage sludge incinerator. In that case, the Part 503 requirements for the incineration of sewage sludge in a sewage sludge incinerator have to be met. When 30% or greater of the material fired in an incinerator is MSW, the incinerator is a MSW combustor and the regulations that address firing of materials in a MSW combustor must be met. If MSW is burned with the sludge, emissions estimates must also reflect the MSW composition and contribution to the total. The New Jersey state-of-the-art limit for particulates of major MSW incinerators is 0.015 grains/dscf, corrected to seven percent oxygen. Burning MSW requires a permit from the DSWM.

2. Treatment Works Approvals

Since sludge thermal reduction projects are also wastewater treatment facilities, such projects are also required to secure TWAs for construction and operation pursuant to <u>N.J.A.C.</u> 7:14A-1 <u>et</u> <u>seq</u>. and <u>N.J.A.C.</u> 7:14A-12.1 <u>et</u> <u>seq</u>. Applicants must submit CP-1 forms for TWAs to the WFRP accompanied with project plans, specifications and design engineer's report. Appropriate endorsements of the local sewerage authority and governing body are a component of this process.

3. Significant Industrial User Permits

Some thermal reduction projects may include wet scrubbers as a means to control air emissions. Under some circumstances when the quantity and quality of wastewater generated by such scrubbers dictates, NJPDES Significant Industrial User (SIU) permits will be required. When SIU permits are required, applicants must submit a CP-1 form for discharge to the WFRP accompanied with details on control technology. Appropriate endorsements of the local sewerage authority and public notice of the draft permit are components of this process.

4. Acceptance of Customer Sludge

This issuance of air emission permits and associated approvals of emission control devices is predicated on the applicant's disclosure of quantity and quality of material to undergo thermal reduction and the ability of the emission control devices to achieve air emission standards, while processing the disclosed quantity and quality of material. In order for a thermal reduction facility to accept customer sludge, it must be determined that the quantity and quality of customer sludge do not violate the criteria on which the emission permit was based. This determination is made by the AQRP on a case-by-case basis for each customer sludge source and each specific thermal reduction facility.

Thermal reduction facilities may, however, accept customer sludges without the departments case-by-case determination, if the emission permit issued to the facility so provides. Permits to accept customer sludge without department case-by-case determination generally require that the emissions be evaluated while the thermal reduction facility is operating at maximum design capacity and processing worst case quality Class C sludge. Where emission standards can be met under these worst case conditions, approval to burn customer sludges may be included in the emission permit.

B. Coordination of Grant/Loan Process with Air Permitting Process

The New Jersey air pollution control program does not give approval to concepts of design and operation without a permit application listing the substances to be emitted and the maximum quantities to be emitted in pounds/hour and tons/year before and after control. At the same time, results of air quality modelling, using emission parameters and local meteorological data, must be submitted in order to check for possible violations of ambient air standards and for possible excessive ambient levels of certain toxic substances. The applicant should obtain guidance from the AQRP on the method of modelling that will be acceptable and on the approaches to be taken in estimating emissions. Such estimates are possible without final designs being completed using key design and operating parameters of the process and air pollution control system. An outline of a plan of study for developing an emission permit application for sewage sludge incineration can be obtained from the AQRP.

C. Monitoring Requirements

1. Stack Test

Once operating, a source may be required to conduct stack tests to demonstrate that emissions are no greater than stated on the permit application. Until this is done, the unit will operate under a temporary certificate. The method of conducting the test must be approved by the AQRP beforehand and the testing witnessed by state representatives. A retest may be required when the five-year certificate to operate expires. The department itself may also test any source of air contaminants.

The stack test should be conducted at or near rated capacity. If this is not done, the unit will be permitted to operate only up to that volume at which it was operated during the test. Some sludge incinerators in the past have had trouble getting enough sludge to the incinerator to achieve full capacity operation for a test, therefore, many are currently permitted below capacity.

Stack test duration is one hour and at least three tests are required.

2. Continuous Monitoring

Continuous monitoring of some stack parameters such as oxygen, carbon monoxide and/or total hydrocarbons is required. This is done as a check on complete combustion. Also, the AQRP may require ambient monitoring stations be set up near the plant at sensitive sites, to monitor pollutants such as particulates and sulfur dioxide. Such ambient monitoring generally is not required.

3. Source Inspection

The department has four field offices. Field inspectors will visit the plant: during the period it is operating under a temporary certificate to observe the shakedown phase; at the time of the stack test to see that operation is normal; at other times in response to citizen complaints; and, at periodic intervals to observe general conditions of operation. The field inspector's report, as well as the stack test results, must be positive before a five-year certificate to operate is granted. Stack testing and/or enforcement action may be the result of field inspection.

VII. Sources of Information and Guidance:

A. Air Quality Regulation Program (609) 984-3023

-Air Quality Regulation Program
-Air Quality Modelling
-Monitoring Data
-Plan of Study for Air Permit Applications

B. Division of Solid Waste Management (609) 530-8203

-Co-disposal with Municipal Solid Waste
-Ash Management

C. Enforcement Policy; Air and Environmental Quality Enforcement:

Metropolitan Regional Office	(201) 669-3935
Northern Regional Office	(201) 299-7700
Central Regional Office	(609) 584-4100
Southern Field Office	(609) 346-8071

-Source Inspection

D. **Wastewater Facilities Regulations; Residuals Management Program** (609) 633-3823

Part 4-V. Landfilling:

I. Introduction:

Prior to 1970, the state Department of Health was responsible for the environmental and health aspects of solid waste disposal practices through Chapter VIII of the Sanitary Code. Chapter VIII declared "dumps" to be hazardous to public health and set operational standards for landfills. In 1970, responsibility for the provisions of Chapter VIII was transferred to the newly created department. Also in 1970, the state Legislature broadened the state's involvement with solid waste management with the passage of the comprehensive Solid Waste Management Act (SWMA) of 1970 (L. 1970, c.39; N.J.S.A. 13:1E et seq.). That law required that all solid waste disposal facilities operating in New Jersey must have an approved registration from the department. In 1974, pursuant to the SWMA, the rules of the Bureau of Solid Waste Management (N.J.A.C. 7:26-1 et seq.) were adopted. These rules contain requirements for landfill registration and engineering design, siting criteria and procedures for operation and closure. They replaced Chapter VIII of the Sanitary Code and, with amendments, are still in effect.

In 1976, there were two significant amendments to the SWMA. P.L. 1975, Chapter 326 included a provision for the establishment of 22 districts for the purpose of developing and implementing solid waste management plans, which provide for maximum practicable use of resource recovery through the recycling of valuable materials for reuse or energy production. Further amendments limited the landfilling of bulk liquids, including septage and sewage sludge (L. 1976, c.99, §5; L. 1980, c.9, §1) and more recently the Legislature recognized that, "New Jersey must move away from its current reliance on landfilling as the principal method of solid waste disposal . . .." L. 1985, c.38, §1.

II. Policy:

Landfilling as a mode of waste disposal requires extensive and long-term commitment of land. This mode of sludge disposal must be considered a method of last resort in New Jersey, which is the most densely populated state in the country and has limited land available to be committed for waste disposal. Realization of this fact has led to the provision in the SWMA that indicates landfilling of waste should only proceed when reuse and resource recovery for beneficial purposes cannot be managed. In accordance with this legislative directive, it is the department's policy to limit the landfilling of sludge to those instances where overriding circumstances, including emergencies, exist.

A. Since March 15, 1985, generators of "clean" sludge have been precluded by the department from consideration of landfilling as a management option unless it is demonstrated they are moving toward acceptable long-term alternatives and under emergency and/or interim conditions. The department determines if generators are making adequate progress toward a long-term management alternative and that overriding conditions exist prior to allowing landfilling past this date. Landfilling of sludge must be in accordance with the terms of an ACO. Those sludge generators that must resort to landfill disposal due to sludge quality unacceptable for the purpose of land application or incineration, must implement pretreatment programs to improve sludge quality so future implementation of reuse or resource recovery management options is possible. Compliance schedules will be included in NJPDES permits for treatment plants to establish a deadline for achieving required quality levels.

B. Under certain circumstances, landfilling by generators of sludge ordinarily suitable for reuse or resource recovery, may be permitted, but only for a limited period as conditioned on the terms of an ACO. Such circumstances include but are not limited to: (1) influent quality problems at the treatment plant that would render sludge temporarily unsuitable for reuse or resource recovery, or (2) unforeseen upsets or operational problems at the approved sludge management site where the generator can prove to the department's satisfaction that no other suitable alternative exists. Landfilling of sludge under these circumstances will be permitted only as long as the overriding circumstances exist.

C. Because stabilized sludge or sludge compost is useful in facilitating revegetation and reclamation, this material may be incorporated in the soil cover of a closed landfill, with prior approval of the DSWM and the WFRP. This use is not considered landfilling.

D. Disposers of ash from thermal reduction of sludge will be encouraged to consider resource recovery options. Landfilling may be considered as an alternative, since the ash is vastly reduced in volume and would not commit large areas of land for disposal.

III. Technical Aspects/General Practices:

Landfilling as a waste disposal method consists of the planned burial of waste on or in the land at a specified location. Management in this way does not permit beneficial reuse and recycling of resources contained in the waste, including sludge. It is therefore, differentiated from land application of sludge, which accomplishes soil conditioning and recycling of nutrients through plant growth.

IV. Environmental Impacts:

Landfill operations may impact water and air resources, public health and aesthetics. Negative impacts have, in many cases, resulted in the closure of existing landfills.

Regulations concerning standards for the design and operation of landfills address these potential impacts.

A. Water Resources

Rainfall percolating through or running off a landfill site picks up contaminants from the waste deposited there. If not controlled, leachate and runoff leave the landfill site and enter ground and surface waters.

Landfill leachate is a concentrated source of pollutants which could degrade water resources contacted and adversely impact aquatic organisms. If ground and surface water resources receiving untreated leachate are used for potable supplies, public health could be affected. Properly designed and lined landfills can control these impacts. Disposal of sludge in landfills results in increased leachate production.

B. Air Quality

The process of anaerobic decomposition produces methane which, if not properly vented and controlled, is a potential source of fire, explosion and air pollution. Disposal of sludge in landfills increases methane production.

Landfills are also a source of odors. Properly designed landfills can control these impacts.

C. Public Health/Vectors

Insects, rats and other scavengers may frequent landfills in search of food. The daily cover requirement was developed to control this problem.

D. Long-term Land Commitment

Landfills occupy significant land areas and have a finite capacity to accommodate waste. USEPA studies indicate that a community of 230,000 generating 28 dry tons of sludge per day (.24 lb/capita/day) would require from 4-50 acres of land/year for sludge only landfilling.[3] New Jersey generates approximately .256 lb/capita/day of sludge. This figure will increase by 60% when mandated treatment plant upgrading pursuant to the federal Clean Water Act is completed. Therefore, New Jersey's rate of sludge production after treatment plant upgrading will be approximately .41 lb/capita/day. Based on USEPA's studies, landfilling would require a land commitment of approximately 7-85 acres per year. Since waste production is an ever-occurring process, continued reliance on landfilling for waste management

[3]Sewage Sludge Management - A Primer, USEPA Technology Transfer, 12/86.

represents a long-term commitment of large areas of land. Use of landfill sites after closure is limited due to ongoing settling which may cause structural instability.

V. Applicable Legislation and Regulations:

Some of the laws, rules, regulations, and guidelines which apply to landfilling are noted below.

A. Statutes

1. Federal

a. Resource Conservation and Recovery Act of 1976 (RCRA) 42 U.S.C. §6901 et seq.

b. Toxic Substances Control Act, 15 U.S.C. §2601 et seq.

2. State

a. Solid Waste Management Act, N.J.S.A. 13:1E-1 et seq.

b. Solid Waste Utility Control Act, N.J.S.A. 48:13A-1 et seq.

c. Pinelands Protection Act, N.J.S.A. 13:18A-1 et seq.

d. Air Pollution Control Act, N.J.S.A. 26:2C-1 et seq.

B. Regulations

1. Federal

a. Hazardous Waste Regulations, 40 CFR Parts 260-265.

b. National Pollutant Discharge Elimination System, (NPDES), 40 CFR Part 125.

c. Solid Waste Disposal Facility Criteria, 40 CFR Part 251 and 258.

2. State

a. Board of Public Utilities Regulations, N.J.A.C. 14:1-1 et seq.

b. Rules of the Division of Solid Waste Management, N.J.A.C. 7:26-1 et seq.

c. New Jersey Pollutant Discharge Elimination System, (NJPDES), N.J.A.C. 7:14A-1 et seq.

d. Pinelands Regulations, N.J.A.C. 7:50-1.1 et seq.

C. Guidelines

1. Federal

a. Sludge Technical Bulletin, (USEPA-430/9-77-004).

b. Sludge Treatment and Disposal, (USEPA-625/4-78-012).

c. Process Design Manual: Municipal Sludge Landfills, (USEPA-625/1-78010; SW-705).

2. State

a. General Criteria for Siting Solid Waste Disposal Facilities, (DEPE, DWM).

b. Solid Waste Facilities Siting and Permitting, (DEPE, DSWM).

c. Pinelands Comprehensive Management Plan, Sections 6-704.5 and 6-705.

VI. Permitting and Regulatory Process:

A. Landfill Disposal of Sewage Sludge

Pursuant to state statute, regulations and policy, effective March 15, 1985, generally only sludges unsuitable for land application or incineration may be considered for temporary landfilling. Such proposals shall only be considered by the department where it is proven to the department's satisfaction that no other practicable alternative exists. In all cases where the department approves temporary landfilling, the sludge generator shall be required to enter into an ACO that will provide for pretreatment and/or provisions for alternative management within a specified period of time. The ACO shall provide a date certain for implementation of alternative management. Prior to entering into the ACO to approve temporary use of a landfill, generally the department shall consider the following:

1. The landfill's compliance with all permits;

2. The landfill's liner;

3. The landfill's leachate collection and control system; and

4. The landfill's ability to accept the sludge without adversely impacting its capacity to accept MSW.

   (See also Section F. Part 4-IX for information concerning emergency management.)

B. Landfill Disposal of Sludge Incinerator Ash

Requirements for disposal of sludge ash in landfills are somewhat less restrictive. However, the department strongly encourages alternative resource recovery management modes for ash in lieu of landfilling.

Normally sludge ash is a highly stable material and, because of its very low moisture content, it does not create the operational difficulties at landfills that sludge creates, although pelletizing will aid in controlling dust associated with ash disposal. The general change in physical characteristics between sludge and ash along with the stability of the ash product and significant volume reductions which result from incineration make ash an acceptable waste for landfilling.

While ash from sludge incinerators is generally classified as ID 27, generators are responsible for determining whether the ash constitutes a hazardous waste. If ash is classified as non-hazardous, it must be disposed of in accordance with waste flow regulations or be authorized for beneficial use. Landfill disposal of ash is an acceptable form of management beyond the March 15, 1985 deadline.

C. Reclamations of Landfills with Sludge or Sludge-derived Product

Stabilized sludge or SDP may be used as an amendment to final cover material on landfills, if approved by the WFRP and the DSWM. Use of sludge in this manner is not considered landfilling and is not subject to the March 15, 1985 deadline for the end of landfilling of clean sludge. Such uses of SDPs promote the establishment of permanent vegetation at closure and are considered soil conditioners.

Part 4-VI. Sewage Sludge Distribution:

I. Introduction:

Distribution programs are conducted pursuant to N.J.A.C. 7:14A-10.8. The department issues a NJPDES permit to the sludge processing facility/operation. The permit imposes operational conditions and sludge quality requirements and contains provisions required of a departmental approved distribution program. Actual sites where sewage sludge is distributed for application to the land under a departmentally approved distribution program will be considered for exemption from site-specific permitting.

Some generators may desire to embark on a marketing program for their sewage sludge or to contract out for these services. In either case, the sewage sludge generator or the wholesale distributor must be able to provide general guidance for the use of the sewage sludge including land application rates for activities including, but not limited to, agricultural uses, horticultural plant production, landscape beautification, final cover amendment to landfills and land reclamation projects.

It should also be noted that distribution programs can also be approved for distribution of food processing waste or other residuals that meet pathogen and quality criteria.

II. Policy:

The department has noted its intent to adopt the federal 503 program through revision to the NJPDES regulations. With the adoption of the federal program, New Jersey will move toward reduced regulation of sewage sludge that meets sludge quality requirements established under the 503 regulations.

III. Technical Aspects/General Practices:

A. Distribution Program

When properly used, sewage sludge is an excellent soil conditioner capable of improving the organic content and productivity of many soils. As a major step in resource recycling, the department encourages the distribution of sewage sludge and other suitable residuals products in a manner consistent with the uses and conditions prescribed in this SSMP Update. Various sewage sludge distribution scenarios are discussed below:

The following notes are provided to clarify the terms and conditions of the various scenarios:

1. Sewage sludge includes a material derived from sewage sludge (40 CFR Part 503.9.w).

2. "Foreign material", such as aeration piping, must be removed from sewage sludge prior to the application of sewage sludge to the land. Foreign material removed from sewage sludge must be managed in a legally permitted manner as solid waste. Foreign material means material contained in sewage sludge that is neither process oriented (i.e. bulking agent) nor product oriented (i.e. amendments that enhance sewage sludge marketability).

3. "Exceptional Quality" (EQ) sewage sludge must meet "High Quality" criteria,

must be Class A with respect to pathogens and must meet one of eight vector attraction reduction requirements.

4. See Table 24 for "High Quality" (HQ) and "Ceiling Quality" (CQ) criteria for sewage sludge.

5. The standards for Class A or Class B sewage sludge with respect to pathogens are found at 40 CFR Part 503.32.

6. Vector Attraction Reduction (VAR) requirements are found at 40 CFR Part 503.33.

7. A "container" is either an open or closed receptacle. This includes, but is not limited to, a bag, a bucket, a carton, and a vehicle or trailer with a load capacity of one metric ton or less.

8. USDA-SCS is the United States Department of Agriculture - Soil Conservation Service.

9. Sewage sludge storage facilities will be subject to appropriate departmental permits and approvals.

10. Applicable NJPDES permit or permit exemption fees will be assessed by the Bureau of Permit Management of the DEPE.

11. All sewage sludge applied to the land in New Jersey must conform to the Policy on Sludge Quality presented in this SSMP Update and as specified in the New Jersey Pollutant Discharge Elimination System (NJPDES, N.J.A.C. 7:14A) regulations.

Scenario I: Exceptional Quality Sewage Sludge - Dewatered

May be distributed in bulk or container

Persons preparing EQ sewage sludge must obtain a permit which, at a minimum, will mandate monitoring and record keeping to demonstrate that sewage sludge is EQ, development of instructional literature for users, an accounting of quantities of sewage sludge processed and distributed, and (where sewage sludge is to be used as a fertilizer or liming agent) registration with the NJDOA.

For bulk EQ sewage sludge, the department may apply any or all of the general requirements in 40 CFR Part 503.12 and the management practices in 40 CFR Part 503.14 on a case-by-case basis after determining that the general requirements or management practices are needed to protect public health and the environment from any reasonably anticipated adverse effect that may occur from any pollutant in the bulk sewage sludge.

Scenario II: Exceptional Quality Sewage Sludge - Liquid

May be distributed in bulk only.

May not be applied to lawn or home garden.

The general requirements at 40 CFR Part 503.12 and the management practices at 40 CFR Part 503.14 apply.

Persons preparing sewage sludge must obtain a permit which, at a minimum, will mandate monitoring and record keeping to demonstrate that sewage sludge is EQ, development of instructional literature for users, an accounting of quantities of sewage sludge processed and distributed, and (where sewage sludge is to be used as a fertilizer or liming agent) registration with the NJDOA.

Persons applying sewage sludge to the land must obtain a permit which, at a minimum, will require that permit exemption letters be obtained for all application sites. Application to the department for exemption letters, at a minimum, will require inclusion of a USDA-SCS farm or SESC plan (where applicable). Exemption letters will specify management practices, site restrictions and reporting requirements on a case-by-case basis.

Scenario III: High Quality, Class A Sewage Sludge Applied Meeting VAR Requirements at 40 CFR Part 503.33.b.9 or 10.

May be distributed in bulk only.

May not be applied to lawn or home garden.

The general requirements at 40 CFR Part 503.12 and the management practices at 40 CFR Part 503.14 apply.

Persons preparing sewage sludge must obtain a permit which, at a minimum, will mandate monitoring and record keeping to demonstrate that sewage sludge is HQ and Class A, development of instructional literature for users, an accounting of quantities of sewage sludge processed and distributed, and (where sewage sludge is to be used a fertilizer or liming agent) registration of product with the NJDOA.

Persons applying sewage sludge to the land must obtain a permit which, at a minimum, will require compliance with VAR Methods at 40 CFR Part 503.33.b.9 or 10 and that permit exemption letters be obtained for all application sites.

Application to the department for exemption letters, at a minimum, will require inclusion of a USDA-SCS farm or SESC plan (where applicable). Exemption letters will specify management practices, site restrictions and reporting requirements on a case-by-case basis.

Scenario IV: High Quality, Class B Sewage Sludge Meeting One of the VAR Requirements at 40 CFR Part 503.33.b.1-8 or Applied Meeting One of the VAR Requirements at 40 CFR Part 503.33.b.9 or 10.

May be distributed in bulk only.

May not be applied to lawn or home garden.

The general requirements at 40 CFR Part 503.12, the management practices at 40 CFR Part 503.14 and the site restrictions at 40 CFR Part 503.32 apply.

Persons preparing sewage sludge must obtain a permit which, at a minimum, will mandate monitoring and record keeping to demonstrate that sewage sludge is HQ and Class B and meets one of the VAR requirements at 40 CFR Part 503.33.b.1-8 (if applicable), development of instructional literature for users, an accounting of quantities of sewage sludge processed and distributed, and (where sewage sludge is to be used as a fertilizer or liming agent) registration with the NJDOA.

Persons applying sewage sludge to the land must obtain a permit which, at a minimum, will require compliance with VAR Methods at 40 CFR Part 503.33.9 or 10 (if applicable) and that permit exemption letters be obtained for all application sites. Application to the department for exemption letters will require inclusion of a USDA-SCS farm or SESC plan (where applicable). Exemption letters will specify management practices, site restrictions and reporting requirements on a case-by-case basis.

Scenario V: Ceiling Quality, Class A Sewage Sludge Meeting One of the VAR Requirements at 40 CFR Part 503.33.b.1-8

May be distributed in bulk or container, as follows;

- liquid may be distributed in bulk, only;
- may not be applied to lawn or home garden in bulk;
- the general requirements at 40 CFR Part 503.12 and the management practices at 40 CFR Part 503.14 apply; and
- literature conformant with 40 CFR Part 503.14.e specifying the annual whole

sludge application rate that does not cause any of the annual pollutant loading rates at 40 CFR Part 503.13.b.4 to be exceeded must be provided with any sewage sludge distributed in a container.

Persons preparing sewage sludge must obtain a permit which, at a minimum, will mandate monitoring and record keeping to demonstrate that sewage sludge is CQ and Class A, development of instructional literature for users, an accounting of quantities of sewage sludge processed and distributed, and (where sewage sludge is to be used as a fertilizer or liming agent) registration with the NJDOA.

Persons applying sewage sludge to the land in bulk must obtain a permit which, at a minimum, will require that permit exemption letters be obtained for all application sites and that cumulative pollutant loading to each application site be tracked in conformance with 40 CFR Part 503. Application to the department for exemption letters will require inclusion of a USDA-SCS farm or SESC plan (where applicable). Exemption letters will specify management practices, site restrictions, cumulative pollutant tracking, and reporting requirements on a case-by-case basis.

Scenario VI: Ceiling Quality, Class A Sewage Sludge Applied Meeting One of the VAR Requirements at 40 CFR Part 503.33.b.9 or 10.

May be distributed in bulk, only.

May not be applied to lawn or home garden.

The general requirements at 40 CFR Part 503.12 and the management practices at 40 CFR Part 503.14 apply.

Persons preparing sewage sludge must obtain a permit which, at a minimum, will mandate monitoring and record keeping to demonstrate that sewage sludge is CQ and Class A, development of instructional literature for users, an accounting of quantities of sewage sludge processed and distributed, and (where sewage sludge is to be used as a fertilizer or liming agent) registration with the NJDOA.

Persons applying sewage sludge to the land must obtain a permit which, at a minimum, will require demonstration of compliance with VAR Methods at 40 CFR Part 503.33.9 or 10, that cumulative pollutant loading to all application sites be tracked in conformance with 40 CFR Part 503 and that permit exemption letters be obtained for all application sites. Application to the department for exemption letters will require inclusion of a USDA-SCS farm or SESC plan (where applicable). Exemption letters will specify management practices, site restrictions, cumulative pollutant tracking, and reporting requirements on a case-by-case basis.

Scenario VII: Ceiling Quality, Class B Sewage Sludge Meeting One of VAR

Requirements at 40 CFR Part 503.33.b.1-8

May be distributed in bulk, only.

May not be applied to lawn or home garden.

The general requirements at 40 CFR Part 503.12, the management practices at 40 CFR Part 503.14 and the site restrictions at 40 CFR Part 503.32 apply.

Persons preparing sewage sludge must obtain a permit which, at a minimum, will mandate monitoring and record keeping to demonstrate that sewage sludge is CQ and Class B, development of instructional literature for users, an accounting of quantities of sewage sludge processed and distributed, and (where sewage sludge is to be used as a fertilizer or liming agent) registration with the NJDOA.

Persons applying sewage sludge to the land must obtain a permit which, at a minimum, will require demonstration of compliance with VAR Methods at 40 CFR Part 503.33.9 or 10, (if applicable), that cumulative pollutant loading to each application site be tracked in conformance with 40 CFR Part 503 and that permit exemption letters be obtained for all application sites. Application to the department for exemption letters will require inclusion of a USDA-SCS farm or SESC plan (where applicable). Exemption letters will specify management practices, site restrictions, cumulative pollutant tracking, and reporting requirements on a case-by-case basis.

IV. Environmental Impacts:

A. General Considerations

Distribution of sewage sludge and other residuals are similar to management of other agricultural products. Therefore, in order to protect ground and surface waters, and in order to control nuisance odors and particulate transport, the following housekeeping measures are generally recommended:

a. Storage piles should be covered to the extent possible;

b. Sewage sludge or other residuals should not be applied or stockpiled on saturated, frozen, ice or snow-covered ground, or in areas that are subject to seasonal flooding;

c. Sewage sludge should not be applied or stored in close proximity to private wells, public wells or surface waters. Appropriate setbacks will be detailed in agricultural conservation plans, soil erosion and sediment control plans, instructional literature or letters of NJPDES permit exemption.

d. Generally compost and SDPs should not be stored within 50 feet of property boundaries unless cover is provided.

The following are additional general facts about sludge or SDPs:

a. Some sludge or SDPs are not suitable for acid loving plants; and

b. Unscreened composts containing wood chips or certain other bulking agents may not be a nitrogen source, but in fact, may induce a nitrogen deficiency in plants.

V. Applicable Legislation and Regulations:

All legislation and regulations applicable to the distribution of sewage sludge can be found under Section F. Part 4-II and III.

VI. Permitting and Regulatory Process:

A. Sewage Sludge Generated in New Jersey

The permitting and regulatory process for sludges generated in New Jersey have been articulated throughout this SSMP Update.

B. Sewage Sludge Generated in Other States

Persons preparing sewage sludge generated in other states for application to the land or applying sewage sludge generated in other states to the land in New Jersey must notify the DEPE in conformance 40 CFR Part 503 and N.J.A.C 7:14A with the above scenarios.

Information required for departmental evaluation of sewage sludge generated in other states includes, but is not limited to that information required to demonstrate conformance with the Policy on Sludge Quality presented in this plan and any specifications of the NJPDES, N.J.A.C. 7:14A regulations. Additionally, a copy of all permits or other authorizations regulating the out-of-state sewage sludge processing and/or distribution operation(s) must be submitted, including the address and phone number of the regulatory agency(ies) which issues permits or authorizations.

At least one complete set of DEPE required analyses must be performed on the out-of-state sewage sludge by a DEPE certified laboratory. All DEPE sewage sludge quality analytical forms must be signed by an authorized representative of the entity permitted or otherwise authorized to generate or prepare the sewage sludge in the state of origin.

TABLE 24

40 CFR PART 503 SEWAGE SLUDGE QUALITY CRITERIA
(Mg/kg, dry-weight basis)

Parameter	High Quality [1] (monthly average)	Ceiling Quality [2]
Arsenic	41	75
Cadmium	39	85
Chromium	1200	3000
Copper	1500	4300
Lead	300	840
Mercury	17	57
Molybdenum	18	75
Nickel	420	420
Selenium	36	100
Zinc	2800	7500

1 - 40 CFR Part 503.13.b.3.
2 - 40 CFR Part 503.13.b.1.

VII. Sources of Information and Guidance:

Sources of information and guidance applicable to the distribution of sewage sludge can be found under Section F. Part 4-II and III.

Part 4-VII. Innovative/Alternative Technologies

I. Introduction:

Past experience has indicated a strong tendency for planners to consider a narrow range of low risk, traditional sludge treatment and management options, without serious consideration of the beneficial uses of sludge as a resource. This has been the case despite a host of fully proven, cost-effective technologies that offer significant environmental benefits, and innovative technologies capable of being adapted for this purpose.

The intent of this section is to provide insights into the conception, development, and formulation of alternative and innovative sludge treatment and utilization system designs that depart from traditional engineering practices and conform to federal and state goals and regulatory requirements.

First, it is essential to differentiate between alternative and innovative technologies.

A. Alternative Technology

Sludge management systems, either treatment or utilization processes, or both, that are fully proven for their intended use and that simultaneously provide for at least one of the below criteria, or national/state goals, shall be defined for the purposes of this document as alternative sludge treatment and utilization system technology. These are systems which:

- Reclaim and reuse water;
- Productively recycle wastewater constituents;
- Eliminate the discharge of pollutants; and
- Recover energy.

The joint treatment and utilization of municipal sludges and MSW shall always be categorized as alternative technology unless processes not fully proven are utilized. In the case of processes and techniques for the treatment and management of sludge, alternative systems would include the following:

TREATMENT PROCESSES

- Anaerobic digestion facilities, provided that 90 % of the methane gas is recovered or used as fuel;

- Anaerobic digestion or drying, provided that treated sludge is used for co-disposal with MSW and managed via any of the methods outlined below;

- Composting prior to land application; and

- Composting prior to incorporation in landfill final cover.

UTILIZATION METHODS

- Land application for horticultural, silvicultural, or agricultural purposes and revegetation of disturbed lands;

- Landfill final cover;

- Self-sustaining incineration; and

- Energy recovery facilities that co-dispose.

B. Innovative Technology

Sludge management systems, whether they be treatment or utilization processes, or both, that: 1) utilize techniques or methods developed but not fully proven for this specific use, 2) satisfy at least one of the national and state goals outlined in Section I.A above (e.g. reuse and resource recovery), 3) represent an advancement in the state-of-the-art in residuals management, and/or 4) utilize municipal sludge and industrial sludge or wastes, shall be defined as innovative sludge treatment and utilization technology. Use of this technology often has potential for even greater environmental and economic benefits than alternative technology. Innovative sludge treatment and utilization processes are generally limited to new and improved applications of those processes and techniques identified in the alternative technology section. However, a conventional sludge management system may be categorized as innovative technology if the process incorporates components that have not been fully proven in the total system design. Processes that jointly treat and utilize municipal sludge and industrial residuals are also categorized as innovative technology.

A partial list of sludge management systems that might be considered innovative is given below. In innovative systems, greater attention is placed on multiobjective planning, inter media impact considerations, and total systems design. Conceptually, innovative designs may embody a number of these opportunities depending on the particular site variables and design objectives, and, as such, the list of innovative designs below is not all inclusive, nor are the elements completely exclusive of one another. Examples of innovative reuse, reclamation, and energy recovery opportunities include:

<u>TREATMENT PROCESSES</u>

- Use of solar energy to accelerate sludge drying;

- Use of solar energy to heat sludge treatment/management facilities;

- Use of digestor gas for in-plant or off-plant uses, including sale for industrial or commercial utilization; and

- Joint composting of municipal sludge and industrial sludge or wastes.

<u>UTILIZATION METHODS</u>

- Joint land application of municipal sludge and industrial sludge or wastes;

- Co-management by incineration of municipal sludge and industrial sludge or wastes;

- Joint use of municipal and industrial sludges in final landfill cover;

- Joint treatment, blending, and management of municipal sludge, solid waste, and industrial sludge or wastes;

- Use of municipal sludge as new material for industrial or commercial production of saleable products;

- Waste heat recovery and reuse for thermal and combustion processes. Industrial use of waste heat from municipal sludge facilities. Municipal use of waste heat from industrial sludge facilities;

- Use of industrial sludge, including off gases, for beneficial municipal uses; and

- Use of municipal sludge, including off gases, for beneficial industrial uses.

It is necessary to emphasize that the above definition and criteria differ substantially from the methodology employed to define innovative/alternative (I/A) technology within the 201 CGP.

II. Policy:

Alternatives to conventional treatment and utilization of sludge and innovative designs leading to greater cost and energy savings have been, and continue to be, strongly encouraged by the department. Major emphasis has been placed, especially in the last five years, on the planning, design, and construction of cost effective processes, and techniques that maximize the recycling and reclamation of water, nutrients, and energy while minimizing adverse environmental and public health impacts.

As previously indicated, alternative sludge treatment and utilization processes are fully proven technologies that involve a very low element of risk. However, innovative processes utilize technology that is developed but is not fully proven in its contemplated use. As a result, a higher degree of risk is involved and the department must therefore be satisfied the technology is developed to the extent the risk of full-scale use is acceptable.

First, the development of the technology should have progressed beyond the laboratory or bench-scale stage and have been successfully tested or demonstrated in a field application or pilot program. Technologies that are not considered fully proven in the proposed application, i.e., sludge treatment/utilization, and which represent an advancement in the state-of-the-art will be further considered by the department as potentially innovative if they meet at least one of the four national and state goals outlined in Section I.B. of this Part (e.g., resource recovery). The state-of-the-art advancement should represent a benefit commensurate with the increased risk. Once this has been determined, the department will permit its application on an experimental basis. The intent is to develop additional sludge treatment and utilization techniques through closely controlled use to evaluate their usefulness on a larger scale.

A sufficient database will have to be compiled from the field application or pilot program in order for the department to determine the adequacy and appropriateness of the system. The use of such a system on a trial basis will require a willingness of citizens or private firms to risk money and resources, and can only be carried out with the recognition that some experiments fail. The department will permit their use but will do so only when an acceptable backup alternative is available in the event of a failure. The department may limit the number of innovative systems of any one type until adequate data has been developed to assure their safety and effectiveness for widespread use. Once constructed, innovative sludge treatment and utilization facilities will have to be closely monitored in order to determine over-all effectiveness. They will require more extensive and elaborate monitoring than fully proven conventional or alternative systems. Reporting requirements will be prescribed on a case-by-case basis.

In all cases, management of the final product from these technologies is to be directed toward reuse and resource recovery (i.e. directly useable products should be directed to compatible uses, and inert/mineral products should be directed toward uses in construction or landfill covers). In no case will the department permit implementation of those facilities as a means to convert sludge waste classes to waste class ID 27 for the purpose of evading the March 15, 1985, deadline for landfilling of sludge.

III. Technical Aspects:

The technical aspects to be considered in alternative or innovative sludge treatment and management systems are substantial. Systems utilizing non-fully proven innovative processes and techniques are especially technically challenging. The intent of this chapter is to provide a contemporary review of alternative and innovative sludge treatment and management system technology and the specific technical aspects and procedures/requirements that must be considered.

A. Risk Versus Potential State-of-the-art Advancement

As previously indicated, it is the policy of the department to encourage the design and construction of more efficient sludge treatment and utilization facilities by advocating departure from traditional engineering and design processes. The role of the design engineer in developing innovative techniques was limited in the past by the absence of adequate laboratory, pilot plant, and most important, plant scale process engineering work. However, there has been more of this research and implementation recently, especially in Europe and Japan. Adaptation of these innovative processes in New Jersey can provide significant economic and environmental benefits. Implicit in this objective must be a willingness to accept a greater degree of risk in order to achieve greater potential for a significant advancement in the state-of-the-art as evidenced by lower costs, greater reliability, or other similar design objectives.

B. Approach to Innovative Planning and Design

While it is difficult to define the exact boundaries or to prescribe universal guidelines leading to innovative processes or system designs, it is possible to outline and categorize successful approaches. Innovative technologies may originate in a number of ways, the most common of which are listed below:

- Greater integration and use of natural resources;
- Maximum consideration and beneficial use of available physical surroundings;
- New process invention and development;
- New equipment invention or development;
- Modification, adaptation, or improvement of fundamental biological, chemical, or physical processes;
- Improved efficiency or control of known processes;
- The application of proven processes or equipment originally developed for another purpose for the treatment and management of sludge; and
- Unique combinations of processes and techniques that recognize and maximize inter-process compatibility or synergistic effects.

The above elements of innovative designs should not be considered all inclusive and the elements are not necessarily mutually exclusive of one another. The degree to which they may be included in a particular project depends on such factors as design objectives, physical constraints, existing facilities, etc.

C. Innovative/Alternative System Objectives and Benefits

As previously mentioned, the intent of utilizing I/A technology is to maximize such benefits as reuse, reclamation, resource recovery, and energy saving in the treatment and management of sludge. Four criteria can be employed to determine whether such benefits will be realized.

1. Improved Operational Reliability

Innovative/alternative sludge treatment and utilization processes should incorporate provisions that allow for the following:

- Decreased susceptibility to upsets or interference;
- Reduced occurrences of inadequately treated residuals (to ensure reuse quality);
- Decreased levels of required operator attention and skills;

Improved operational reliability can be due to:

- Greater mechanical reliability;
- Greater inherent physical, chemical, or biological process stability or reliability, including processes and transformations taking place in the soils of land application systems;
- Improved system design;
- Increased standby or backup facilities;
- Continuous monitoring alert or diversion systems; and
- Combinations of the above.

2. Improved Toxics Management

Proposed technologies should consider better or improved management of toxic materials by reducing the direct or indirect exposure of known toxicants beyond that normally expected in current practice. Better management can also be demonstrated through enhanced controls such as improved monitoring. Reduction of recycling and exposure potential can be achieved by:

- Isolation;
- Modification of the chemical form (detoxification); and
- Destruction by such methods as thermal or biological oxidation.

The intent of improved management of toxic materials is to encourage the use of specific exposure reduction mechanisms that result in improvement over the current state-of-the-art sludge treatment and utilization techniques. In general, better management of toxics can be found in improved source controls, i.e., improved treatment of industrial waste and improved removal at the plant prior to sludge treatment or utilization, or prior to effluent disposal. If most of the toxic constituents are retained in the sludge, sludge detoxification or destruction may be a viable option.

3. **Increased Environmental Benefits**

Environmental benefits may be maximized in the selection of I/A sludge treatment and utilization processes. Four specific examples of potential environmental benefits that may be derived from the use of such processes are:

- Water conservation;
- More effective land use;
- Improved air quality; and
- Reduced resource requirements for facility construction and operation.

Although an I/A process may rate high in one or more of the environmental benefit categories, it may, at the same time, rate low in others. Therefore, it is necessary to determine the "net environmental benefits" of the process. Planners and engineers should consider using a scaler rating system with both positive and negative values, e.g., benefits and costs.

4. **Improved Joint Treatment**

I/A processes can provide for new and improved methods of the joint treatment and utilization of municipal and industrial sludges. Improved joint treatment and utilization refers to the joint treatment and ultimate management of municipal and industrial sludges resulting from the joint or independent treatment of liquid wastes. The overall objective is to encourage joint industrial/municipal facilities that maximize cost effectiveness of sludge treatment and utilization, equitably distribute the cost, and achieve improved management and control of toxic materials and industrial wastes. Examples of the more common potentially beneficial industrial recycling and joint treatment opportunities are listed below. This list is intended to illustrate potential opportunities but should not be considered all-inclusive:

- Use of industrial waste heat to improve solids processing efficiency;
- Use of high nutrient industrial waste to supplement nutrient deficient municipal sludge or vice versa;
- Addition of industrial residuals to control or alleviate corrosion of municipal collection systems;

- Use of industrial wastes or by-products as organic supplements or treatment aids and bulking agents for chemical/biological treatment processes; and

- Use of municipal sludge to fuel industrial/commercial/public facilities.

D. Available Alternative Processes

The purpose of this section is to present a review of innovative/ alternative sludge treatment and utilization processes.

1. Alternative Sludge Treatment Processes

a. Aerobic Digestion

Stabilization of sludge via aerobic digestion is similar to the activated sludge process. Microbiological aeration, oxidizing both the biodegradable organic matter and some cellular material into CO_2, H_2O, and NO_3. The oxidation of cellular matter is via endogenous respiration and is normally the predominant reaction occurring in aerobic digestion. Stabilization is not complete until there has been an extended period of primarily endogenous respiration, typically 15 to 20 days, and until there is a 38% volatile solids reduction in the sludge. Major advantages of aerobic digestion include odor reduction, reduction of biodegradable solids, and improved sludge dewaterability. Major advantages of aerobic digestion over anaerobic digestion include swifter stabilization, greater simplicity of operation, lower capital cost, lower BOD concentrations in the supernatant, recovery of more of the fertilizer value of sludge, fewer effects from interfering substances (such as heavy metals), and no danger of methane explosions. However, high operating costs (primarily to supply oxygen) make the process less competitive at larger plants and volatile solids reduction is generally not as good as anaerobic digestion.

b. Autothermal Thermophilic (Oxygen) Digestion

This type of digestion is a form of aerobic digestion that operates in the thermophilic (greater than 45°C) temperature range and utilizes pure oxygen instead of air to aerate the sludge. The operation is autothermal; that is, the heat required for the increase in temperature is supplied completely from the exothermal breakdown of organic and cellular material occurring during aerobic digestion. The increased temperatures, in turn, reduce the required retention time for a given amount of solids retention. The digestor tanks are covered and insulated to minimize heat losses from the system. The high temperatures reached in the digester may result in complete destruction of pathogens and eliminate the need for further disinfection. Thermophilic conditions can be reached in most climates and require a much shorter retention time than unheated aerobic digestion or anaerobic digestion, i.e., eight days retention time required when temperature is greater than 50°C.

c. **Composting** (See Section F. Part 4-III)

d. **Co-composting**

Sewage sludge and municipal solid waste (MSW) can be co-composted without adverse environmental emissions, and the compost product can be beneficially applied for agriculture and horticulture. This treatment process combines municipal solid waste and sewage sludge before composting. The same temperature requirements must be met and similar distribution regulations must be followed. These requirements are discussed in Section F. Part 4-III.

1) Conditions for High Rate Composting

High rate composting can usually produce a stable product in six days. To produce an acceptable product, strict control must be maintained over sludge to bulking agent ratios, the surrounding environment, moisture content, aerobic atmosphere, and porosity. An active microorganism colony is also essential. When the above requirements are satisfied, the only atmospheric emissions from the composting process should be the inlet air, with part of its oxygen converted to CO_2; water vapor; and heat, generated by the microbial action, which raises the temperature in the composting mass to between 150-170°F.

A good high rate composting process requires:

a) A carbon/nitrogen ratio between 25 and 30 in the waste mix, since living organisms use about 30 parts of carbon per part of nitrogen. Failure to supply sufficient carbon could result in the discharge of ammonia to the atmosphere. Insufficient nitrogen could result in the failure to obtain a mature compost. Immature compost would not be useful in agriculture or horticulture and would require some other means of ultimate management.

b) A moisture content preferably between 40 and 70 percent. Excessive moisture results in reduced porosity which can prevent aerobic composting and result in anaerobic decomposition with its attendant odors. Insufficient moisture retards microbial action, and would not permit rapid composting. At about 15 percent moisture, biological activity practically ceases.

c) Porosity through the composting mass to ensure aerobic action.

d) About four billion or more microorganisms per gram of seed inoculant. With additional food, these microorganisms have been measured to increase more than 20 fold in 48 hours. This increase in microorganisms explains in part why high rate composting is effective.

e) CO_2 resulting from composting that in part combines with the moisture present to form carbonic acid and solubilizes the non-water soluble microbial nutrients.

To achieve good high rate composting, the process should proceed in a closed vessel.

2) Benefits of Co-composting Sewage Sludge and MSW.

MSW generally has a C/N ratio of between 80 to 100:1 and a moisture content of about 20%. Undigested sewage sludge, after dewatering by centrifuge or belt press without coagulants, is about 90% moisture and rich in nitrogen four to six percent of the dry-weight solids.

With a sludge containing six percent nitrogen and 90% moisture, the optimum C/N ratio and moisture content should be obtained with about one ton of MSW and one ton of sludge.

With a four percent nitrogen content, the sludge would require dewatering to about 86% moisture. To prevent loss of nitrogen, the sludge should not be digested. Digestion is not necessary since the pathogens should be destroyed by the temperature achieved in the process. The range in carbon/nitrogen ratio and moisture content permissible is sufficiently broad to permit a considerable range in the feed mix while achieving satisfactory results both in the compost obtained and in the process emissions.

3) Types of Enclosed Composters

There are at least three patented systems that compost MSW and sewage sludge -- two employ slowly rotating drums. They differ in detail as to stages employed, residence time in the drum, seeding, and the arrangement of grinding and screening devices. Such plants have operated successfully since 1969. Where the drum residence time is very short, the stabilization process continues in open piles in a closed structure. The third system employs fixed structures with a series of screens, paddles, or augers and pre-, interstage-, and postgrinding with recycling of compost for seeding. This system was first used in the early 1960's.

The emissions to air from these plants are controlled by the process and are CO_2, atmospheric gases and water vapor. The end product contains significant quantities of plant nutrients, organic carbon, and vital microorganisms necessary to convert nutrients to a form usable for plant life. Because of its high humus content, co-compost holds water, at least doubles the availability of nutrients to plants, and reduces leaching of such nutrients as nitrogen to ground water.

e. Drying Processes

Fully proven processes, as outlined below, that utilize heat from a sludge management process to dry the residuals are considered alternative technologies.

1) Flash Drying

This process involves pulverizing sludge in a cage mill or by an atomized suspension technique in the presence of hot gases from a thermal reduction unit. The equipment is designed so that the particles remain in contact with the turbulent hot gases for a sufficient time to accomplish mass transfer of moisture from sludge to the gases.

2) Spray Drying

A spray dryer uses a high-speed centrifugal bowl into which liquid sludge is fed. Centrifugal force serves to atomize the sludge into fine particles and to spray them into the top of the drying chamber where steady transfer of moisture to hot gases from an incinerator takes place.

3) Rotary Drying

Rotary kilns and dryers have been used to dry sludge and for the drying and burning of MSWs and industrial wastes. In direct-heat drying units, the hot gases from an incinerator are separated from the drying materials by steel shells. In indirect dryers, the hottest gases surround a central shell containing the material but return through the shell at reduced temperatures. (See the section on Innovative Utilization Processes for further information on rotary kiln incineration). Under federal regulations at 40 CFR 257, sludge treated in this fashion will satisfy requirements for a PFRP if gas exit temperatures meet or exceed 80°C.

4) Multiple-hearth Drying

This is a countercurrent operation in which heated air and products of combustion pass by finely pulverized sludge that is continually raked to expose fresh surfaces.

2. Alternative Sludge Utilization Processes

a. Co-incineration of Sludge and Solid Waste

Co-incineration is incineration using a combination of wastewater sludge (including a combination of municipal and industrial) and another combustible material, other than natural gas or oil, in a single furnace. Some other combustible materials include: MSW, coal, wood wastes, farm wastes, textile wastes.

b. Land Application of Sludge

Liquid sludge, dried sludge, composted sludge and sludge cake can be applied to the land via tank truck, injection, ridge and furrow spreading, trenching, and spraying. Sludge can be incorporated into the soil by plowing, discing, or other similar methods. Ridge and furrow methods involve spreading sludge in the furrows and planting crops on the ridges. Utilization of this technique is generally best suited to relatively flat land and is well suited to certain row crops. High application rates are commonly used to reclaim strip mines or other low quality land parcels. Sludge spreading in forests has been limited, but offers opportunities for improved soil fertility and increased tree growth.

c. Incineration of Sludge : Fluidized-bed Furnace

Sludge incineration via a fluidized-bed furnace is a two-step process involving drying and combustion after preliminary dewatering. The sludge is first dewatered to a solids concentration of between 20 and 30%. It is then injected into the furnace where moisture is evaporated and combustion of the sludge occurs. Self-sustaining combustion without supplementary fuel is often possible if waste heat is recaptured and conveyed to the windbox supplying air to the reactor.

The fluidized-bed furnace is a vertically oriented, cylindrically shaped, refractory lined, steel shell that contains a sand bed and fluidized air distributor. Sludge is fed above the floor of the furnace. Temperature of the bed is controlled between 1400°F and 1800°F. Ash is carried out of the top of the furnace and is removed by air pollution control devices, usually wet scrubbers. Generally, sludge is fed directly into the bed.

d. Incineration of Sludge : Multiple-hearth Furnace

The concept behind the multiple-hearth furnace and the fluidized-bed furnace is similar except the multiple-hearth contains four to 13 horizontal hearths positioned one above the other. Sludge is raked radially across the hearths by rabble arms which are supported by a central motor driven rotating shaft that runs the height of the furnace. Sludge is fed to the top hearth and proceeds downward through the furnace from hearth to hearth. Gas or oil burners are provided on some hearths for start-up, after burning, and/or supplemental use as required.

e. Co-incineration of Sludge : Waterwall or Refractory Furnace

Waterwall and refractory furnaces have been successfully used for the management of sludge and for the co-management of sludge and MSW. Generally, sludge from sewage treatment plants is dewatered to a solids content of approximately 25% before the flash drying process incorporated into the waterwall combustion furnace. The drying of the sludge takes place in a combination hammermill-material handling fan. The sludge is dried by a flow of hot flue gas entering the system on the suction side of the fan and is discharged into the furnace together with the flue gas and evaporated moisture. To ensure intimate contact between the sludge particles and the hot flue gas, the sludge is fed into the flash dryer via a steam atomizing nozzle. The dried sludge and vapor is then fed into a waterwall furnace where refuse is simultaneously fed (via a charging hopper) for thermal co-management.

The refractory furnace co-burning design is similar. The sludge drying system, however, is different. In the co-burning design, dried sludge is delivered to the incinerator plant's twin silo located at the top of the furnace. Wet sludge is mixed with previously dried sludge and then introduced into a cage mill where the sludge is dried by hot furnace gases to approximately 80% solids. The mixture then passes through a cyclone that separates the dried sludge from the gases. A portion of the sludge is blown into the furnace, separate from the gases. The remainder of the dried sludge is recirculated for mixing with the wet sludge to produce a mixture that can be handled by the cage mill. Refuse is fed by a charging hopper.

As an alternative methodology for introducing sludge into these incinerators, some operators have successfully introduced 20% dewatered sludge in a thin layer along the top of the MSW in the feed hopper. This modification has realized significant savings in time and money.

3. Alternative Treatment and Utilization Processes for Other Treatment Plant Residuals

a. Incineration of Grit and Screenings Followed by Sorting

This treatment of grit and screenings allows recovery of these materials for reuse. The process involves incineration to burn the organic and combustible components such as rags and plastics. The remaining grit is sorted through a series of screens into various marketable sizes.

b. Washing Grit for Aggregate Use

Thoroughly washed grit can be used in place of commercial sources of aggregate provided it does not contain undesirable screenings as well. During this process, wasted grit washwater is returned to the head of the treatment plant and the heavier washed grit is settled and removed for use.

c. Use of Spent Sand Bed Material for Daily Landfill Cover

Over time, sands from sludge drying beds and effluent sand filtration beds will clog and require evacuation. These clogged sands generally include less than ten percent organic matter and are suitable for use as daily cover material on landfills. The DSWM must be contacted for specific approval to use a particular facility's material for this purpose.

d. Pelletizing Incinerator Ash for Daily Landfill Cover

Incinerator ash is a stable material that is generally of suitable chemistry for reuse as daily cover for landfills. However, dried ash is often associated with dust problems and is therefore difficult to manage. To address this problem, ash can be pelletized. Resulting particle size is on the order of one-eighth inch or less. Through this process, a workable product for use as daily cover is created. It should be noted here that the pelletized ash is not suitable for final cover. The DSWM must be contacted for approval to use ash from a particular incinerator for this purpose.

e. Incinerator Ash as Sub-base Material

Incinerator ash is generally suitable for use as a sub-base material in road and parking lot construction. The DSWM must be contacted for approval of the specific incinerator ash for this use. EP toxicity, sulphide and cyanide reactivity and total petroleum hydrocarbon analyses will commonly be required by the DSWM to determine the suitability of the ash for use as sub-base material.

If the ash is determined to be suitable and approval is granted, a minimum of three feet must be maintained between the ash and local ground water. Dust control measures such as watering, tarping and/or fencing may also be required by the department to reduce potential nuisance impacts to the surrounding community during construction.

For use of the incinerator ash off-site as sub-base material, the Department of Transportation must be contacted. In this case, further testing may be required to determine the stability and bearing capacity of the material.

E. Available Innovative Processes

1. Innovative Sludge Treatment Processes

a. Oil-immersion Dehydration

The drying of sludge can be accomplished using an oil-immersion process. Thickened or dewatered sludge is immersed in a light carrier oil to form an easily pumpable slurry. The oil prevents scaling and minimizes corrosion as the water in the sludge is vaporized. Energy efficient evaporation is carried out either in a multi-stage evaporator or a mechanical vapor recompression evaporator followed by a single or two stage drying evaporator. From evaporation, the slurry of dry sludge in carrier oil is separated in a centrifuge.

The liquid or oil phase containing most of the oil, grease and other organic chemicals originally in the sludge is steam distilled under vacuum to separate and recycle the carrier oil to the process, while yielding a heavy sewage oil residue. Heat and steam are used to remove carrier oil from the centrifuged dry solids, which can then be used for fuel or be pelleted to be marketed as a fertilizer.

Energy recovery from the heavy oil will supply process thermal requirements, as well as part of the electrical requirements, if desired. If the solids are also used for energy recovery, all of the thermal and electrical requirements for the process are generated as well as a surplus available for use elsewhere as electricity or steam.

Where the use of the final pelletized product is intended for fertilizer or soil amendment, sludge quality and pathogen requirements apply.

b. Oxyozonation of Sludge

Hyperbaric oxyozonation utilizes a gas-liquid contact process to enhance chemical oxidation of sludge. Liquid sludge is pumped into the oxyozonation vessel, which is maintained one-half full with the sludge phase at the bottom and a gaseous ozone-oxygen phase under pressure at the top. The sludge is then recirculated from the bottom of the liquid phase and introduced into the gas phase, where the sludge is comminuted into fine particles, providing maximum interface and rapid transfer between the gas under pressure and the particles. Under hyperbaric conditions, a dissolved oxygen concentration in the range of 150-200 ppm can be achieved. The liquid is recirculated into the gas phase to replenish the dissolved oxygen as it is used in the oxidation process until the total retention time is accomplished. For easily oxidized compounds, high purity oxygen can be used without ozone. The optional ozone treatment increases decomposition of the more resistant organics and also disinfects the sludge in compliance with PSRP requirements under 40 CFR 503, Appendix B and can be modified through a patented process to achieve PFRP requirements. The pH of the sludge is adjusted prior to treatment in the hyperbaric chamber to provide hydrogen ions in solution to assist in the destruction of organic pollutants. The fate of dissolved metals in the waste stream resulting from this process has yet to be determined. Therefore, the department requires analysis of total and dissolved metals in the return process side stream and the plant influent. If metals concentrations show significant increase, metals removal will be required for the return side stream.

c. Freeze-thaw Process

This process calls for the sequential freezing and thawing of raw sludge to effect the separation of the sludge into concentrated and dilute parts. The system comprises a reversible refrigeration circuit including a pair of heat rechargers that serve as an evaporator and a condenser and that are adapted to receive and discharge sludge respectively, a compressor, and the appropriate valves and pumps for controlling the circulation of refrigerant through the circuit. The evaporator receives the raw sludge and freezes it. The sludge is then thawed by the compressor from which the treated sludge is discharged. The literature indicates the sludge's filterability is greatly enhanced by use of this process and the system is capable of operating on a continuous basis to treat large quantities of raw residuals efficiently and effectively.

d. Reed Beds

This system of sludge treatment combines the action of conventional drying beds with the effects of aquatic plants on waterbearing substrates. While conventional drying beds are used to drain 20-25% of water content from sludge, the resulting residue must be hauled away for further treatment. By having the drying beds built in a specific manner or minor modifications to existing drying beds, the beds can then be planted with reeds (Phragmites communis), and further desiccation of the sludge is accomplished through the plants voracious demand for water. To satisfy this demand, the plants extend their root systems continually into the sludge deposits. The extended root system causes the establishment of a rich microflora that feeds on the organic content of the sludge. Aerobic conditions needed by the microflora are created through the root action of the plants. Eventually more than 95% of the sludge solids are converted into carbon dioxide and water with a corresponding volume reduction. These drying beds can be operated for up to ten years before the remaining sludge residues have to be removed.

The heavy metal content of the final residual produced by this method determines what amount can be managed on a given land area. While there is an accumulation of metals in the sludge depending on the quality of the original wastewater, the plants take up a considerable amount which is removed from the beds by the annual harvest. The harvested plants are best disposed of by composting. The actual volume of the harvest is quite small as one acre of plants yields only 25 to 30 tons and the dry weight is only a fraction thereof.

The beds must be taken out of service six months prior to being emptied of their deposits (after eight to ten years) to allow the uppermost layer to become mineralized as well as disinfected. Then all deposits together with the filter sand must be removed, new filter sand laid down and the beds flooded to allow the remaining rhizomes in the substrate to regenerate.

e. Gasification

This treatment process utilizes stable, burnable briquettes or pellets made from a mixture of sewage sludge, crushed caking coal, and/or refuse derived fuel (RDF, the combustible fraction of MSW). Sewage sludge dewatered to 20% solids or more is suitable if RDF is used. If no RDF is used, sewage sludge must be dewatered to 80% solids or greater. The ratio of sewage sludge to coal to RDF is dependent on the moisture content of the sludge. These briquettes or pellets are then processed through a gasifier resulting in non-leachable ceramic frit (which immobilizes metals) and several other useable by-products. A temperature of 3000°F in the hearth of the gasifier causes volatilization of organics. Non-combustible inorganics partition to a slag, which is drawn off and quenched in water to form the non-leachable ceramic frit which can be used as a road-building aggregate. The gas product is drawn off at 2000°F and contains mostly carbon monoxide and hydrogen. The gas is cooled and scrubbed to remove ammonia and sulfur (both useable by-products) resulting in a clean product which can be used as a fuel or as a raw material in other processes.

f. Wet Air Oxidation

In thermal conditioning process, primary and secondary sludges are first ground up, then pumped to a pressure of 350 psi and mixed with air. The preheated sludge then enters the reactor where steam raises its temperature to 300 to 400°F. Here in the reactor, the sludge is partially oxidized and the number of living pathogens is reduced. This process reduces sludge solids content, increases the dewaterability and reduces pathogen numbers. The resultant product generally classifies as PFRP and can be incinerated, directly land applied, or distributed.

2. Innovative Sludge Utilization Processes

With this SSMP Update, the department wishes to emphasize that the innovative sludge treatment and management systems discussed herein are based on the best information available on generic processes and should not be construed as an official endorsement of any particular manufacturer or as complete descriptions of any patented process.

a. Starved Air Combustion of Sludge

This process utilizes equipment and process flows similar to incineration except that less than the theoretical amount of air for complete combustion is supplied. Autogenous starved air combustion can be achieved with a sludge solids concentration greater than 25%. For lower solids concentrations, an auxiliary fuel may be required, depending on the percent volatiles in the solids. High temperatures decompose or vaporize the solid components of the sludge. Under proper control, the gas leaving the vessel is low BTU fuel gas which can be burned in an afterburner to produce energy. The process reduces sludge volumes and kills pathogens. It also offers the potential advantages of producing useful by-products and reduces the volume of product without the use of large amounts of fuel.

b. **Melting Furnace for Sludge**

The melting furnace adopts a film melting process. It has a primary combustion chamber of reverse conical shape formed by a combustion unit on the ceiling and sludge at the lower part where temperatures between 1300°C and 1400°C are reached. It is a vertical rotating furnace consisting of inner and outer cylinders. The outer cylinder rotates to supply sludge to the primary combustion chamber. The inner cylinder where ceiling and combustion unit are provided is designed so that furnace load is adjusted by up and down motion. The burned and melted sludge turns to molten slag and continuously flows down the slag port together with high temperature combustion gas. The molten slag solidifies on the slag conveyor located at the lower part of the secondary combustion chamber and is taken out. The combustion gas is led to excess heat recovery equipment and the waste gas treatment equipment via the secondary combustion chamber. The slag can be used as aggregate and roadbed fill.

c. **Incineration of Sludge Rotary Kiln**

Another type of incineration system that has been used by industry for the thermal reduction of solid wastes is the rotary kiln. The kiln, which is a large cylinder rotating on steel tires turning on trunnions, is sloped slightly from the feed to the discharge end so that the sludge being incinerated will move along the length of the cylinder. The cylinder is usually lined with some type of refractory, often firebrick. Sludge is charged at the high end of the kiln and usually ignited by a burner located at the lower end, however, this is not always the configuration employed. Burning equipment may be located at the feed end of the kiln for sludge (and possibly MSW) which is combustible in itself and does not require a great deal of auxiliary heat. The air for combustion is usually pulled through the kiln by means of an induced draft fan located downstream from the kiln, afterburner, and scrubber system. Ignition occurs at the front end of the kiln and combustion progresses until the unburned sludge or ash is discharged into an ash pit at the low end of the kiln. The flue gases then pass an afterburner section where they are reheated to 1500 to 1800°F. A wet scrubber is usually used to capture particulates.

d. **Solidification and Cement Made From Sludge**

In this process, sludge is combined with a cement-making process for producing cement economically from normally wasted materials. Activated sludge is flocculated with sequential additions of carbon dioxide and calcium oxide. It is then filtered to a sludge cake, and fed to a cement kiln. The combustible organics in the sludge reduce fuel requirements in the kiln and the resultant clinker is in the portland cement composition range. One of the substantial costs in cement manufacturing operations comprises the fuel required for firing the kiln to the required elevated temperatures. Since the sludge filter cake fed to the cement kiln comprises a substantial amount of combustible organic materials, a substantial fuel economy results since less fuel is required in the kiln. Thus, by combining sludge treatment with cement production, otherwise wasted organic materials are burned to produce heat for making cement and simultaneously are reduced in volume to avoid disposal problems. As an alternative to processing in a cement kiln, sewage sludge (digested or raw) can be mixed with portland cement, lime, sodium silicate and ferric chloride. The resultant is a stable product with a pH of approximately 12. This pH is responsible for the inactivation of pathogenic viruses and bacteria. Parasitic eggs are destroyed by the high concentrations of ammonia present as a result of hydrolysis of urea. The resulting product from these processes can be used as block or for similar uses, or can be pulverized and used as a soil conditioner or lime substitute with properties similar to a silty clay.

e. Utilization of Existing Infrastructure

The possibility of utilizing existing facilities offers significant opportunities that should be investigated. Use of such facilities as unused or underused incinerators, rotary kilns or dryers, reclamation of abandoned quarries (often with adjacent rail lines), and other disturbed lands may have the advantage of small initial capital expenditures and these opportunities are often are located near large urban areas where large volumes of sludge are produced. The utilization of processed sludge to partially supply energy needs of existing commercial and industrial facilities also has the potential for significant long-term savings.

IV. Environmental Impacts:

The range of innovative and alternative facilities addressed in this section, and the many more which have not been addressed, is very broad and covers facilities that could have potential discharges to air, soil, ground and surface waters if implemented and/or operated in an uncontrolled fashion. Depending on the alternative selected, the environmental and public health impacts may vary widely. Generally, it should be understood that facilities incinerating sludge will have to address the impacts of air emissions discussed in Section F. Part 4-IV. Those alternatives involving incorporation into the soil must address ground water impacts and possible public health impacts associated with applications on incompatible crops. I/A facilities processing sludge usually discharge leachate or supernatant back into the treatment process. Therefore, such facilities must carefully evaluate both the quantity and the quality of that discharge and determine the possible impacts of the discharge on proper performance of the treatment plant. It is important to determine whether chemical additions to the sludge will adversely impact liquids returned to the treatment process and/or if they will be retained in the sludge. The impacts of any process are determined by the quality and quantity of the discharges from the process and the fate of those discharges or emissions.

V. Applicable Regulations and Legislation:

The nature of the discharges from a process or facility determines the nature of the potential environmental and public health impacts, and in turn, determines the applicable regulatory requirements. Reference should be made to the other parts of this SSMP Update for the regulations that relate to air, water and solid waste management impacts of innovative or alternative management systems and permitting processes.

VI. Permitting and Regulatory Process:

Reference should be made to the section of Part 4 for the permitting and regulatory requirements that relates to the various processes and management methods. As guidance, the applicant should consider potential discharge to ground and surface waters, air emissions quality determinations and hazardous determinations on the final product. Processes with air emissions should be directed to the permitting process discussion in Section F. Part IV, and processes with potential ground water discharge should refer to the permitting discussion of Section F. Part III. In all cases, construction projects for sludge management will require TWAs from the WFRP and projects that manage both sludge and MSW in a co-management operation will be required to secure registration from the DSWM as well as applicable permits from the WFRP.

VII. Sources of Information and Guidance:

Cosulich, William F., Codisposal of Refuse and Sludge, Public Works Magazine, August, 1980.

James, Richard W., Sewage Sludge Treatment and Disposal, Noyes Data Corporation, Park Ridge, New Jersey, 1979.

Metcalf & Eddy, Inc., (revised by George Tchobanoglous) Wastewater Engineering: Treatment, Disposal, Reuse, McGraw-Hill Book Co., New York, 1979.

United States Environmental Protection Agency, Evaluation of Sludge Management Systems (USEPA-430/980-001), Office of Water Programs Operations, Washington, D.C., 1980.

United States Environmental Protection Agency, Innovative and Alternative Technology Assessment Manual (USEPA-43019-78-009), Office of Water Program Operations, Washington, D.C., 1980.

United States Environmental Protection Agency, Process Design Manual for Sludge Treatment and Disposal, Office of Technology Transfer, Washington, D.C., 1974.

Part 4-VIII. Emergency Management:

I. Introduction:

Under certain circumstances it is necessary to turn to short-term emergency solutions for sludge management. Emergency solutions may be necessary due to failure or malfunction of selected long-term management programs. Incinerators can experience operational difficulties, weather conditions can cause interruption of land application or composting, and equipment can malfunction. It is the nature of such events to require quick response from the DEPE and the sludge generator in order to prevent adverse impacts on public health and the environment. Accordingly, there is no opportunity for public comment. These management solutions are restricted to short periods of approval and are not applicable, or permitted for extended periods. Generally they are neither technology nor capital intensive. The emergency permitting powers of the department are invoked if no other remedy is available, and are intended to provide the necessary time to develop or to return to permitted long-term management modes.

As indicated, emergency alternatives tend to be low technology intensive by necessity. The speed with which they must be implemented prevents construction of complicated mechanical equipment. There are, however, occasions when modular or prefabricated components are readily available and may be purchased and delivered quickly enough to provide emergency solutions. The most commonly issued emergency permits are for on-site storage and reed beds. The department has also issued emergency permits for land application and composting activities and in the case of extreme hardship has approved emergency landfilling (see Section F. Part 4-V). Reed beds are addressed in detail in Section F. Part 4-VII and can, in most cases, be converted to full permits during the terms of the emergency permit through satisfaction of all permitting requirements including public comment. History has shown that it is less feasible to convert emergency land application and composting permits to full permits during the term of the emergency permit due to significant public controversies. The information required for emergency permitting of either of these alternatives is identical to that required for full permits (see Section F. Parts 4-II and 4-III), however, opportunity for public comment is reduced. As stated in Section II below, and in Part 4-V, Section VI.A., under emergency conditions, the department may exercise its authority to issue short-term approvals for landfilling of sludge. The technical, environmental, and permitting aspects of sludge landfilling are addressed in Section F. Part 4-V. Therefore, only storage will be addressed here. Emergency on-site storage is only permitted under short-term emergency conditions and cannot be converted into a full NJPDES permit or TWA except as provided in Section F. Part 4-IX.

II. Policy:

Irrespective of the selected emergency management alternative, if an emergency NJPDES permit or department approval is required for the activity, a compliance schedule will be included as part of the NJPDES permit conditions or approval. This schedule requires the permittee to perform specified tasks to provide for acceptable sludge management on or before the expiration date of the emergency permit or approval. Further, in recognition of public concerns regarding the lack of opportunity for public comment and reduced DEPE review periods, emergency permits include increased monitoring and reporting requirements. The department will only consider emergency permits where overriding adverse potential public health or environmental impact would occur if the DEPE failed to act. Increases in short-term or long-term sludge management costs alone are not acceptable justification to warrant issuance of emergency permits.

If all emergency remedies for storage have been exhausted and it has not been possible to implement a viable management solution, the department may determine that an emergency of suitable magnitude exists that would warrant the institution of landfilling on a short-term emergency basis. If the department makes such a determination, approval to perform emergency landfilling shall be conditioned on the signing of an ACO containing a compliance schedule that provides for an acceptable sludge management alternative. Prior to entering into such an agreement, the department will consider whether the candidate landfill is in compliance with all permitting requirements and whether it can be demonstrated that the landfill can accept the emergency sludge without adversely affecting its ability to accept MSW.

III. Technical Aspects/General Practices:

As the name implies, on-site storage simply stores sludge on the treatment plant grounds until a long-term management solution can be implemented. Stored sludge must be contained in a manner that will prevent solids from washing off site and/or into water bodies and that will prevent leachate from entering ground water. This is generally accomplished by placing the stored material within an impermeable, lined containment area with provisions for leachate collection and return to the head of the sewage plant for treatment. Plastic liners over earth-bermed containment areas are often used. Most treatment plants have spare pumps and piping available for general maintenance. These components can be assembled to provide for leachate control. Generally the following conditions are imposed on the permittee:

- The stored sludge must be liberally limed to reduce odors; odors should not be offensive beyond the property line;

- An impermeable barrier such as clay, vinyl or macadam must be placed over the entire area to be utilized for sludge storage to prevent leachate from entering ground waters;

- Leachate from the site must be prevented from entering ground or surface waters by providing for collection with recycling to the plant for treatment;

- A berm must be constructed around the storage site to retard runoff; and

- Site access must be controlled.

The emergency on-site storage permits expire at the end of 90 days or when an approved management method is implemented, whichever comes first.

IV. Environmental Impacts:

Sludge stored on-site is little more than a waste pile or dumping activity. It provides no ultimate solution for management of daily sludge production. Sludge storage may cause odor problems and attract insect vectors. If uncontrolled, the concentration of leachate generated by the storage pile can result in ground and surface water contamination.

V. Applicable Legislation and Regulations:

A. Statutes

1. Federal

a. Resource Conservation and Recovery Act of 1976, 42U.S.C. §6901 et seq.

b. Federal Clean Water Act, 33 U.S.C. §1251 et seq.

2. State

a. Solid Waste Management Act, N.J.S.A. 13:1E-1 et seq.

b. Water Pollution Control Act, N.J.S.A. 58:10A-1 et seq.

c. Air Pollution Control Act, N.J.S.A. 26:2C-1 et seq.

B. Regulations

1. Federal

a. Criteria for the Classification of Solid Waste Disposal Facilities, 40 CFR 257.

2. **State**

   a. New Jersey Pollutant Discharge Elimination System (N.J.A.C. 7:14A-1 et seq.).

   b. Division of Solid Waste Management Rules (N.J.A.C. 7:26-1 et seq.).

   c. Air Pollution Control Regulations, (N.J.A.C. 7:27-1 et seq).

VI. Permitting and Regulatory Process:

Treatment plants requiring emergency on-site storage should contact the WFRP for management assistance. WFRP will assist in locating alternative solutions that can be implemented immediately by the treatment plant. All alternatives must be exhausted and verified by WFRP before they will consent to emergency on-site storage. To expedite the review process, telephoned information should be followed by written confirmation of the emergency conditions prompting the on-site storage request. WFRP will forward an application form to the treatment plant. The application form requires information on the layout of the treatment plant grounds as well as specifics on sludge containment, storage location, odor control and control of public access. If the completed application is satisfactory, an emergency on-site storage permit will be issued for a period of 90 days. The processing time for this permit generally ranges from one to two weeks.

Part 4-IX. Storage

I. Introduction:

Storage alone is not a method of ultimate sludge management. It is a mechanism incorporated in an overall residuals management program that adds flexibility and improves the efficiency of the program. For example, a treatment plant may require daily or weekly sludge removal, but a receiving land application site may only be able to accept sludge during the 30 days preceding crop planting, and not at all during the winter months. Storage could be a necessary component of such a sludge management proposal. In other cases, storage capacity can serve as a component of a contingency for periods when selected management modes are closed for repairs, or due to inclement weather, provided the stored sludge can be ultimately managed in an acceptable manner. And storage capacity (transfer stations) can be utilized to facilitate transportation of small generator sludge and septage sources to ultimate residuals management sites.

Storage can have many forms. It may be mobile or stationary. It may consist of tanker trailers, frac tanks, slurry tanks, surface impoundments, bunkers, or sheds. It may be located at the treatment plant site, at the residuals management site, or be located in consideration of transportation and/or development and population density factors. The storage method can be located above or below ground level. For the purposes of this Part, storage installations are only those which are used for storage alone. Although many treatment plant components include some storage capacity in the design (e.g. digesters, thickeners, and drying beds, etc.), these components are primarily intended for treatment or processing and are not considered to be storage installations.

This Part addresses permanent storage installations as part of routine sludge management and contingencies. Temporary storage installations are discussed in Section F. Part 4-VIII as they are used to resolve emergency conditions.

II. Policy:

Storage in permanent storage installations is only acceptable to address short-term management requirements. Storage is intended to provide residuals management flexibility during periods of inclement weather, and to serve as a contingency plan if regular management is temporarily interrupted. Accordingly, all residuals must be removed from storage installations for ultimate management.

Storage is only appropriate as a component of contingency alternative when it can be demonstrated that the ultimate residuals management alternative has the capacity to manage daily residuals generation concurrently with management of backlogged stored residuals which have accumulated during the contingency management period.

The department considers storage to be the responsibility of the sludge generator as an integral component of proper treatment plant management. Storage beyond the structural and permitted capacity of the treatment plant components or sludge storage installations will be subject to enforcement action except as authorized by the department in emergency circumstances, when, in the department's judgment, no other alternative is available, and the environment or public health is threatened.

The department encourages the siting of permitted transfer stations for residuals. These serve as a central regional depository for smaller truck-loads of residuals. In this way, many small trucks can be dispatched to more distant areas to collect septage and sludge from small generators, and fewer large trucks are needed to haul residuals to ultimate management sites. Such transfer programs can produce significant transportation cost savings, and eliminate unnecessary truck traffic.

III. Technical Aspects/General Practices:

Storage of residuals can be accommodated in a number of different ways that are dependent on the characteristics of the particular residual. The various types of storage installations are discussed below together with the characteristics of the residual appropriate to each storage type.

A. Installations for Liquid Residuals Storage

Since liquid residuals are a suspension ranging from one to nine percent solids, the solid component will settle during storage and form a density gradient with higher solids at the bottom of the liquid storage installation. The density gradient also creates a nitrogen and metal concentration gradient in the stored residuals. Where liquid storage is used in conjunction with agricultural application, it is particularly important to provide mixing equipment of sufficient capacity to thoroughly mix (homogenize) the storage contents in order to secure an acceptable sample for nitrogen analysis. The nitrogen concentration of the residuals must be determined prior to removing stored residuals for application on fields. Failure to homogenize the liquid residuals may result in uneven application of nitrogen (unacceptable crop yields on some portions of the site and over application on others).

1. Surface Impoundments

Surface impoundments are excavations (man-made ponds), natural topographical depressions, or diked areas formed primarily of earthen materials, designed to hold an accumulation of liquid wastes. All surface impoundments must be lined with a continuous layer of natural or man-made materials, beneath and on the sides of the surface impoundments, to restrict the downward and lateral escape of any residuals. Liquid residuals are generally pumped into surface impoundments from tanker trucks. However, some surface impoundments are designed to be filled by gravity release of liquid residuals from the tanker. Such designs must provide sufficient structural bearing to the discharging platform (loading dock) that the walls and the lining are not damaged.

2. Frac Tanks

Frac tanks are mobile tanks. However, because they generally exceed vehicle size and load limits for over the road travel, once positioned, they usually remain on the storage site permanently. Frac tanks are equipped with mixing and reversible pumping equipment. Liquid residuals are generally pumped into frac tanks. However, if they are positioned in a depressed location they can be filled by gravity discharge from a tanker.

3. Slurry Tanks

Slurry tanks are stationary structures. They are generally prefabricated and erected on a concrete pad. Slurry tanks can be constructed of steel or preformed concrete which is bolted into place at the site. They have been used extensively by agriculture for manure storage around the world. Slurry tanks are usually equipped with timed mixing pumps which can be programmed to maintain a homogeneous and aerobic mixture. Residuals are pumped into slurry tanks in most cases. However, if the tank is placed in an excavation below ground, gravity discharge from tanker trucks may be accomplished.

4. Tanker Trailers

Liquid residuals may, also, be stored in tanker trailers, which when filled, are intended to be used to haul the stored residuals off site to their point of ultimate management. For the purposes of this SSMP Update, such storage equipment is distinguished from frac tanks, because, although frac tanks are mobile equipment, they are generally not used to transport residuals when filled, and because tanker trailers usually are not equipped with mixing equipment. Tanker trailers are generally equipped with reversible pumping equipment for filling and discharge or they may be parked on a depressed pad or parking area where they can be filled from above by gravity.

B. Installations for Dewatered Residuals Storage

Most dewatered residuals fall within the range of nine to 35% solids. They resemble a heavy black mud, and once dewatered, are not conducive to rewatering. When placed in storage, dewatered residuals do not flow together and commingle without active mixing by the storage site operator. Therefore, if the ultimate management site requires precise information on sludge quality (e.g. land application requires concentrations of nitrogen and metal to calculate loading rates), it is advisable to keep residuals of known chemical quality in discrete areas of the dewatered storage installation. Unlike liquid residuals, it is difficult to obtain a uniform blend of diverse dewatered sludges, therefore operators of these installations are advised to institute loading and unloading procedures to prevent mixing. In those cases where storage operations cause mixing of residuals, an analysis of a composite of statistically appropriate samples drawn from locations distributed throughout the stored residuals may be required.

1. Bunker Silos

Bunker silos are agricultural installations that have been traditionally used for silage storage. They are ideally suited to residuals storage at farm sites and have been adapted for that use. They have a concrete floor and three low concrete wall, generally six to eight feet high, although lower walls may be suitable depending on site conditions. The floor is sloped to prevent ponding following precipitation events. A drainage system is constructed to intercept runon and runoff, as a measure to protect ground and surface water quality. Bunker silos are filled by dump truck or front end loader. The loading vehicle drives onto the concrete floor to deposit residuals progressing from the back of the bunker silo to the front.

2. Pads

Pads are large gently sloping surfaces surrounded by a curb. They are constructed of concrete (asphalt is unsuitable for the constant traffic of heavy residuals equipment). A drainage system is installed around the pad to intercept runon and runoff, as a measure to protect ground and surface water quality. Storage pads are filled by dump truck or front-end loader. The loading vehicle drives onto the concrete floor to deposit residuals progressing from the back of the pad to the front.

3. Sheds

Sleds or garage type structures can also be used for dewatered residuals storage. Since such structures by their nature protect the stored sludge from runon and runoff, drainage controls are usually not required, except for drainage within the structure which is a necessary component of washdown requirements. Stored residuals are loaded by dump truck or front-end loader.

4. Roll-Off Containers

It is common practice to position a roll-off container at the end of dewatering conveyor belts at treatment plants. These containers are trucked off-site when full, or they may remain at the treatment plant for longer periods until collection is scheduled. They also provide a storage mechanism at ultimate sludge management sites. Hauling vehicles may unload the container at the management site, where they may remain until the operator schedules ultimate management (e.g. land application, composting or incineration) after which the empty container is collected by the hauler and returned to the sewage treatment plant.

IV. Environmental Impacts:

When a storage installation is proposed, the public is generally concerned about odors, ground or surface water pollution and tank rupture. These concerns are largely overrated in view of the New Jersey permitting process. The conditions imposed on these installations effectively control environmental impacts. Spills or leaks are only remote possibilities where storage installations are maintained in accordance with permit conditions.

A. Odors

Odor control mechanisms are specific to the type of installation, the nature of the residuals and the term of the storage.

1. Dewatered Residuals

Odors at dewatered residuals storage installations are generally controlled by liberal liming of the surface area of the storage piles. Where population is in close proximity to the site, enclosures (e.g. sheds or garages) may be appropriate additional controls. Where piles are contained in such enclosures, headspace over the piles may be vented and controlled using odor control equipment. However, in general, air flow and dispersion around dewatered sludge piles is sufficient to prevent odor from becoming an issue.

2. Liquid Residuals

Odors at liquid storage installations are controlled through two mechanisms: ongoing aeration to prevent development of septic (anaerobic) conditions, or water blankets to prevent escape of odors from anaerobic sludge. Covers are also appropriate for some liquid storage installations, and any vents from such permanent, stationary installations would be equipped with odor control equipment. Frac tanks and trailer tanks are generally effective odor control alternatives, because stored liquid residuals are fully contained and are not exposed to the ambient air.

B. Surface and Ground Water Pollution

Surface or ground water pollution is highly unlikely, since storage installations are designed to contain the residuals and prevent release into the environment. The possibility of accidental spills or leaks is remote when storage installations are maintained and operated in compliance with permits and approvals. If such incidents do occur, the possibility of causing surface or ground water pollution is also remote, because of both the nonhazardous nature of stored residuals and design and structural safeguards built into such installations. Moreover, where appropriate, regulations require monitoring wells in order to ensure that any spills or leaks do not go undetected.

1. Dewatered Residuals

Runon and runoff across stored dewatered sludge piles is the mechanism by which ground or surface water might be affected. Since installations are constructed to prevent stored sludge or leachate from coming in contact with ground or surface water, controlling overland flow across the piles effectively eliminates concerns about ground or surface water contamination.

2. Liquid Residuals

Tank storage and surface impoundments are also designed to prevent stored residuals from coming in contact with ground or surface water, therefore, overland flow is not an issue with tanked containments. Spill and leak prevention is addressed through permit conditions requiring routine inspections and spill response. Such issues are closely controlled and monitored, and accordingly, permitted installations should not pose a ground or surface water threat. Surface impoundments are required to be lined with impermeable barriers to assure protection of ground water.

V. Applicable Legislation and Regulations:

The laws, rules, and regulations which apply to residuals storage are listed below:

A. Statutes

1. Federal

a. Clean Water Act of 1977, (CWA) 33 U.S.C. §1251 et seq.

b. Clean Air Act (CAA), 42 U.S.C. §7401 et seq.

c. Resource Conservation and Recovery Act, 42 U.S.C. §6901 et seq.

2. State

a. Water Pollution Control Act, N.J.S.A. 58:lOA-1, et seq.

b. Air Pollution Control Act, N.J.S.A. 26:2C-1, et seq.

B. Regulations

1. Federal

a. National Pollution Discharge Elimination System Regulations (NPDES) 40 CFR Part 125.

b. Air Regulations, 40 CFR 61.

c. Underground Storage Tank Regulations, proposed April 17, 1987, FR 12662-12864.

d. Standards for the Use and Disposal of Sewage Sludge, 40 CFR Part 503.

2. **State**

a. New Jersey Pollutant Discharge Elimination System Regulations, N.J.A.C. 7:14A-1 et seq.

b. Treatment Works Approval Regulations, N.J.A.C. 7:14A-12.1 et seq.

c. Underground Storage Tank Regulations, N.J.A.C. 7:14B-1 et seq., proposed August, 1987.

d. Division of Sludge Management Regulations, N.J.A.C. 7:14C-1 et seq.

e. Air Pollution Regulations, N.J.A.C. 7:27-1 et seq.

f. Collection and Haulage Regulations, N.J.A.C. 7:26-1 et seq.

VI. Permitting and Regulatory Process:

The permitting requirements below do not apply to installations for dewatered SDPs storage.

A. Installations for Liquid Residuals Storage

Permits and approvals for the following installations include provisions for public notice to the local municipality and sewerage authority through an opportunity to endorse the project. NJPDES permits are subject to a public hearing if significant public interest is demonstrated during the public comment period.

1. Surface Impoundments

Surface impoundments are required to secure a NJPDES ground water discharge permit prior to installation. In addition to the information required in N.J.A.C. 7:14A-2.1, applicants for a NJPDES permit for surface impoundments must submit the information detailed in N.J.A.C. 7:14A-10.7. This information includes details of residual characteristics; information with respect to the nature and permeability of the proposed liner and its compatibility with the residual to be stored; detailed site information including but not limited to geology, soils, topography, depth to seasonal high water table, proximity of potable wells, locations of existing neighboring development, roads, surface water and critical areas. As a component of the NJPDES ground water permit, ground water monitoring wells must be installed and monitored.

Engineering and design information must also be submitted. Associated piping and pumping equipment is subject to a TWA.

Conditions in NJPDES permits for residuals storage surface impoundments include quarterly sampling of ground water monitoring wells, procedures for routine inspection of structural integrity, spill control and emergency responses.

2. Frac Tanks

Frac tanks are required to secure a TWA when they are fixed into position. Submission requirements include detailed design and specifications including structure, piping and pumping equipment, as components of a completed CP-1 application. Operational and reporting requirements are imposed under the terms of a NJPDES permit as a potential discharge to ground water. These include, at a minimum, procedures for routine inspection of structural integrity, spill control and emergency responses. Submission requirements for the NJPDES permit include site information including, but not limited to, topography, proximity of surface water, critical areas, proximity of neighboring development, roads and plot plans. Where these installations are permanently fixed and are provided with vents to the ambient air, those vents may constitute emission points and may also be subject to air emission control permitting.

3. Slurry Tanks

A TWA must be secured for slurry tanks prior to construction or operation. The submission requirements include detailed design and specifications including structure, piping and pumping equipment as components of a completed CP-1 application. Operational and reporting requirements are imposed under the terms of a NJPDES permit as a potential discharge to ground water. These include, at a minimum, procedures for routine inspection of structural integrity, spill control and emergency responses. Submission requirements for the NJPDES permit include site information including but not limited to topography, proximity of surface water, critical areas, proximity of neighboring development, roads, and plot plans. If these tanks exceed 10,000 gallons in capacity, they are also subject to air emission permitting requirements. And if ten percent or more of the storage volume (including appurtenant pipes, fixtures and equipment) is below ground, the tank may be subject to regulatory requirements as an underground storage tank including, but not limited to, registration under N.J.A.C. 7:14B-1 et seq.

4. Tanker Trailers

As mobile equipment, tanker trailers are exempt from TWAs and are required to be registered pursuant to solid waste regulations. The vehicle that transports these trailers is also required to be registered. Operational and reporting requirements may be imposed under the terms of a NJPDES permit as a potential discharge to ground water. These include, at a minimum, procedures for routine inspection of structural integrity, spill control and emergency responses. Submission requirements for the NJPDES permit include site information including but not limited to topography, proximity of surface water, critical areas, proximity of neighboring development, roads and plot plans.

B. Installations for Dewatered Residuals Storage

Permits and approvals for bunker silos, pads and sheds include provisions for public notice to the local municipality and sewerage authority through an opportunity to endorse the project. NJPDES permits are subject to a public hearing if significant public interest is demonstrated during the public comment period.

1. Bunker Silos

Bunker silos are permanent structures for which a TWA must be secured prior to construction or operation. The submission requirements include detailed design and specifications including structure, piping and pumping equipment as components of a CP-1 Application. Designs must also include appropriate drainage structures, equipment and site modifications to control overland flow and movement of residuals out of the installation. Operational and reporting requirements are imposed under the terms of a NJPDES permit as a potential discharge to ground water. These include, at a minimum, procedures for routine inspection of structural integrity, spill control and emergency responses. Submission requirements for the NJPDES permit include site information, including but not limited to, topography, proximity of surface water, critical areas, proximity of neighboring development, roads and plot plans.

2. Pads

Permitting for pads is identical to that for bunker silos.

3. Sheds

Storage sheds are permanent structures that must secure a TWA prior to construction or operation. The submission requirements include detailed design and specifications including structure, piping and pumping equipment as components of a CP-1 application. Designs must also include appropriate drainage structures. Storage sheds generally require installation of equipment to ventilate the headspace in the shed. Details of this ventilation system must be submitted to the AQRP for a determination on necessary air emission controls and permitting. Operational and reporting requirements are imposed under the terms of a NJPDES permit as a potential discharge to ground water. These include, at a minimum, procedures for spill control and emergency responses. Submission requirements for the NJPDES permit include site information including, but not limited to, topography, proximity of surface water, critical areas, proximity of neighboring development, roads, and plot plans.

4. Roll-Off Containers

As mobile equipment, roll-off containers are exempt from TWA. However, roll-off containers, as well as the vehicle that transports them, are required to be registered with the DSWM. Operational and reporting requirements may be imposed under the terms of a NJPDES permit as a potential discharge to ground water where significant quantities are to be stored at a site in this manner. The submission requirements for roll-off container storage complexes are the same as those for tanker trailers.

Part 5. Financial Alternatives:

I. Preface:

This Part provides a thorough discussion of the approaches that can be pursued when financing the construction of various wastewater facilities. However, while the general financing concepts today may be similar to those presented in the 1987 SSMP, the financial industry has changed significantly. No attempt has been made to thoroughly update this section. Those responsible for the development and financing a wastewater treatment facility should seek the assistance of a financial consultant to determine the most appropriate financial strategy in addressing their needs.

II. Background and Introduction:

Financing the management of sludge was not a matter of great concern until the end of the 1970's. Prior to this time, hauling and management costs, primarily at landfills, were low. Today, neither is the case. Rising fuel costs, the low number of acceptable management sites, increased volumes of sludge associated with higher levels of treatment, and the public's insistence on stringent environmental controls at management operations have all combined to push the costs of sludge management beyond the reach of most pay-as-you-go local financing.

During the 1970's, Section 201 of the federal WPCA offered some financial relief to publicly operated treatment works in the form of 75% federal grant monies for planning, design and construction of water pollution control facilities. But few New Jersey treatment plants recognized the need for grant assistance for sludge management projects so, for the most part, they failed to apply for these monies. The first New Jersey 201 grant applications solely for sludge management projects did not appear on the state priority list until 1977 and 1978. This was only two or three years before the federal authorizations to the 201 program for fiscal years 1982-1985 were reduced to less than half the previous funding levels, which clearly affected the number of projects that could receive construction grant funds. Today, treatment plants are faced with mounting volumes of sludge, lack of existing management sites, and stringent environmental regulation. The public's desire for closely regulated management has resulted in a trade-off of high environmental and public health costs for high monetary costs for sludge management. This section goes beyond 201 grants, and outlines various financial approaches for implementing sludge management projects. The information presented in this part is subject to changes, both legislative and regulatory, as elected officials and the agencies attempt to respond to changing economic and financial needs. Therefore, before initiating the financial component of a sludge management proposal, the reader is advised to seek the advice of the following experts:

Authority Financing -	Bureau of Authority Regulations Division of Local Government Services 363 West State Street CN 800 Trenton, NJ 08623
Budget Caps -	Bureau of Financial Regulatory & Assistance (same address as above)
Municipal & County Contracts and Procurement -	Bureau of Local Management Services (same address as above)
Bond Laws -	Consult your Bond Counsel
Tax Laws -	Consult your Tax Attorney
201 Construction Grants -	Municipal Wastewater Assistance Program CN 029 Trenton, NJ 08625
Environmental Trust Act Loans -	Bureau of Program Development Municipal Wastewater Assistance Program (same address as above)
Farmers Home Administration Financing -	Farmers Home Administration The Washington House 100 High Street, Suite 100 Mt. Holly, NJ 08060

III. State Policy Regarding Financing of Residuals Management:

A. Effective March 12, 1982, all domestic treatment plants in New Jersey were notified of the regulatory requirements for proper sludge management and the estimated costs of proper management at that time. They were also advised, that effective with the March 12, 1982 notice, they were expected to budget for proper management of sludges. Insufficient funds would not be accepted by the department as grounds for exemption from proper management requirements.

B. The department encourages creative solutions to financing for sludge management facilities within the constraints of the various laws and regulations discussed in the public, private, and mixed financing alternatives portions of this Part.

C. The present responsibility for financing the planning, design, and implementation of sludge management operations rests jointly with the sludge management district under the SWMA (N.J.S.A. 13:lE-1 et seq.) and the treatment plants themselves under the NJPDES. It is, however, the policy of the department that regional solutions shall be encouraged on a sludge district-wide basis as a generally more cost effective approach to sludge management problems. It is the department's policy to utilize existing infrastructure in sludge management facilities and equipment to the maximum possible extent. Pooling facilities will eliminate the need for financing redundant dewatering, stabilization, and other management equipment. Associated savings may be realized with expansion of existing facilities and operations and through economies of scale.

D. It is the department's position that in many cases the true costs of wastewater treatment have not been borne by many users. In some cases user costs have been kept low by failure to allocate a sufficient percentage of annual treatment plant budgets toward necessary maintenance, expansion, upgrading and rehabilitation. With respect to sludge management costs, user costs have not included costs for post-closure management of landfills or capital set aside for construction of incinerators, or purchase and replacement of land application or composting equipment. The department endorses efforts of sludge generators to build capital reserves into annual budgets to prepare for future expenses, and as may be required by regulatory agencies.

E. Finally, it is the department's position that user costs imposed on customers should be fair and just, and reasonably imposed on authority members and customers alike. Consideration should be allowed for capital investments and bonded project expenditures borne by authority members through the planning, design, permitting, and construction periods during which time waste flow revenues are not available. Liabilities for enforcement actions during project operation should also be considered when developing customer costs. Where sludge management/treatment operations indicate an interest, the department strongly recommends that customer participation in sludge management projects be offered the long-term security of owner/members through the purchase of or contracting for a portion of the total processing capacity of the project, as is the practice with sewage flows to treatment plants. Such customer participation may help to defray the costs of operating projects which exceed the initial needs of owner/member participants or where anticipated development never occurs. Thus, facilities/operations will be made available to a greater number of sludge generators. The department further recommends those customer arrangements be incorporated into the DSMP.

IV. Alternative Financing Methods for Implementing Sludge Management Programs:

Financing of sludge management programs must begin with the planning stage and continue through design, construction, and operation. The funding approaches can be divided into three major categories: full public financing by the public operating agency, full private financing as a strictly commercial venture, and a mixture of public and private funding.

A. Public Financing

1. Types of Financing Arrangements

There are four mechanisms for a public body to finance a sludge management program: Pay-as-you-go, Bonding, Grant Programs, and Loan Programs.

a. Pay-as-you-go

As the name implies, this approach requires the public body to appropriate sufficient funds for the sludge program on a yearly basis as the need arises. Where projects are small and are not technology intensive, such an approach may be feasible. For example, incinerators are high technology solutions with high costs, and it would be unrealistic to pursue incineration with pay-as-you-go financing. Pay-as-you-go approaches are, also, usually not conducive to implementing long-term (20-year capacity) programs. But a modular approach to program implementation may lend itself more readily to the pay-as-you-go financing. Under this scheme, the public body implements a small project which is affordable with present capital on hand. Expansion is then accomplished as necessary and as money permits. Capital for future or large expansions or large expenditures can be developed through accumulating annual appropriations into a capital improvement account.

b. Bonding

Traditionally, local utility projects have been financed and owned by a local governing unit through the issuance of bond obligations by the local governing unit to pay for the cost of the project's construction. Under the internal revenue code, the income from the obligations of the local governing unit is exempt from federal taxation, and in most states is exempt from state and local taxation as well, if they are obligations of an in-state governmental unit. Depending on its powers under enabling legislation, a public body may issue general obligation bonds or revenue bonds to raise necessary capital for capital facilities. The discussion that follows defines these types of bonds, and addresses bond marketability and security (seek the advice of bond counsel for further information).

1) **Definitions:**

    a) **General Obligation Bonds (GO)**: These are long-term tax exempt bonds guaranteed by the local tax base. Retirement of GOs is pledged through the full faith and credit of the local tax base. The power of the local body to levy ad valorem taxes for bond repayment secures the bond; they are not secured by the project itself. Therefore, this type of bonding is applicable only to counties and municipalities. However, a county or municipality can issue GO's and either lend or donate the money to a utility authority. If the GO exceeds the borrowing capacity of the county or municipality, it must be approved by the local finance board.

    b) **Revenue Bonds:** These are long-term tax exempt bonds. Retirement of revenue bonds is accomplished through the power of the public body to raise money through fees for use of the bonded project. Therefore the bond is secured by the revenues promised through operation of the project. This form of bonding is applicable to authorities, counties, and municipalities. Such bonds are subject to the review and recommendation of the local finance board.

2) **Bond Marketability:** In addition to these bonding mechanisms, authorities have credit enhancement vehicles available to them to improve the salability of their revenue bonds. These include agreements between the taxing power entities and the authority. These agreements provide that the taxing power of the municipality/county will be made available to the authority if actual revenues from the project fall short of bonding obligation needs. This approach is called a double barrelled obligation, and it makes the bond issue very attractive from a marketing standpoint. Beyond the financial mechanisms for improving bond salability, the nature of the project can affect the salability of the bonds. Where the public

perceives great risks to be associated with the success of the project, marketability is adversely affected.

3) **Bond Security:** In addition to marketability, the soundness of a bond issue is related to whether the lender has the necessary assurances that the public body (municipality, county, authority) is legally bound to meet its commitments to retire the bonds. Within this frame of reference, it is extremely important to the lender that the public body have the statutory power to finance the project and issue bonds for financing the project. Under New Jersey statute, only utilities authorities and county improvement authorities have explicit statutory powers to issue bonds for sludge project, sites, or equipment that will serve regional and customer needs. Sewerage authorities do not have explicit powers to issue bonds for sludge projects; the sewerage authority statute covers sewerage but was never amended to explicitly cover sludge. Although the statute can be liberally construed to cover sludges generated by the facility, customer sludges are sufficiently beyond the scope of the statute to raise concerns regarding the binding commitment of the sewerage authority to retire the bonds.[4] Bonding for implementation of new facilities or operations, which rely on revenues from foreign sludge flows, is not to be confused with customer usage of excess capacity at an existing sewerage authority facility. Under the latter circumstances, where there is no increase in the physical plant structure, and no new bonds are floated, there would be no threat to bond security. Finally, where bonds are issued for construction of projects to accommodate a contract customer arrangement as distinguished from a membership arrangement, the bond security is enhanced by a contract that binds the customer for the length of the bonding term.[5]

c. Grant Programs

For the last 15 to 20 years, federal grant programs have been the mainstay of sewerage project financing. The most publicized of the grant programs has been the 201 grant program under section 201 of the federal CWA. The federal government also provides grants through the FmHA. Although these grant programs still remain in the text of public law, budget

[4]Kraft and Hughes, Esqs., Bonding Counsel advising the Sludge Task Force.

[5]Municipalities are accustomed to 40-year bonds for sewers and one year contracts for removing sludge. The Bond Act may restrict sludge bond terms to 15 years, and the Contracts Law permits only 25-year contracts for solid waste recycling in conformance with a solid waste management plan. However, the Privatization Law of 1985 for wastewater treatment facilities (including sludge management) permits contracts up to 40 years in length, and the McEnroe Law, P.L. 1985, c. 38 provides for resource recovery projects with solid waste (co-disposal) with 40-year contracts.

allocations to implement them have been greatly reduced in recent years. Unfortunately, the curtailment of these grant programs come after the upgrading of primary treatment plants to secondary and higher treatment levels but before those upgraded treatment plants had come to grips with the management problems associated with vastly increased volumes of sludge. Now, as the magnitude of our sludge management needs becomes apparent, the future of grant assistance as a revenue source for sludge project implementation is uncertain given the general cut-backs in government funding in the 1990's. The federal grant programs are addressed below with the understanding that federal allocations to these programs are insufficient to meet present sludge management needs, and their future availability is uncertain.

1) **201 Grant Program:** Construct grants provide for 55% of the cost to construct the project plus an allowance to help defray the costs for planning and design of the project based on a percentage of the construction cost. For projects that involve an innovative or alternative technology, an additional 20% funding (a total of 75%) is available if the project meets the definition of "Innovative or Alternative" under the 201 program's methodology as presented in the 201 Innovative and Alternative Technology Assessment Manual (MCD-53). Those contemplating pursuing an innovative and/or alternative sludge project through the 201 program should be cautioned to examine the eligibility criteria for such a grant early in the planning stage, and should consult the 201 Innovative and Alternative Technology Assessment Manual and the department staff for a detailed evaluation. Projects are eligible for funding on a priority basis based on criteria of demonstrated need including affected population, water quality impacts, water quality uses, etc. Bonus points are awarded for innovative technology on population differences.

   A project constructed under the 201 grant program must be the most cost effective, environmentally sound and implementable project to handle the 20-year needs of the study area based upon a present worth analysis. Projects are reviewed by the department to assure compliance with these regulatory requirements. Irrespective of funding for Steps I and II, the project must still be processed through department review and approval of the plan of study, architectural and engineering contracts, facility plan, and construction plans and specifications before grant issuance. In addition, it must be high enough on the priority list to be within reach of the limited funds available (within funding range). For further information contact the department.

2) **FmHA Development Grants for Waste Disposal Systems**: Projects financed by the FmHA, shall primarily serve rural residents. The terms rural and rural areas shall not include any area in any city or town having a population in excess of 10,000 inhabitants according to the latest decennial census. Projects serving both rural and urban areas may be eligible for FmHA funds to finance only that portion serving rural residents regardless of facility location.

   In addition to the project's serving a rural area, the public body applicant must have the legal capacity and authority granted by statute to own, operate and maintain the project. The median family income of the service area must also be less than 85% of the New Jersey non-metropolitan median family income, for an applicant to be considered for FmHA grant assistance. Grant funds may be used to install and improve sanitary sewer facilities including treatment plants; solid waste management projects including those for the collection, treatment or management of human, animal, agricultural and other wastes; purchase or rent equipment; acquire land and rights; services and fees; and the FmHA grant may not exceed 75% of the eligible project development cost. Grant funds may not be used to pay annually recurring operation and maintenance expenses; purchase existing systems; refinance existing indebtedness; or pay interest. Grants will be used for projects serving the most financially needy communities to reduce user costs to a reasonable level for farmers, ranchers, and rural residents.

   FmHA grants are usually made in conjunction with FmHA loans but may be used on projects where other types of financial assistance are available provided the other assistance is at reasonable rates and terms. Pre-applications for grant assistance may be made at the FmHA county office or district office serving the county in which the applicant is located. Pre-applications can be filed at any time during a fiscal year. Eligibility and priority scores are determined by FmHA within 45 days of filing. Funding is dependent on the availability of funds at the time of grant approval. However, it is current policy for FmHA assistance to be part of a joint funding package of federal, state, and commercial assistance for any project.

   FmHA coordinates closely with the 201 grant program during their application review period. Every attempt is made to prevent conflicts between the two programs. (For example, project segments being funded by FmHA after they had been determined to have adverse environmental impacts under the 201 grant program.) For further information contact the FmHA.

3) **Housing and Urban Development Grants:** The federal Department of Housing and Urban Development and the New Jersey Department of Community Affairs administer the community development block grant program, which is directed toward benefiting low and moderate income families in primary metropolitan areas. In New Jersey, 29 municipalities and nine counties were designated as entitlement areas prior to 1987 and were allocated grant monies under the Community Development Block Grant Program; entitlement areas may choose to use part of their grant monies toward sludge management.

4) **L. 1985, c.38:** Certain sludge management projects (i.e. those that co-manage sludge and MSW) may be considered resource recovery facilities. Where this is the case, development of such projects may fall under the requirements of this act. The act also establishes procedures which local government units may use to enter into long-term (40-year) contracts with private firms for the provision of resource recovery services. The revenue source for these grant funds is a tax levied against landfilled solid waste. Grant money is distributed based on the solid waste management needs of the county. L. 1985, c.38 provides for two sources of funds for use by districts in development of resource recovery facilities:

    a) **Solid Waste Services Tax Fund:** The monies from this fund provide state aid to counties for the preparation, revision and implementation of solid waste management plans; and

    b) **District Resource Recovery Investment Tax Fund:** These monies are to be expended by the district only after approval of a DSMP amendment outlining the proposed use of the monies, for the purpose of reducing rates charged to users of resource recovery facilities. These grants are processed through the DSWM. Currently available grant monies are small and must be distributed among 22 solid waste management districts. For more detail, refer directly to the statute and contact the DSWM.

d. Loan Programs

Two loan programs currently exist but are restricted to rural or agricultural communities (Farmers Home Loan Assistance Program and the Rural Community Assistance Program) and a third loan program is the Environmental Trust Fund. These are discussed below.

1) **FmHA Community Facility Loans for Waste Disposal Systems Facilities:** financed by FmHA shall primarily serve rural residents.

The terms rural and rural areas shall not include any area in any city or town having a population in excess of 10,000 inhabitants according to the latest decennial census. Facilities serving both rural and urban areas may be eligible for FmHA funds to finance only that portion serving rural residents regardless of facility location.

In addition to the facility serving a rural area, the public body applicant must have the legal capacity and authority granted by statute to own, operate, and maintain the facility. Also, applicants must certify in writing, and FmHA shall determine and document, that the applicant is unable to finance the proposed project from their own resources or through commercial credit at reasonable rates and terms.

Loan funds may be used to construct or improve sanitary sewerage and sludge management facilities and operations; pay for reasonable fees and services; pay interest; purchase existing facilities with FmHA concurrence; acquire land and rights; purchase or rent equipment; pay for initial operating expenses; refinance debts subject to certain conditions; and pay obligations for construction incurred before loan approval subject to certain conditions. Loans are scheduled for repayment on terms within the useful life of the facility but no longer than 40 years from the date of the bond or note. Interest rates are set by FmHA at least for each quarter of the fiscal year.

a) **Market Rate:** This rate is determined quarterly based on the bond buyer index and applies to those applicants whose median family income exceeds 85% of the New Jersey non-metropolitan median family income.

b) **Intermediate Rate:** This rate equals the poverty line rate plus one-half the difference between the poverty line rate and the market rate. The rate applies to those applicants who do not qualify for the poverty line rate and for which the median family income of the service area is less than 85% of the New Jersey non-metropolitan median family income and greater than the poverty line.

c) **Poverty Line Rate:** This rate will not exceed 5%. It applies to loans where the primary purpose of the loan is to upgrade existing facilities or construct new facilities required to meet health or sanitary standards; and where the median family income is below the poverty line for a non-farm family of four, as prescribed by the Office of Management and Budget. The applicable rate is determined at the eligibility stage but the actual rate is determined at the time of loan approval. (i.e. The applicant qualifies for the intermediate rate which cannot be fixed until the loan is approved and funds are obligated.) For the current poverty line contact the FmHA.

Loans to public bodies are secured by the full faith and credit of the borrower when the debt is evidenced by general obligations for municipalities and counties, and/or pledges of taxes or assessments and/or pledges of project revenue evidenced by revenue bonds for authorities. Sludge management projects will be secured by bonds pledging sludge management revenue, only when the revenue pledged includes that from the sludge project plus revenue from other facilities of the applicant with tie-in enforcement rights, or by the taxing power of participating local governments. Joint funded projects where security is to be shared, requires a parity position with FmHA and the other lender. Pre-applications for assistance may be made at the FmHA county office or district office serving the county in which the applicant is located. Pre-application can be made at any time during a fiscal year. Eligibility and priority scores are determined by FmHA within 45 days of filing. Funding is dependent on the availability of funds at the time of loan approval. It is current policy for FmHA assistance to be a part of a joint funding package of federal, state and commercial assistance for any project. For further information contact the FmHA.

2) **Rural Community Assistance Program:** This program is an offering of a nonprofit private corporation, Rural Housing Improvement, Inc. which operates out of Winchendon, Massachusetts. The program administers the Housing Assistance Council Pre-Development Loan Fund for the northeastern region of the country. Loans through this program are available to lower income rural municipalities with populations under 10,000 where a need is defined by a threat to health and safety. Only pre-development costs are eligible, and these may include preliminary engineering studies, site easements, test well drilling, soils and water investigations, legal expenses and various other planning related activities. In addition, these loans can be used for interim financing of local shares of USEPA Grants. Loans are available for amounts ranging from $2,500 to $10,000. Low interest is charged on loans plus a small percent service charge. However, there is a two-year deferment on loan payback.

   Other services to low income rural communities are, also, offered through the Rural Community Assistance Program (RCAP) in the form of training and technical assistance. These services are provided at no cost to the municipality. On request, RCAP offers both general and technical training to individuals, groups, and municipalities on subjects related to sludge management such as wastewater technology, system financing, and operation and maintenance. RCAP technical assistance may take place at any step in the development of the wastewater project. RCAP staff provide technical assistance in engineer selection, engineering study review, and needs assessment, in addition to preparing federal and state financial applications.

3) **The New Jersey Wastewater Treatment Trust Act and the Wastewater Treatment Bond Act of 1985:** This program was passed by statewide referendum in the November 1985 election. The Trust Act restricts financing opportunities to environmental projects. This program creates a streamlined state financing authority empowered to maximize the use of available state and federal funds for construction costs with allowance for planning and design of wastewater treatment systems (includes sludge management projects). The trust was capitalized with proceeds of state general obligation bond issues, and related revenues. It provides low-interest loans to local government units from both its equity capital and from additional revenues generated through the issuance of trust revenue bonds backed by partial use of its equity capital and pledge of its loan repayment. The current proposal would authorize $300 million of debt for wastewater projects (includes sludge management projects) over a three-year period which would be loaned to local entities in accordance with a priority list developed by the department each fiscal year and approved by the state Legislature.

4) **The Resource Recovery and Solid Waste Facility Bond Act of 1985:** This program was passed by statewide referendum in the November 1985 election and is analogous to the Wastewater Treatment Trust Act discussed above. The act appropriated monies which are available for funding operations which manage sludge along with solid waste, (i.e., co-incineration or co-composting).

2. Rules, Regulations and Statutes Controlling Public Financing of Sludge Projects

All public financing is under the jurisdiction of five basic areas of regulatory control: local public contracts law, local bond law, local fiscal affairs law, local budget law, and the newly enacted local authority fiscal control law. The Division of Local Government Services in the Department of Community Affairs administers the regulatory and assistance programs associated with these laws. In addition, financing power is limited by spending and bonding authorizations as stated in the enabling legislation for the particular public body. These areas of financial regulation are discussed below. For more detailed information contact the Division of Local Government Services.

a. Local Public Contracts Law (N.J.S.A. 40A:11-1 et seq.)

This law addresses bids, purchases, contracts and agreements, joint purchasing agreements, specifications and the form of the contract. One of the principal features of this law is that most contracts with a value in excess of $7500 (the bidding threshold) are subject to public bidding requirements whereby the lowest bid by a responsible bidder must be accepted. Public entities work within the framework of this law on a routine basis and therefore, it will not be discussed in detail. However, the section of this law (40A:11-15) that deals with the duration of contracts is of particular interest to sludge management. In general this provision limits public contracts to a 12-month duration, but there are several exceptions to this 12-month limitation which permit longer contracts. Currently, four of these exceptions have partial applicability to sludge management (legislative revisions may provide for additional exemptions).

1) The recycling of solid waste, for any term not exceeding 40 years, when such contract is in conformance with a solid waste management plan approved pursuant to the SWMA and with the approval of the Division of Local Government Services and the department (40A:11-15(17)).

2) The construction, reconstruction or rehabilitation, including architectural and engineering services, of any single public works project for the time period necessary to complete actual construction.

3) The leasing or servicing of equipment of any kind for a period of three years or less, provided that such contracts are in compliance with the rules and regulations of the Division of Local Government Services.

4) As an included component of wastewater treatment systems, under 40A:11-15(19) 40-year contracts are permitted for sludge management facilities and operations.

b. Local Fiscal Affairs Law (N.J.S.A. 40A:5-1 et seq.)

This law governs the day-to-day financial operations of the local governing unit. It deals with the designation of auditors and depositories, the requirements for financial statements, and approval of payments and deposits of public monies. It has very little applicability to sludge management implementation beyond the routine operations of the local governing unit.

c. Local Bond Law (N.J.S.A. 40A:2-1 et seq.)

The powers and restrictions of the local bond law are extremely important to implementation of sludge management projects. This law gives counties and municipalities the power to borrow money by issuing bonds for legally approved purposes, provided the amount of the debt does not exceed 2% for counties and 3½% (these percentages may be changed by the Legislature from time to time) for municipalities of the net equalized valuation of real property in accordance with the supplemental debt statement. The New Jersey Local Finance Board must approve all debts in excess of these limitations.

It is anticipated that the cost of sludge management projects will exceed these debt limits in many cases. Therefore, it is important to identify the exceptions to the debt limitations which might be applicable to sludge project implementation. The bond law lists several exemptions to the debt limitation; of these exemptions, a local governing body can find the best opportunity for sludge projects in the provision for the local governing body to determine that a project is necessary with subsequent passage of an ordinance of endorsement. Excess debts incurred for the purpose of infrastructure projects, such as sludge projects, are in most cases acceptable to the local finance board. Therefore, the bonded indebtedness limitations do not appear to present an insurmountable obstacle to bonding for implementation of sludge projects.

One other provision of the local bond law which impacts on sludge project implementation is related to the maturation of bonds and the useful periods of facilities to be bonded. The bond law requires bond issues to mature in the average period of the useful life of a project. Although the law identifies useful life for a number of projects, sludge projects are not among them. The law mentions sewerage systems with a useful life of 40 years and garbage incinerators and disposal plants of 25 years, but it does not explicitly mention sludge facilities or operations. Therefore, most sludge facilities or operations appear to fall within the broad category of "any unmentioned purpose," and for these the bond law assigns a useful life of 15 years. This shortened term may pose a problem for local governing units striving to maintain low user costs for their residents.

d. Local Budget Law (N.J.S.A. 40A:4-1 et seq.)

This law governs the form of county and municipal budgets. It identifies specific items that must be included in the local budget including provisions for a capital budget. It details the approval process, and defines the assessment and appropriation procedure. But the provision of the budget law, which has been of greatest concern to local units faced with rapidly increasing costs for sludge management, is the section of the law known as the Budget Cap Law.

The cap law was enacted in 1976 as part of what is commonly referred to as the "State Income Tax Package." The purpose of the cap law is to assist in controlling the spiralling costs of local government in order to protect the homeowners from undue local real estate tax increases. The cap law prohibits municipalities, other than those having a municipal purposes tax levy of $0.10 or less per $100.00 of assessed valuation, from increasing their budgets by more than five percent of the preceding year's appropriations. Similarly, counties are prohibited from increasing their respective tax levies in excess of five percent of the preceding year's tax levy. (Note: the Legislature may from time to time amend these dollar values and percentages.)

The cap law recognizes that efforts to limit local government spending should not render it impossible for local government to provide necessary services to their residents, and to that end, provides certain specified exemptions to the five percent limitations. The applicability of these budget cap exemptions to implementation of the SWMA of which sludge management planning is a component, is discussed in two formal opinions from the Attorney General (Opinions #3 1977 and #16 1979). The substance of those opinions is presented below:

1) **Cap Exemption for Expenditures Mandated After the Effective Date of the Cap Law Pursuant to State or Federal Law:** Approval for such expenditures requires that the expenditure appear in the "excluded from the cap" section of the local budget with the appropriate explanation that the expenditure is mandated after the effective date of the cap law (1976). With respect to sludge management, the SWMA was amended to require sludge planning after the enactment of the cap law.

2) **Cap Exemption for Local Government Expenditures for Use, Services or Provision for any Project, Facility or Public Solid Waste Improvement Pursuant to a Contract between Public Bodies:** Approval for such expenditures requires that the expenditure

be shown in the "excluded from the cap" section of the local budget with the appropriate exemption reference for an Interlocal Service Agreement and passed on to the Division of Local Government Services for approval. This exemption is available to local governmental units to exclude substantial portions of their budgets for solid waste services from the Cap Law limitations.

3) **Cap Exemption for New or Increased Service Fees Imposed by Ordinance:** This exemption is available to municipalities but not to counties. This exemption will appear as an add-on to the "cap" base. It provides for relief from cap limitations if the exemption shown in the budget is derived from new or increased service fees developed by ordinance. Thus any such fees for sludge management could be expended without limitation in implementing a SMP under the provisions of the SWMA.

4) **Cap Exemption for Municipal Matching Funds for State or Federal Aid Programs:** Provided that a municipality does not increase its final appropriation by more than 5% above the previous year's budget, a municipality may spend the amount necessary to secure state or federal funding for implementing a solid waste (sludge) management plan. Such budget expenditures are indicated in the budget with the appropriate explanation and passed on by the Division of Local Government Services.

5) **Cap Exemption for Expenditures by Referendum:** Under any circumstances the cap law permits a local government to make expenditures over the cap limit if approved by referendum. Hence if the voters determine the expenditures are necessary to implement a solid waste (sludge) management plan, that expenditure is excluded from the cap law.

6) **Cap Exemption for Capital Expenditures:** Under this exemption a local government could construct a sludge project financed through bonding without being subject to cap law limitations. Further, the debt service on such bonds would, also, be exempt from the cap law for both municipalities and counties.

7) **Cap Exemption for All Debt Service Incurred:** This provision provides for exemption for municipalities for debt service but does not apply to counties.

It is apparent, therefore, that sufficient exemption opportunities exist so that the cap law does not present an impregnable barrier to implementation of sludge management programs. For more detailed information please contact the Division of Local Government Services.

e. Local Authorities Fiscal Control Law

This law expands state regulatory authority to cover authorities. Among other things, the statute requires authorities to make annual budget submissions to the Division of Local Government Services for approval. Total budgeted appropriations must not exceed anticipated revenues. In addition, authorities proposing to undertake capital projects must, also, submit capital budget and capital program detailing the nature of proposed capital projects. Authorities anticipation the need to implement sludge projects should incorporate such capital expenditures in their capital programs pursuant to this law.

f. Powers and Authorities under Enabling Legislation

Despite the counties' mandated responsibility for sludge management planning under the SWMA, SMPs and projects can, in practice, be implemented by a wide variety of public bodies in accordance with the statutory powers and authorities of the particular body. The powers of candidate sludge management agencies have been researched and it has been determined that there are two categories of candidate agencies: those with explicit statutory authority to issue bonds for implementing sludge management projects, and those whose statutory language does not specifically reference sludge but which may be utilized after a case-by-case analysis.

1) Agencies with Explicit Statutory Authority to Issue Bonds for Implementing Sludge Management Projects:

a) Municipal and County Utility Authorities (N.J.S.A. 40:14B-1 et seq.)

b) County Improvement Authorities (N.J.S.A. 40:37A-44 et seq.)

2) Agencies Whose Statutory Language Does Not Specifically Reference Sludge But Which May Be Utilized For Implementing Sludge Management Projects on a Case-by-case Analysis:

a) Sewerage Authorities (N.J.S.A. 40:14A-1 et seq.);

b) Counties (N.J.S.A. 40:66A-31.1 et seq.) - County Solid Waste Disposal Financing Law;

c) Incinerator Authorities (N.J.S.A. 40:66A-1 et seq.);

d) County Industrial Pollution Control Financing Authorities (N.J.S.A. 40:37C-1 et seq.); and

e) Municipalities (N.J.S.A. 40:63-1 et seq.) - Sewers, Drains and Disposal Plants Legislation.

g. Other Regulatory Controls on Public Financing

Dependent on the funding source for the particular sludge management project, additional state and federal grant and loan programs are all regulated by statutory and regulatory requirements that restrict applicant eligibility, project eligibility, procurement and various other aspects of the financial agreement. Where state and federal funding is to be used for sludge management projects, applicable statutory and regulatory requirements must also be met.

B. Private Financing

When a private entity finances a sludge management project, under current tax laws, economic benefits may accrue in the form of depreciation, tax free interest to bond holders, and tax deductibility of interest expense. In some cases energy credits are also available. These benefits may allow the private entity to charge lower user fees than a public entity would have to charge if it were to implement the project itself without grant money. In addition to these tax related savings, the private sector can realize capital cost savings by: negotiated construction contracts as opposed to procurement procedures imposed on public entities; more realistic project design capabilities; and the ability to move quickly and thereby reduce the cost impacts of inflation on the project.

1. Types of Privately Financed Arrangements for Sludge Projects:

Private management facilities/operations for both sewerage and solid waste have served the public's needs for many years. In the area of sludge management, commercial landfills were the traditional form of privately financed facilities. Recently, a number of private interests have been approved to operate sludge land application sites. Land application at farms is a NJPDES permitted operation and does not require a solid waste registration. Although private incineration projects would also be conceivable, the high cost of such projects, and the risks associated with securing necessary permits and meeting projected performance levels have been significant deterrents to private investment. Two private incinerators were constructed in New Jersey with the permitted capability to handle sludge along with other solid waste. However, rates charged at these incinerators are not competitive with other public and private sludge management facilities and operations, because their rates are structured to include hazardous waste manifesting and/or other special approvals. Commercial composting projects represent still another type of privately financed sludge management project with great promise for solving some of the state's needs. Although no such projects have been implemented to date, the low capital cost, the low risks associated with such projects, and the great demand for sludge management alternatives makes them an attractive investment opportunity. Unlike the variety of public financing alternatives, private financing does not offer a number of alternatives beyond the conventional bonding and security offerings available to the private sector. An exception is the industrial development bond which is available through the New Jersey Economic Development Authority under arrangements with the commercial banking industry.

2. Rules, Regulations and Statutes Affecting Private Financing of Sludge Projects

By definition, private financing is exempt from the jurisdictions of the Local Public Contracts Law. However, other legislation at both the state and federal level provides a mix of financial constraints and opportunities for the private entity. The areas of regulation are found primarily within the tax laws and the Board of Public Utilities (BPU) regulations. For detailed information on these citations please contact your tax lawyer or the BPU as appropriate.

a. Tax Laws

These laws affect private financing of facilities in 4 areas: tax exemptions on interest paid on a debt which is used to finance a facility, depreciation deductions, energy tax credits, and deductibility of interest expense. As a result of ongoing Congressional changes to the tax laws, this section is reserved until statute and regulation is finalized and evaluated.

b. Board of Public Utilities Laws

These laws are narrowly construed to relate to only those private activities specifically addressed in the statutes. With respect to privately owned and financed sludge facilities or operations, BPU jurisdiction extends to private incinerators or resource recovery facilities. The BPU regulation of these industries relates to designation of their franchise areas and rate setting. Private companies involved in these activities are defines by New Jersey public utilities legislation as "Public Utilities." Their definition as public utilities by the New Jersey statutes is not to be confused with "public utility" designation under the internal revenue code. New Jersey public utility regulation does not identify land application of sludge or composting of sludge as private enterprises subject to BPU regulation. With respect to BPU involvement in determination of resource recovery (incineration with energy recovery) facility franchise areas, revenues from energy generation, and rate setting, the specific nature and extent of BPU regulation is detailed in "Findings and Conclusions of the BPU/DEPE Generic Proceedings of 1983". For additional information on BPU regulation please contact the Board of Public Utilities now merged into the DEPE.

C. Mixed Private and Public Financing

A blend of public and private financing enables a local government unit to negotiate the construction of a project with a private developer. As long as a sufficient amount of capital is placed at risk by the private entity, the private entity can utilize tax benefit features which are provided for the private sector. Generally, this tax structure provides a tax benefit to the private sector.

Because of tax benefits and other economies available to the private sector, a private entity can often build and operate a sludge project at a lesser net cost (in the absence of significant grants) than a public entity. Therefore, the private firm can pass these benefits on to users tin terms of lower rates, with some of the tax benefits being retained by the private entity as his profit. Since the local governmental unit does not directly pay taxes to support this process, such tax benefits would be lost if they were not utilized by the private entity. Advantages of privatization are summarized in the list which follows:

- Provides a timely answer to environmental and economic development needs.

- Minimizes federal and state involvement in local affairs.

- Permits greater flexibility in key factors such as flow-matched sizing of the treatment works, billing users for services provided, and avoids indirect costs of grant administration and potential headaches of grant audits.

- Privatization may provide 100% funding of sludge facility/operation construction costs, thereby preserving local debt capacity for other essential purposes. The 201 grant program in contrast provides a percentage of funding for eligible costs only (eligible costs equal low bid construction cost).

- Tax benefits which the private sector is capable of using should result in lower user fees than local debt financing would necessitate.

- Opportunity for community/private sector organization to work together toward the issuance of industrial development bonds that would further lower the interest cost financing by the private sector, and, may in fact equate the interest rate borrowing cost of the private group with that of the local community.

- For many communities proper operation and maintenance of sludge or sewage treatment projects is best achieved through private sector contractors. Community difficulties include pay scales to attract and retain key technical talent and limited career growth opportunities.

- Private sector should have opportunities to experience significant economies of scale in operation of multiple facilities, thereby resulting in lower user fees for operation and maintenance compared to even the best run Publicly Owned Treatment Works. Reasons include factors such as:

  - Ability to share licensed operators among multiple plants.;

  - Ability to centralize/consolidate common services such as preventative maintenance, accounting and administration, laboratory services, spare parts, etc.;

  - Ability to bulk order chemical supplies and other essential common commodities; and

  - Profit incentive for cost/efficient operations and search for revenue generating capability of treatment plant resources in addition to local user fees.

When a public entity considers the privatization potential of a sludge management project the following factors should be analyzed:

- The nature of the sludge management needs; the technologies available the meet those needs; the potentially qualified firms to provide the service; the impacts to the community that may result;

- The variety of forms of privatization that could be used (these will be discussed below); and

- The legal, institutional and regulatory factors.

More detailed discussion is presented in the "Privatization Study" as prepared for the department by Arthur Young and Co. and Bear Stearns and Company, investment bankers. Those seriously interested in pursuing private participation in their sludge management project, are directed to this report that shall be included as part of this section by reference. Additional information on privatized financing can be obtained from the Division of Local Government Services.

1. Types of Financial Arrangements which Mix Public and Private Monies

There are a large number of public/private financial arrangements that can be utilized to implement a sludge management project. In order to assure successful financing utilizing equity, contractual arrangements governing the operations of the sludge facility must be carefully structured to preserve the potential tax benefits to the private owner/operator. One major issue if identification of the entity(ies) that bear the risk and reap the benefits when operating costs increase or decrease of when resource recovery revenues increase or decrease. In order for a private entity to be considered the beneficial owner for tax purposes, the public entity(ies) must be considered to be receiving a "service" from the sludge facility/operation, not be "using" the facility/operation. In order to so qualify, contracts between the private entity and public entity must generally be based on a fixed fee (plus inflators), rather than on a cost-plus-fixed-fee basis. The three general types of public/private financial arrangements are presented below:

a. **Leaseback** - A private entity finances and builds the project to community specifications, and then leases it back on an annual basis to the public entity to operate. The community does not incur long-term debt or issue bonds. The private firm realized the depreciation tax benefits.

b. **Turnkey** - An agreement between public and private entities by which the public entity buys the principal components (i.e. architectural and engineering services and project construction) as a single package, but does not take title to the project until after the system has passed a performance test.

c. **Sale with Operations is Whole or In Part by the Private Sector** - This is similar to the leaseback arrangement, only the private sector owner also operates the sludge project, making the private entity eligible for all tax benefits including ACRS and investment tax credits. Ideally the lower costs are passed on toe the municipality through lower service fees.

d. **Full Service** - A private entity fully finances, builds and operates the project (see Section II.B. "Private Finances" of this Part).

2. Rules, Regulations and Statutes Affecting Public/Private Mixtures of Financing Sludge Facilities

a. New Jersey Wastewater Privatization Act

The regulatory requirements and benefits for public/private financing mixtures combine the responsibilities and provisions under both public financing and private financing. Those wishing to pursue mixed public and private financing will also be required to comply with the regulatory requirements detailed in the New Jersey Wastewater Privatization Act of 1985 which amended P.L. 1971 c. 198 supplementing Title 58. This statute, was specifically enacted to enable such public/private partnerships for wastewater and sludge management. Pursuant to this statute, an integrated state agency review of contracts for privatized sludge facilities is required. In general terms this law provides the following:

- At least 60 days before issuance of a "Request for Qualifications" (RFQ) the local entity (county, municipality, sewerage authority, utilities authority, etc.) must formally notice the Division of Local Government Services (Department of Community Affairs), the department and the Department of the Public Advocate of its intent to issue an RFQ. The local entity is advised to meet with the DEPE prior to formal RFQ notice to discuss alternative management options.

- The local entity issues the RFQ describing general services and minimum qualifications for private vendors. The RFQ issuance must be noticed in one trade journal and one local newspaper.

- The local entity must prepare a list of qualified vendors stating criteria for selection and publish the list in the same publications as per the notice of RFQ issuance above.

- The local entity must send out a "Request for Proposals" (RFP) which details the services, proposal format and procedure, and specific information vendors must provide in their proposal and sets the deadline for proposal submission.

- The local entity reviews proposals and selects vendors. The selection must be notices in a newspaper of general circulation.

- The local entity negotiates a proposed contract with the vendor, according to Local Public Contracts Law. The contract can extend for 40 years. The proposed contract must be sent to the Division of Local Government Services, the department and the Public Advocate.

- The local entity must give a 90-day public hearing notice to the Public Advocate, consumers and interest groups.

- A public meeting must be held with consumers and interest groups 45 days after the 90-day hearing notice. The purpose of the public meeting is to explain the contract and to receive written questions for the hearing record.

- The local entity holds the public hearing; the vendor must be present. All questions must be answered and compliance with local public contracts law must be demonstrated. It must also be demonstrated that the vendor's proposal is the best solution among the alternatives. A transcript must be made of this hearing. The hearing record must remain open for 15 days following the hearing and the transcript of the hearing must be available to the public 45 days after the hearing.

- Pursuant to the hearing and comments, a revised contract must be negotiated with the vendor.

- The local entity must submit the new contract and the response to comments document to the Division of Local Government Services, the department and the Public Advocate. If there are significant changes, the local entity may be required to reinitiate another 90-day public hearing notice process.

- The department has 60 days to review, approve or conditionally approve the contract with respect to its compliance with 208 and 201 plans, discharge limitations and state and district sludge management planning. Contract revisions detailed by conditional approvals may necessitate a new hearing.

- The Division of Local Government Services, Department of Community Affairs has 60 days to review and approve or conditionally approve the contract for compatibility with the fiscal and financial capabilities of the contracting unit. As with department review, contract revisions detailed by conditional approvals may necessitate a new hearing.

- No contracts may be awarded unless both department and the Division of Local Government Services have issued their approval.

The above is not the full text of the statutory requirements, for more detail refer to the law directly. Local entities interested in developing contracts pursuant to the requirements of the Wastewater Privatization Act are advised that their contracts must include but not be limited to:

- Allocation of risks of financing and constructing the project;

- Allocation of risks associated with operation and maintenance of the permit;

- Allocation of risks from circumstances beyond control;

- Provisions for default or termination of the contract;

- Provisions for vendor operating reports and audit reports to be submitted to the Division of Local Government Services and the DEPE;

- Provision for contract renegotiation intervals;

- Provision for the local government employees affected by the contract; and

- Disclosure of the formulas and methodologies used to develop charges, rates or fees.

For further information and additional contract requirements contact the Division of Local Government Services.

b. L.1985, c.38

This act was designed to encourage joint public-private sector cooperative ventures for waste-to-energy projects. If establishes a procedure under which a local government unit may enter into a long-term contract (up to 40 years) with a private firm for the financing, engineering, construction, operation and maintenance of a resource recovery system. The procurement procedure established in this act constitutes an alternative to other contracting procedures now available to a local government unit. The act also established funds for use to districts for solid waste planning and implementation, and for reduction of rates charged to users of resource recovery facilities (see Section III.A.1.c.4 and A.2.g. of the act). For further details on the procurement procedure, refer to the act.

V. User Charges:

Financing for the sludge management project is provided by those who benefit. An equation is developed to equitably apportion those costs among the beneficiaries. This ultimately results in the assessment of user costs. The user cost equation varies from operation to operation, but, generally, has three basic components: summation of all costs; determination of the beneficiaries; and apportionment of the costs among the beneficiaries.

A. Summation of all Facility/Operational Costs

The spectrum of costs under consideration will depend upon political considerations as much as true cost considerations, and distinctions are often make between those costs which will be borne by owner/members of the facility/operation and those which will be borne by customers of the facility/operation. The universe of potential costs in the equation includes but is not limited to: capital costs; financing costs, interest, service charges, etc.; legal costs; permit costs; operational costs including power, operator salaries and benefits, chemical costs, transportation, laboratory analyses, insurance, etc.; maintenance costs including parts repair and replacement, cleaning, painting, repaving, etc.; development of capital reserves; replacement costs for parts and equipment at the end of useful life periods; consideration for use of bonding, and budget cap capability borne by owner/members; consideration of permit enforcement liabilities borne by owner members; and consideration of nuisance, aesthetic, and other factors affecting neighbors or the host municipality. There may be many other factors considered in the cost component of the user costs equation. The latter three considerations for bonding and budget capability, enforcement liability, and nuisance factors may be both subjective and political, however, they are no less real.

B. Determination of Beneficiaries

It is clear, that the beneficiaries of a project are those that directly use the project; in the case of a sewerage treatment plant those properties which are connected to the sewerage system are clear beneficiaries. However, a strong argument has been made that proper sewage management benefits the public at large by virtue of improved general environmental conditions. This line of thinking led to the passage of the funding program under Section 201 of the federal WPCA. As a result, 201 grants for construction of wastewater treatment facilities provided for a contribution from federal tax revenue in anticipation of nationwide improvements in water quality. Beneficiaries of a sludge management project may also include property owners or businesses who would be unable to sell or develop their land, or expand their business without the operation of the project. Accordingly, property values generally rise where clean efficient sludge management is available, and drop where sludge management is a problem. Hence the determination of the beneficiaries can be a complex process, and it is clear that the wider the circle of beneficiaries included in the equation, the smaller the costs will be for each individual user.

C. Apportionment Among the Beneficiaries

Having identified the universe of beneficiaries, a decision must be made regarding the degree to which these beneficiaries will benefit from the project, and the degree to which their particular sludge will burden operation and maintenance. For example, an industrial discharge may impose heavy constraints on the management of a sludge and may corrode equipment, and, therefore, it may be determined that a greater portion of the costs should be borne by the industry per unit volume of sludge, than would be imposed on a residence. Other, non-sludge associated factors may, also be included. The most common is cost reduction for senior citizens. Decisions may also be made to reduce user costs below the true cost of managing a particular sludge in order to encourage management at the particular site and discourage illegal dumping. Such decisions are often made with respect to septage management. But whenever a decision is made to reduce the costs for a particular group of beneficiaries, a heavier burden is imposed on the remaining users.

D. Conclusion

The calculation of user costs ranges from the simple to the extremely complex and is frequently molded by a preconceived notion of what costs the public would accept. Often, user costs are unrealistically reduced because of political pressure, and facilities find that they have insufficient revenues for maintenance and replacement. In the long run, both the environmental and financial costs of inadequate assessments may be much greater if user costs are insufficient to properly manage the facility or operation.

Part 6. Implementation:

I. Introduction:

This Part of the SSMP Update gives an overview of the planning and implementation requirements for districts, 201 and Areawide Water Quality Management (AWQM) agencies, and sewerage treatment plants and sets forth the standards, goals, and criteria by which SMPs will be evaluated for DEPE approval.

II. Facilities and Operations with Prior Approval:

Table 22 of the SSMP Update are county by county lists of DEPE approved sludge management facilities and operations. The lists include existing permitted facilities and operations; court approved alternatives; existing long-term contractual arrangements; and sludge facilities developed through the federal 201 grant program, that at a minimum, have received planning and design approval, have fully executed design contracts, and have authorized local funding for design. The lists shall serve as a basis for identifying immediate and ten-year management capacity in each district. The facilities/operations identified are to be considered a part of existing sludge management infrastructure that must be used to the maximum possible extent to resolve immediate and long-term sludge management needs, unless documentation is provided that proves these operations are not operated and maintained in accordance with all applicable health and environmental standards. The lists are restricted to operations or long-term contracts for ultimate management. It is not the department's intention to subject treatment plant stabilization and dewatering operations and modifications to the DSMP amendment process. These processes are conventional components of treatment plant operation and will generally continue to be regulated solely through the TWA program.

III. Implementation Requirements for Districts:

Districts shall be responsible for satisfaction of the following requirements. Failure to satisfy any of these requirements (criteria and procedures) shall be grounds for the department to intervene through the imposition of orders or through direct department execution of planning and implementation requirements. Districts shall be required to attend an orientation meeting to discuss these requirements before initiation of the district planning process.

DSMPs must address all sludge produced within district boundaries which is classified as either waste ID 12, dry sewage sludge; ID 74, liquid sewage sludge and ID 73 septic tank clean-out waste. Long-term plans for management of these residuals must be developed based on quantities projected to be generated in 10 years.

A. Planning Appropriations

To discharge the implementation requirements as specified herein, districts must appropriate funds for completion of all requirements as discussed in this Part. It should be noted that the department has completed much of the inventory work necessary for district planning (see Section C). A thorough review of the SSMP Update should provide each district with most of the tools necessary for execution of district requirements, therefore the department does not anticipate the need for large district appropriations to satisfy planning requirements. Each district must prepare an appropriations document, which provides line items for each of the implementation items detailed in the following sections of this Part, and as listed below:

Document #1 - Inventory and Strategy Document;
Document #2 - Alternatives Document;
Document #3 - Selection Document;
Document #4 - Implementation Document;

Document #5 - The DSMP, including a transcript of the public hearing and a response summary addressing public comments on the DSMP; and

Expenses for the district sludge task force subcommittee of the district solid waste advisory council.

As proof of appropriations, a copy of the district resolution appropriating monies for each specific planning document must be sent to the department for approval. If an action is taken that amends an existing resolution, a copy of amended resolution must be submitted.

B. Creation of the District Sludge Task Force Subcommittee

1. Composition

Each district must create, by formal resolution, a sludge task force subcommittee of the district solid waste advisory council (SWAC) for the purpose of review and comment on each of the planning documents. The sludge task force subcommittee shall include, but not be limited to, representatives from each of the sludge management interest groups listed below. If any of the listed groups are not currently represented on the district SWAC, additional members must be appointed.

Appointees	Constituency
1	Mayors
1	Municipal Planning Boards
1	Municipal Health Department or Boards
1	Municipal Environmental Commissions
2	Publicly Operated Wastewater Treatment Agencies
1	Consulting Wastewater Engineers
1	Industry
1	Agriculture (not applicable to Essex, Union, Hudson or Bergen Counties)
1	Sludge Haulers or Sludge Management Operators/Permittees
1	County Planning Boards
1	Areawide Water Quality Management Committees

2. Format

Each district must submit to the department a copy of the formal resolution creating the sludge task force subcommittee and a list of appointees and their constituency.

C. Selection of the Lead Planning Agency

The lead planning agency shall be responsible for development of the DSMP and for the continuing planning process which follows. This agency may be "designated" or "delegated" pursuant to discussions below. However, ultimate responsibility resides with the district governing body.

1. District Agency Designation

The SWMA mandates that planning be performed on a district-wide basis and designates the county freeholders and the HMDC to execute this planning function. The freeholders and the HMDC may designate the specific agency under their respective jurisdictions that will be responsible for planning. Where a district wishes to designate a district governmental agency/office to complete the sludge management planning requirements within the time constraints specified by the SSMP Update, the district must submit a copy of a resolution adopted by the governing body of the district designating the specific district agency/office as the planning agency for developing district sludge management planning.

2. Alternative Agency Delegation

Given the special nature of sludge management and the long-term specific involvements and expertise of sewage treatment plants and 201 agencies, in accordance with this SSMP Update, districts are hereby encouraged to delegated planning authority outside the governmental structure of the district to a publicly operated sewerage treatment agency(ies). The department strongly supports such a delegation for districts particularly where regional sewerage authorities and/or major municipal facilities have already established sludge management projects or plans. However, delegation to another lead agency does not relieve the freeholders or HMDC of the ultimate responsibility for district sludge management unless the freeholders or HMDC have compiled with the delegation requirements identified in Section B of this update. If the district desires to retain ultimate responsibility, the planning documents executed by the delegated agency(ies) must be compiled by the district into single submission documents.

Where a district wishes to pursue delegation of sludge management planning to a sewage treatment agency(ies) the district governing body must adopt and submit to the department, a formal resolution indicating its intent to delegate sludge management planning to a public sewerage treatment agency(ies), together with a similar resolution from the delegate sewage treatment agency(ies) accepting said responsibility within the time constraints specified by the SSMP Update. Where the district opts to delegate this authority, the selection of the delegated lead agency must be made based on a thorough evaluation of the following criteria and submitted on Form D-1.

a. **Evaluation of the Conformity of the Geographical Area of the Delegated Agency** - Agency jurisdiction must be evaluated to determine its consistency with the district area. Where there is inconsistency, the freeholders must resolve that inconsistency.

b. **Experience of the Delegated Agency with Approved Land-based Sludge Management** - Evaluation of this issue must address the general understanding and participation of the particular delegated agency(ies) with the requirements for proper sludge management planning, implementation and the daily operations of sludge management. Clearly, the department discourages the designation of agencies that have established a record of noncompliance with existing regulations. Experience evaluation should address three (3) areas of sludge management:

    1) **Planning Experience** - Has the agency had experience in development of an SMP?

    2) **Implementation Experience** - Has the agency had experience with implementing the selected alternative of its SMP?

    3) **Operational Experience** - Has the agency demonstrated a history of proper sludge management? This evaluation should address the regulatory compliance history of the agency, and the life expectancy of the agency's selected management mode (i.e. emergency, interim, or long-term?). An agency operating in an emergency mode would necessarily have less experience than an agency operating a successful incinerator.

c. **Statutory Authority for Regional Sludge Management** - Evaluation of this issue focuses on the statutory provisions enabling the particular agency(ies) to address the sludge management needs of all sludge generators within the district. For example, where the particular agency is a sewerage authority, it is assumed that statutes permit that agency to plan and implement a sludge program to address the sludge generated by the particular authority's treatment plant(s). The issue of concern here is jurisdiction over customer sludges.

d. **Other Considerations** - Clearly other areas of evaluation will be significant to the suitability of a particular agency(ies). These might include, for example, the willingness of the agency to take on the task and political considerations. When delegating to a planning agency, the district must submit to the department an evaluation sheet that addresses these factors and the agencies considered.

3. Format

Districts must formally notice all POTWs of their intent to name a lead planning agency (either through designation of a district agency or delegation to an alternative agency(ies) and must provide an opportunity for these treatment agencies to comment at a public meeting. The minutes of this meeting with treatment plant agencies must be submitted to the department together with a copy of the formal notice. The district must make a formal resolution naming the lead planning agency. Where the authority is delegated to a publicly operated sewerage treatment agency(ies) a signed bilateral agreement(s) must be submitted to the department together with complete department forms evaluating agency qualifications.

D. District Preplanning Meetings

In order to minimize the time and costs associated with district sludge management planning, the department intends to hold meetings with district representatives for the purpose of providing guidance prior to initiation of district sludge management planning activities.

E. Development of District Sludge Management Plans

It is the purpose of district planning to provide for management of all sludge from domestic and POTWs in the district for 10-year planning periods. This planning will be reviewed by the department for its consistency with statutes, regulations, and policy (see Section F. Part 2). Sludge management planning will be required to conform to the requirements detailed herein. All submissions are to be concise and must be completed on "Appendix K Forms" or as may be subsequently revised by the department. The development of the DSMP shall be monitored through submission of the documents as detailed below.

1. **Inventory and Statement of Sludge Management Strategy**

a. **Inventory Content**

The district sludge management inventory must be submitted on "Appendix K Forms" prefaced "IS". Where district inventory information differs from that presented in this SSMP Update, footnotes must be provided to indicate the source of information. In addition, district plans must develop an inventory of sludge quality. The WFRP will make available all quality information and industrial surveys and assist districts in development of this inventory information. The sludge quality inventory must be submitted on Forms IS-10a and 10b.

b. **Statement of Sludge Management Strategy Content**

The statement of sludge management strategy must be developed and submitted on "Appendix K Forms" IS-12, 13 and 14.

c. **Format**

The inventory and strategy document must be prepared on department forms ("Appendix K forms" prefaced with "IS"). Inventory and strategy documents must be formally noticed to the public, and to every domestic and POTW in the district. The document must be reviewed by the district sludge task force subcommittee. Copies of the formal notices to the public and the district treatment plants and a copy of the district sludge task force subcommittee evaluation must be submitted to the DEPE together with the inventory and strategy document.

d. **General Guidance**

Districts are directed to avoid inclusion of text except as absolutely necessary. It is anticipated that district plans will revise projections of sludge production based upon more intimate knowledge of areas of sewer service extension, projected population growth and needs for upgraded treatment. In such cases, a footnote page may be appended to the form in question.

2. **Alternatives Document**

a. **Content**

All districts must develop a list and map of potential alternatives that would be capable of managing sludge generated by domestic and POTWs located in the district. In order to develop this list and map, districts must begin by including all DEPE approved facilities and operations pursuant to Table 22 of this SSMP Update, unless such facilities and operations are not operated and maintained in accordance with all applicable health and environmental standards. In such a case, substantiation for exclusion must be appended to the alternatives document. The number of alternatives must be expanded to provide capacity for two times (2x) the 10-year projected sludge production of the district or the equivalent as determined by the department. Additional alternatives under consideration shall at a minimum include 201 plans currently under development and any alternative facilities and/or operations requiring a permit from the department. Districts and delegated agencies are reminded that district plans and 201 plans must not conflict. Further, districts must anticipate maintenance and seasonal closures of alternatives and provide for contingency alternatives. All alternatives must be located within the district boundaries unless provisions are made for interdistrict waste flow agreements. Alternative sites must take into consideration the department's technical criteria used in permitting as addressed in Section F. Part 4.

b. Format

The alternatives document must be prepared on department forms provided herein or subsequently revised by the department (Appendix K forms prefaced "A"). The alternatives document must be formally noticed to the public and to every domestic and POTWs in the district. The document must be reviewed by the district sludge task force subcommittee. Copies of the formal notices to the public and to the district treatment plants and a copy of the district sludge task force subcommittee evaluation must be submitted to the DEPE together with the alternatives document.

c. General Guidance

Districts are directed to avoid inclusion of text except as absolutely necessary in footnotes or appendices.

3. Selection Document

a. Content

All districts must develop a list and map of selected alternatives and contingencies which combined would be capable of managing all sludge generated by domestic and POTW located in the district for ten years. The selected alternatives must be drawn from the list provided in the district alternatives document. All selected alternatives must be evaluated to provide for consistency with approved 201/AWQM plans, and the sum total of the selected alternatives must provide for management of all sludge generated within the district for the 10-year planning period. An environmental assessment of each selected alternative must be performed in conformance with DEPE requirements as defined by selected alternatives forms. Districts are advised that selected alternatives may be modified during the DEPE permitting process in as much as it is the mandate of the DEPE permitting process to control environmental impacts. Districts must anticipate closures of alternatives and provide for contingency alternatives.

b. Format

The selection document must be prepared on department "Appendix K Forms" or as subsequently revised by the department (These "Appendix K Forms" are prefaced with the letter "S"). The selection document must be formally noticed to the public and to every domestic and POTW in the district. The document must be reviewed by the district sludge task force subcommittee. Copies of the formal notices to the public and the district treatment plants, and a copy of the district sludge task force subcommittee evaluation must be submitted to the DEPE together with the selection document.

c. General Guidance

Districts are directed to avoid inclusion of text except as absolutely necessary in footnotes or appendices.

4. Implementation Document

a. Content

The implementation document shall consist of the following:

1) Supervising Implementation Agency Identification

All districts must designate a department, unit or committee of the county government, HMDC, to supervise the implementation of the DSMP. This function may also be delegated to a DTW or POTW in a manner analogous to that outlined for delegating the lead planning responsibility to a DTW or POTW. Where this responsibility is delegated, a formal bilateral agreement must be signed between the district and the delegated agency.

2) **Delegation or Designation of the Operating and Constructing Entities**

The implementation document must identify the agency(ies) responsible for construction and operation of each of the selected alternatives. Districts may delegate this responsibility to a public sewerage treatment agency in analogous fashion to the delegation of a lead sludge planning agency. However, where this responsibility is delegated, a formal bilateral agreement must be signed by the district and the delegated agency. The district is reminded that the ultimate responsibility for implementation resides with the district in the event of forfeiture or failure on the part of the delegated agency.

3) **Development of the Implementation Schedule**

All districts must develop an implementation schedule that shall provide dates for completion of each of the following for each selected alternative.

- Request for Qualifications for Design;
- Request for Proposals for Design;
- Notice Award for Design;
- Request for Qualifications for Construction if privatized pursuant to Chapter 72 P.L. 1985;
- Request for Proposals for Construction if privatized pursuant to Chapter 72 P.L. 1985;
- Bid Notice for Construction if publicly funded pursuant to N.J.S.A. 40A:11-1 et seq.;
- Notice Award for Construction if publicly funded pursuant to N.J.S.A. 40A:11-1 et seq.;
- Initiation of Construction;
- Completion of Construction;
- Request for Qualifications for Operation if privatized pursuant to N.J.S.A. 40A:11-1 et seq.;
- Request for Proposals for Operation if privatized pursuant to N.J.S.A.

40A:11-1 et seq.;

- Notice of Award for Operations if privatized pursuant to N.J.S.A. 40A:11-1 et seq.; and

- Start of Operations.

4) Development of Financial Management

All districts must develop a statement of the financial management program for the selected alternatives(s) that shall provide for, at a minimum, the 10-year capital, operating and maintenance expenses for each selected alternative. The submitted material must include an evaluation of the financial management program performed and signed by a certified public accountant, and appropriations of public monies where appropriate.

5) Permit Applications

Complete formal permit applications on department forms must be submitted for all selected additional alternatives included in the DSMP and which are to be implemented within three years of department approval of the DSMP.

b. Format

The implementation document must be prepared on DEPE "Appendix K Forms" (These forms are prefaced with the letter "I"). The development of the implementation document must be formally noticed to the public and to every domestic and POTW in the district. The document must be reviewed by the district sludge task force subcommittee. Copies of the formal notices to the public and the district treatment plants, and a copy of the district sludge task force subcommittee evaluation must be submitted to the DEPE together with the implementation document. Where the district chooses to delegate implementation, a copy of the signed bilateral agreement(s) must also be submitted to the department.

5. District Sludge Management Plan

a. Content

Every district must hold a public hearing on the sludge management planning documents and make appropriate revisions pursuant to public comment. The DSMP shall consist of the inventory and strategy document, the alternatives document, the selection document and the implementation document.

The DSMP must be certified to the department by formal district resolution and must be accompanied by a formal resolution by the district approving, in whole or in part, or disapproving the DSMP and a copy of the evaluation made by the sludge task force subcommittee to the SWAC.

b. Format

The certified district plan must be submitted to the department on department forms as discussed in Part 6 together with the following additional documents:

- Resolution naming the lead planning agency
- Copy of the notice of public hearing
- Transcript of the public hearing
- Responsiveness summary
- Resolution of district certification
- Sludge task force subcommittee evaluation of the DSMP
- Summary of the dates and content of all meetings, discussions and correspondence with the department during the planning period
- Permit application as appropriate for new sludge management alternatives to be implemented in three years from the date of department approval of the DSMP

6. Amendment and Biennial Review of DSMPs

Following state certification of approval, DSMP's will be required to undergo four biennial reviews during each 10-year planning period. If modification is found to be necessary, an update must be submitted to the department by preparing revised "Appendix K Forms" and other required submissions as detailed in "Content" and "Format" discussions above. Content and format requirements for such amendments/modifications must follow requirements of the original plan submissions.

Where it is determined during biennial review that no changes are necessary, the district must submit a resolution stating that the plan has been reevaluated and has been determined to require no amendments. The resolution shall be accompanied by an evaluation by the sludge task force subcommittee of the SWAC regarding the need for amendment/modification to the DSMP.

In the event the district wishes to make unscheduled modifications to the DSMP following department certification of approval, content and format requirements shall be the same as scheduled biennial updates.

IV. Implementation Requirements for 201/AWQM Agencies:

Notwithstanding the districts' responsibility for sludge management planning, it is in the interest of responsible sludge management to utilize existing 201 planning wherever possible. However, all 201 facility plans and AWQM plans must provide for cross adoption of DSMPs to prevent inconsistencies that would confuse the permitting process.

V. Implementation Responsibilities for the State:

A. Interim Period

During the period between adoption of this SSMP Update and state certification of the DSMP, the department shall continue to issue sludge management permits to applicants for proposals and projects that comply with applicable state statutes and regulations. For permits issued during this period, the department shall provide the district in which the permitted project is to be located with an opportunity to comment of the proposed permit's impacts on ongoing district sludge management planning. The department shall consider the district's comments on proposed permitting activities within the district but shall not be bound by the district's comments.

B. Determination of District Failure

In the event the district fails to plan pursuant to the SSMP Update, or in the event the district certifies failure pursuant to N.J.S.A. 13:1E-21b, the department shall discharge its responsibility to plan under the SWMA by requiring that sludge generators develop and implement plans for the management of their sludge as a condition of their NJPDES permits. In the event a DSMP is approved by the department but the district fails to implement its DSMP pursuant to the implementation schedule of the DSMP, the department may exercise its authority to issue interim permits for sludge management facilities and/or operations pursuant to N.J.A.C. 7:14A-1 et seq. or may institute legal action to force implementation.

VI. Implementation Requirements for Individual Sludge Generators:

A. Interim Period

The interim period is the time between adoption of this SSMP Update and the initiation of operations of selected alternatives pursuant to the DSMP approved by the department. District responsibilities for sludge management planning in no way relieve individual sludge generators of their responsibilities for proper planning and management of their sludge as required under the NJPDES. Until such time as district plans are implemented, individual sludge generators are required to pursue planning and implementation of such sludge management projects as may be necessary to meet the terms of their NJPDES permits.

Prior to department approval of the DSMP, no DSMP consistency determination will be required for such plans, however, in the interests of sound financial planning, it would behoove individual generators to maintain a close cooperative relationship with district sludge management planning efforts to assure against the expenditure of monies for duplicate or redundant facilities. Following department approval of the district plan, permitting for sludge management facilities and operations will require consistency with the district plan.

The failure of districts to discharge their responsibilities under this Part of the SSMP Update shall not be accepted as justification for treatment plant violations of sludge management requirements specified under the terms and conditions of the generator's NJPDES permit.

B. Determination of District Failure

In the event of district failure to plan or implement in accordance with the SSMP Update, the individual sludge generators will be required to execute SMPs for the quantity of sludge generated by their treatment plant(s) at permitted flow or at projected flow in 10 years, whichever is greater. Generator SMPs will be required to conform to all planning requirements per Section F. Part 6. III. A., D., and E. on a schedule as specified in their NJPDES permit(s). In order to accomplish required planning and implementation, generators may form regional study groups, joint meetings or authorities pursuant to statute. Plans developed and implemented by sludge generators will be evaluated by the department utilizing the standards, goals and criteria detailed in the SSMP Update and shall be required to undergo biennial review.

C. Expansion or Upgrading

In the event a sludge generator upgrades or expands treatment plant capacity, the sludge generator shall be required to provide for management of all sludge to be generated by the expanded or upgraded treatment plant. This requirement shall be further addressed in the sludge management regulations.

VII. Conclusion:

This SSMP Update amends the 1987 SSMP by establishing a statewide management policy that provides for the environmentally sound management of sewage sludge as a resource. Consistent with New Jersey's progressive policy directions in other areas of waste management, this policy will emphasize pollution prevention, and expedite movement toward recycling of sewage sludge into beneficial uses, and toward the end of out-of-state disposal. The conversion of sludge into beneficial products transforms an undesirable waste into a valuable resource. This approach reduces the negative environmental and social impacts of management through waste disposal, while contributing to agriculture and other industries. It is hoped, that the policies established in this SSMP Update will support innovation and initiative among all those involved in sludge issues in working together toward a carefully crafted, environmentally sound statewide sludge management program emphasizing beneficial use and self-sufficiency.

ATTACHMENT

A. Regionalization Analysis; Form A-4

The following form is to be completed when submitting the standardized SMP "Appendix K forms."

This form must be completed by all domestic treatment works as part of their SMPs except for those in categories 1 and 2 (with permitted wastewater flows of less than 1.0 mgd).

A description should be provided of possible regionalized approaches that have been explored, in relation to categories 1-6 below. For each category, one or more regionalization options that were considered should be described. The following must be addressed for each option:

A) How they may address limitations in the current system;
B) The steps which were taken to assess them;
C) What DTWs or other organizations were contacted; and
D) The conclusions drawn as to feasibility and appropriateness.

Additional pages may be used as necessary.

DEPE may require additional background on this regional assessment in the form of documentation through letters, notes on meetings and telephone calls. This documentation must therefore be maintained by DTWs.

If the existing approach in a category is already a regional one, it should be briefly described, and the above information should be provided with regard to assessment of the potential and desirability of further regionalization.

1. Regional approaches to dewatering:

2. Beneficial use projects among multiple authorities (including selection, purchase and construction of facilities):

3. Joint efforts to bid specifications to procure transportation and processing services by contract vendors for beneficial use products.

4. Joint projects in marketing and promotion of beneficial use products:

5. Joint projects in encouraging pollution prevention in local industries and commercial establishments:

6. Joint projects in public education on individual responsibilities for proper handling of hazardous chemicals: