

## CHAPTER 3. THE EXISTING SOLID-WASTE-MANAGEMENT SYSTEM.

### 3.1 Prevention Programs.

#### 3.1.1 Prevention Programs for MSW.

"Waste prevention," in the context of this plan, means keeping material out of the waste collection/processing/disposal system. The meaning is equivalent to the State DEC's use of the term "waste reduction," but is less ambiguous (since "reduction" of waste volume and weight also occurs in composting and waste-to-energy facilities, as well as in landfills) and makes more explicit the goal of preventing waste from being generated in the first place. The term as used here is meant to include "re-use" of products, since their continued usefulness prevents them from being discarded as waste.

Whether called waste "prevention," or waste "reduction," the concept is a relatively new one in terms of formal government-sponsored waste-management programs. There are not many waste-prevention programs in existence, nor are there many data to guide program development.

##### 3.1.1.1 Public-Sector Waste-Prevention Programs.

The Sanitation Department's current waste-prevention programs primarily consist of public-information materials which are designed to motivate people to reduce the amount of waste they generate, and to inform them of techniques and opportunities for doing so.

A program called "Materials for the Arts," which has been funded jointly by the Sanitation Department and the Department of Consumer Affairs, collects donations of unwanted goods and materials from businesses and private donors and gives them to non-profit cultural and arts organizations, thus preventing these materials from being discarded and entering the waste stream. 390 tons of material were "re-used" under this program in fiscal year 1991, which won an award from the National Conference of Mayors at the beginning of 1992.

The Sanitation Department conducted a small-scale waste-prevention-outreach pilot program in the fall of 1990, in which 3,000 households in four building complexes participated. Durable canvas and cotton-string shopping bags were distributed to each household; these contained suggestions for preventing waste and localized directories of repair shops, thrift shops, and charity groups that accept donations of used household items.

In a broader effort, the Department is testing a variety of waste-prevention techniques in the experimental "intensive waste-prevention and recycling zone" project which is taking place in

the Park Slope and Gowanus neighborhoods of Brooklyn. This program began in January, 1991. In the spring and summer of 1991, the Department conducted a home composting demonstration in the zone, which involved intensive outreach efforts to residents, community groups, schools, and other institutions. In the fall of 1991, a Re-Use Guide for the zone was developed and distributed through local area merchants and institutions. The Department is also working with businesses in the zone to encourage private-sector waste-prevention activities, in addition to gaining their cooperation in educating residents about preventing waste while shopping.

The Department has supported several pieces of state and federal legislation, and a Mayoral executive directive, that have been designed to reduce the amounts of particular materials in the waste stream.

#### 3.1.1.2 Private-Sector Waste-Prevention Programs.

In September, 1991, the Department and four business associations -- D'Agostino Supermarkets, the New York State Food Merchants Association, the Neighborhood Cleaners Association, and the Direct Marketing Association -- formed the New York City Partnership for Waste Prevention. The first municipal alliance of its kind in the nation, the Partnership represents some 15,000 local businesses who are committed to identifying and instituting business-specific waste-prevention practices and to informing their employees and consumers about how they can prevent waste.

#### 3.1.2 Prevention Programs for Sludge and Waste Water.

Short of severely restricting New Yorkers' dietary intake, or restricting or reducing population growth, there is little that can be done to reduce the amount of sewage sludge that is generated. There is no direct relationship between the amount of hydraulic flow per se and the amount of sludge produced (since sludge volume is a function of the amount of solids in the water), so water conservation measures will not reduce the amount of sludge that is generated.

As noted in Chapter 2, one of the significant differences between the rate of sludge generation in New York City and other major cities is that in-sink garbage grinders are prohibited in the city (except for some households that are served by private sewer systems). The effect of this prohibition is that food wastes do not enter the sewage system to end up as sludge. While this is beneficial for the sewage-treatment system (since it requires less plant capacity, presents less potential for siltation in neighborhoods with small-diameter, low-gradient sewer lines, and produces less sludge that must ultimately be

disposed of somewhere), the concomitant effects of directing this food waste to the MSW stream need to be compared to these benefits in order to evaluate the economic and environmental costs and benefits of this practice for the City's overall waste-management system.

If 25 percent of New York City's population installed in-sink garbage grinders, and used them to dispose of half of their food wastes, the incremental sludge-disposal costs (not including the cost of building and operating the extra water treatment plant capacity itself) would range from \$22 million (if the incremental sludge were composted along with MSW in an in-vessel composting facility) to \$28 million (if it were composted in a sludge-only composting facility); these would be offset by reduced MSW-disposal costs ranging from only \$2 million (if the food waste were composted or landfilled) to \$5 million (if the food waste were incinerated in a waste-to-energy facility). Since there would be no effective reduction in MSW collection costs due to such a trivial decrease in MSW quantities, the net incremental waste-management cost to the City would be on the order of \$20 to \$23 million per year. (This cost-benefit analysis is presented in Appendix Volume 4.2.) The Department of Environmental Protection is in the process of conducting a further, more detailed, evaluation of this issue in relation to New York City.

Planned improvements in the combined sewer overflow system, which currently allows significant quantities of solid materials to pass directly into the "receiving" surface waters around the city without treatment when heavy rainfalls have overloaded the system, will somewhat increase sludge quantities. However, the fraction of sludge generated from solid material that is flushed from the streets into sewers by rain could be reduced by more stringent anti-litter and street-cleaning programs. Like the ban on in-sink garbage grinders, of course, preventing "street sweepings" from turning into sewage does not necessarily reduce the overall amount of solid wastes that the City must manage, but merely moves material from one waste stream into another.

Although it is difficult to reduce the quantity of sludge produced in the City, the quality can be significantly improved by reducing the amounts of heavy metals and other pollutants of concern that enter the sewage system, primarily through industrial discharges. Such reductions in these pollutants make it easier and less expensive to dispose of the sludge produced, because more disposal options are available for "cleaner" sludge (as will be discussed in Chapter 9). In order to reduce the levels of these harmful pollutants that enter the sewage system, the Department of Environmental Protection has developed an "industrial pre-treatment" program, the goal of which is to

produce "no net increase" in the amount of pollutants discharged. Additional reductions in sludge pollutant concentrations have been achieved as a result of reductions in the use of leaded gasoline (lead from exhaust fumes is washed off streets); additional reductions in pollutant levels may follow further improvements in vehicular fuel efficiency or composition, or come about through reductions in automobile traffic.

### 3.2 Collection, Transfer, and Transport Systems.

#### 3.2.1 Municipal Solid Waste (Non-Source-Separated) Collected by the Sanitation Department

The Sanitation Department owns and operates a fleet of about 1,520 rear-loading and 440 side-loading collection trucks to collect residential waste at the curb. In 1990, the rear-loading truck was used in 49 of the 59 Sanitation Districts (which are coterminous with the Community Boards); the side-loading trucks are being phased out and replaced with rear-loaders. These diesel-powered rear-loaders have a 20- or 25-cubic-yard hopper, in which bagged refuse is compacted to about one-quarter to one-third of its original volume. The fleet runs an average of nearly 1,100 truck shifts each day, six days a week. Trucks in the fleet have a replacement cycle of seven years, and are generally replaced when they are between seven and eight years of age. In mid-1990, the average collection truck in the Sanitation fleet was 3.7 years old.

The Department uses two-person collection crews, who work eight-hour shifts on pre-designated routes. (The 1981 union contract agreement, under which the standard crew size was reduced from three to two, also stipulated that there be a fixed minimum number of truck shifts: this major impediment to cost-effective recycling programs is being overcome through City-union negotiations currently in progress.) The designated routes are structured within geographic units called "sections;" the 59 districts are divided into 229 sections. Depending on the population density of the section in which they reside, waste generators set out their waste at the curbside between two and three times a week. "Bulk waste" -- large items such as furniture, appliances, and construction materials -- is collected separately in some parts of the city.

In 1990, approximately 40% of the collection trucks were driven to the disposal location (one of the eight marine transfer stations, three incinerators, or two landfills then in operation) and unloaded by a "relay" driver on a second shift, because the length of the route and the distance to the dump site did not allow collection crews to unload during their eight-hour shifts.

About eight percent of the refuse collected by the Department in 1990 was loaded automatically in large containers. These containers are used on routes that service large apartment buildings, municipal buildings, correctional facilities, and public schools. Several types of vehicles are used for containerized collections: front-loading packers, roll-on/roll-off vehicles, and hoist-fitted chassis vehicles. The 95 front-loading trucks in the fleet have a 47-cubic-yard capacity; they service 6,570 containers (DS- and privately owned) ranging in size from one to eight cubic yards at nearly 1,300 locations. The 65 roll-on/roll-off vehicles have 30- to 35-cubic-yard hoppers, and are used for large-quantity generators such as hospitals, cafeterias, and large apartment buildings at about 130 locations. Because the hoist-fitted chassis vehicles are more expensive to operate than the others, they are being phased out over a four-year period.

A detailed evaluation of 1990 collection costs and efficiencies, as modeled by NYC WastePlan for use as a benchmark for the evaluation of alternative scenarios, is presented in Appendix 4.2, "New York City's Baseline Solid Waste and Recycling Collection Program Evaluation; Residential Curbside and Containerized Collections for Fiscal Year 1990," and "Existing Baseline Trucks." Depending on the population density of the section, a crew on the average truck shift collected refuse from between 720 and 2,275 households, making an average of 325 stops in low-density areas and 55 stops in high-density areas, and collecting between 8.7 and 10.8 tons. This equates to between 3,000 to 4,000 pounds per collection hour,<sup>2</sup> at an overall cost of \$75 to \$94 dollars a ton, or \$257 million annually for refuse collection (not including recycling or bulk-waste collections).<sup>3</sup>

### 3.2.2 Municipal Solid Waste Collected by Private Carters

There are about 420 licensed private carting companies that collect waste from the quarter-of-a-million businesses in New York City. Collection crews for private carting companies generally have two workers who work five to six days a week, eight to 10 hours a day, primarily at night. Most commercial waste generators set out plastic bags at the curbside; many larger customers use one- to six-cubic-yard containers. Most private-carter trucks are 31-cubic-yard high-compaction rear-loaders equipped with hoists that are capable of lifting containers. Loaded trucks are emptied at transfer stations in the city, in northern New Jersey, and in Long Island.

Carting rates are established by the City's Department of Consumer Affairs. The current charge to commercial customers is \$14.70 per cubic yard.

### 3.2.3 Municipal Transfer Stations for Municipal Solid Waste.

The Department of Sanitation operates eight marine transfer stations, at which refuse from collection trucks is unloaded onto barges for transport to the Fresh Kills landfill in Staten Island. Their operation is simple in the extreme: rear-loading compactor trucks drive up inclined ramps into the facilities. They stop on a scale at the building entrance to be weighed, and then back up against a low backstop and dump their loads into barges moored in the slips below. When full, the barges are covered with a disposable net to minimize wind-borne litter, and winched out of the slip into the channel to be picked up by a tug.

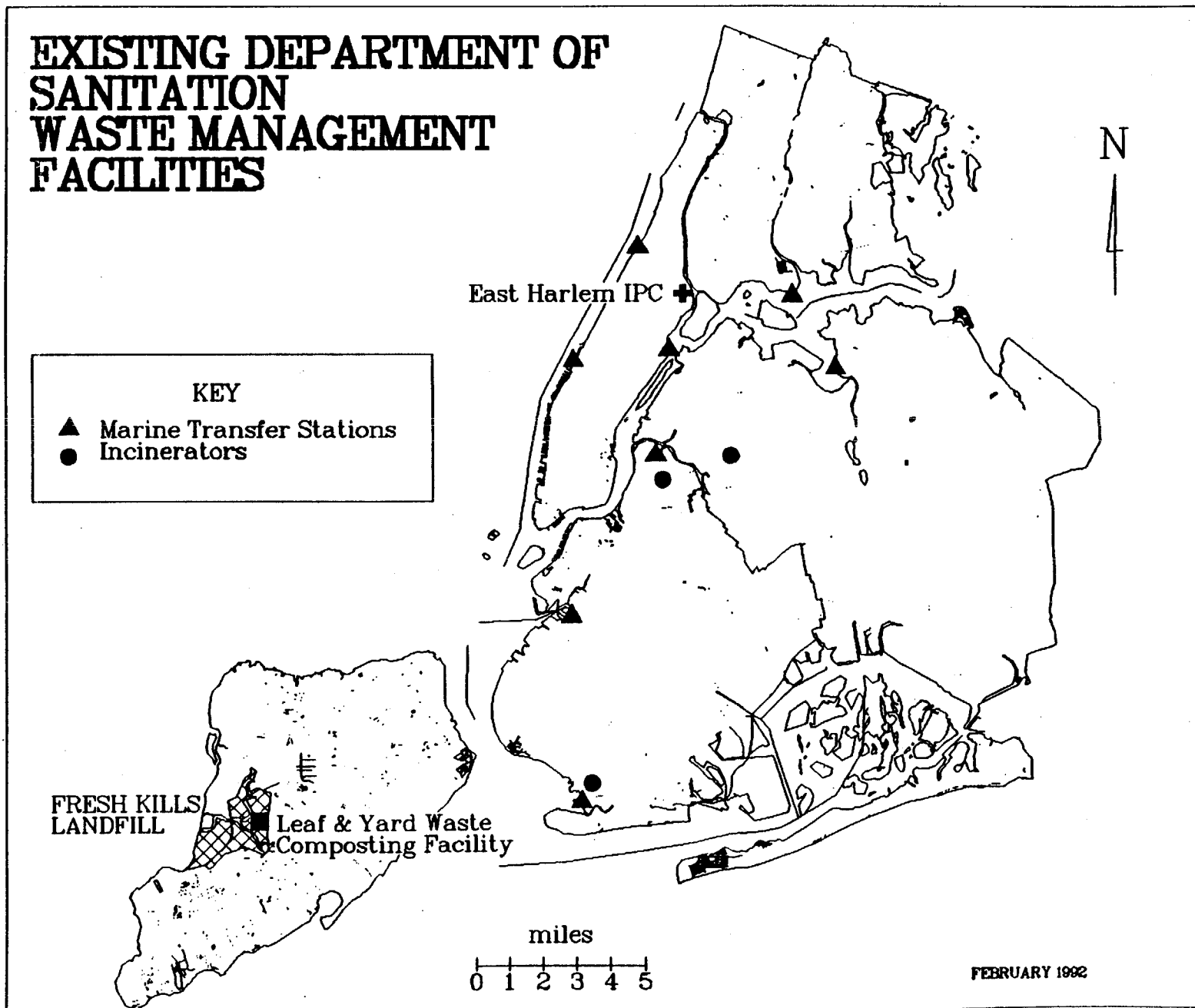
Most of the marine transfer stations were first built at their current sites several decades ago; with the exception of the relatively new Hamilton Avenue transfer station in Brooklyn, each has undergone varying degrees of renovation or reconstruction since it first began operation. The Sanitation Department has recently completed a major rehabilitation program for them. The 59th Street station in Manhattan was completely rebuilt to replace the station at Gansevoort Street, which is now retired and will only be used as a back-up facility. The Hunts Point station in the South Bronx has deteriorated beyond feasible repair. A detailed physical and cost description of a typical marine transfer station is presented in Appendix 5.

The marine-transfer system greatly reduces the truck-miles travelled on city streets, which has a major beneficial impact on costs, congestion, and environmental impacts.

### 3.2.4 Private Transfer Stations.

There are 115 private transfer stations reported to be operating throughout the city. The number of these facilities has increased appreciably in the past several years as a result of the Sanitation Department's significant increase in private-carter "tip" fees at the Fresh Kills landfill, which had the result of making waste transfer for long-distance transport a less costly alternative. 49 handle only non-putrescible wastes (i.e., construction and demolition debris); 33 handle putrescible wastes; and another 33 handle "fill material" as defined by Local Law 40, i.e., sand, stone, rock, concrete, and dirt. Five transfer stations are licensed to handle regulated medical wastes; four are licensed to handle asbestos. Some of these facilities are currently operating without City or State permits, and must either become permitted or be closed; some 30 non-putrescible-waste transfer stations and four putrescible-

Figure 3.2.3-1: Existing Department of Sanitation Waste-Management Facilities



waste transfer stations were closed by City enforcement actions between August, 1989 and January, 1992. The daily throughput capacity of these facilities ranges from 300 to 35,000 cubic yards; the total citywide capacity of these private facilities is about 15,500 tons a day. A complete list of these facilities, which identifies their permitted capacities and summarizes available tonnage records, is in Appendix 4.2.

Most of the private transfer stations load compacted waste into trucks for export out of the city. Several transfer stations, however, load waste onto barges or rail cars, or into containers for rail-and-barge shipment. The New York Cross Harbor Railroad Terminal Corporation has such a facility in Brooklyn.<sup>4</sup> There are barge-only transfer stations in the city, including the Long Island City operation that launched the famous "Mobro" barge in 1988. Harlem River Yard Venture, Inc. is developing a rail-transfer facility in the Harlem River Yards in the Bronx.<sup>5</sup> Existing rail and barge operations within the city have a considerable potential for expanded use for solid-waste transport. (See "Review of Available Rail and Waterway Transport Systems" in Appendix Volume 2 for more detail.)

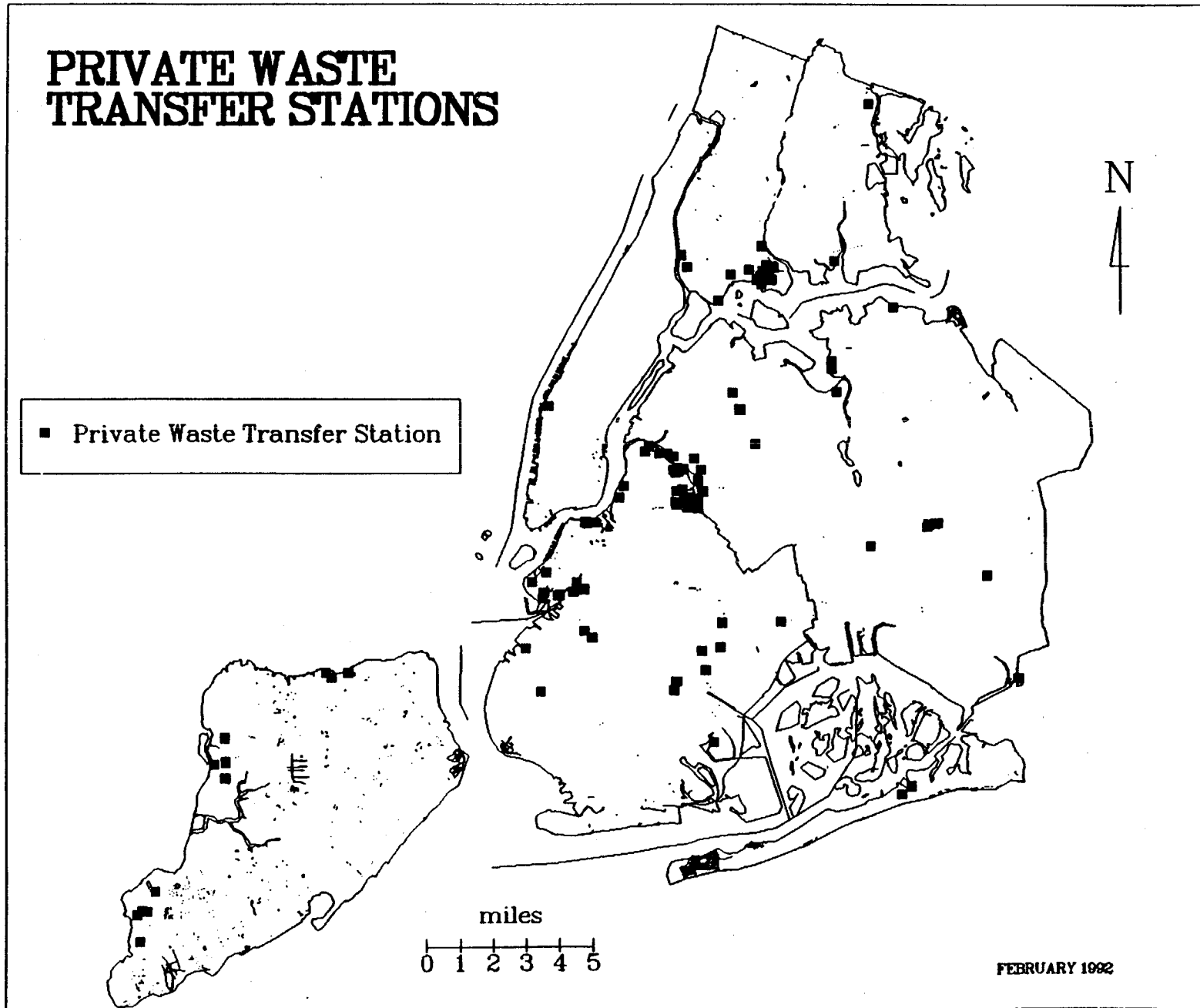
New York City's zoning ordinances permit these facilities as-of-right only in heavy manufacturing (M-3) districts. These districts tend to be concentrated in limited portions of the City. Existing transfer stations are likewise concentrated in relatively few areas; many of these facilities are located in northern Brooklyn, the Red Hook section of Brooklyn, and in the South Bronx.

Transfer stations are regulated by the State Department of Environmental Conservation, and by the City Department of Sanitation, which, pursuant to Local Law 40 of 1990, has assumed the regulatory responsibilities for putrescible-waste transfer stations formerly held by the City Department of Health. Among other requirements, the Sanitation Department's newly adopted regulations specify that the tipping areas of all putrescible-solid-waste transfer stations must be free of solid waste for at least half an hour each day, during which they must be thoroughly cleaned and deodorized. Consolidating transfer station regulations under the Department of Sanitation's jurisdiction has allowed for more effective enforcement of permitting and operational requirements, which has helped to create a general improvement in transfer-station operations.

In a trend that is increasing rapidly, the distinction between transfer stations and recycling/processing facilities is often blurred. This trend is related to the same economic forces noted above which have caused the proliferation of transfer stations. As transport distances and tipping fees increase,



Figure 3.2.4-1: Private Transfer Stations



there are increasing incentives to minimize transport costs by shredding and baling or otherwise densifying wastes. At the same time, it is cost-effective to remove as much material from this waste-stream as possible, thus providing an incentive for materials recycling beyond the direct revenues received from marketing these materials. In addition, the Sanitation Department has adopted rules that mandate recycling of designated materials in the commercial waste stream. Local Law 19 permits generators of the designated materials to arrange, through their carters, to have the materials separated for recycling after they have been collected. The Department's current rules require transfer stations that accept designated materials to separate the materials, unless they arrange for separation at a subsequent location. For these reasons, virtually all transfer stations in the City do some separation of materials for recycling, using conveyor lines that enable employees to pick out specific materials, and/or other equipment that mechanically separates waste materials. However, allowing transfer stations to transfer mixed waste to another location for processing impedes the Department's ability to enforce commercial recycling requirements and, because of contamination, is likely to reduce the amount of recyclable material that is ultimately recoverable. Therefore, the Department will seek to amend recycling requirements for transfer stations to require operators to separate designated recyclable material at their facilities.

(See "Current Collection and Transfer Operations" in Appendix Volume 4.2 for a more detailed description of existing systems.)

### 3.2.5 Disposal of Private Transfer Station Materials.

Virtually all of the waste collected by private carters from businesses in New York City is delivered to one of the transfer stations discussed above. After some degree of processing to remove recyclable materials for marketing, most of the remaining waste is shipped to landfills outside the city. 90 percent of the city's commercial waste is disposed of in five states (Pennsylvania, 35 percent; Ohio, 19 percent; West Virginia, 13 percent; New York, 13 percent; Indiana, 11 percent); the remaining 10 percent goes to Maryland, Missouri, Illinois, Connecticut, Virginia, Kentucky, and Florida. A detailed discussion of the destinations for this waste is presented in Appendix Volume 2.

### 3.2.6 Collection, Transfer, and Transport of Non-MSW Waste

Dewatered sewage sludge is currently pumped from treatment facilities into ships for ocean disposal. When new sludge-management facilities come on line, sludge will be pumped to

near-by facilities for dewatering, or trucked to facilities that are located too far away for pumping. Sealed trucks for transporting sludge typically carry 10-ton loads. A combination of in-city and out-of-city locations will be used to process, use and/or dispose of sludge over the next six years until permanent facilities can be sited, designed, and constructed.

Floating harbor debris is collected in New York Harbor and the rivers surrounding the City by specially outfitted skimmer vessels operated by the Corps of Engineers. These vessels unload into barges, in which the material is transported to its disposal location. Floating debris is also collected by skimmer boats operating at the Fresh Kills landfill; these vessels unload into barges that are unloaded for landfilling. Pier-maintenance debris is loaded directly from shore onto barges.

Dredge spoils are collected directly into barges for transport to disposal locations.

Black-bag medical waste, for the most part, is collected by the Department of Sanitation, generally in containers for automated collection. Red-bag waste must be collected by licensed medical-waste carters.

Construction and demolition waste is generally collected by private carters or construction-and-demolition firms in roll-on/roll-off containers, or in smaller wheeled containers that are hoist-loaded.

### 3.3 Recycling Programs and Facilities for MSW.

#### 3.3.1 Sanitation Department Recycling.

Local Law 19, which became effective in July of 1989, requires the Sanitation Department to implement collection programs, develop processing facilities, and take other steps necessary to achieve specified recycling goals. The primary mechanism for implementing mandatory recycling programs is a series of regulations promulgated by the Department. These regulations specify recycling requirements for the residential, City agency/institutional, and commercial waste streams. The regulations for each waste stream designate the materials that must be recycled (newspaper, magazines, corrugated cardboard and metal, glass and plastic containers, as well as high-grade office paper and metal bulk items for the institutional and commercial sectors and certain construction debris and film plastic for commercial establishments) and set forth an implementation schedule (generally by district for the residential and institutional sectors and by material for the commercial sector).

The regulations also include requirements for placing materials out for collection.

### 3.3.1.1 Curbside and Containerized Apartment-House Recycling.

The most ambitious element of the Sanitation Department's current programs is a curbside collection program that (as of March 1992) services 29 of the City's 59 community districts, in which there are a total of 1.5 million households. In that program, on one collection day per week (or, in some districts, every other week) newspapers, magazines, and corrugated cardboard are bundled and set out separately at the curb for separate collection in a standard rear-loading compactor truck. A second truck collects mixed metals, glass, and plastics placed on the curb in blue plastic bins that were distributed to each building or homeowner. (Regular collections of unsorted MSW are collected in a third truck.) In seven districts, only the paper materials are collected. In five districts, all materials except plastic are collected. It is the responsibility of building owners and managers to establish a recycling area in their buildings and to inform tenants how to participate. Participation is enforced by Sanitation Police.

The newspaper, magazines, and corrugated cardboard are taken directly to paper dealers' facilities located within the city,<sup>6</sup> where they are sorted, baled, and graded for transport to paper mills. The mixed metals, glass, and plastic are taken to a City-owned, privately operated processing center in East Harlem or to private processors outside the city, where these materials are cleaned, sorted, and densified for shipping to manufacturers. During fiscal year 1991, an average of 485 tons of paper, and 170 tons of metals, glass, and plastics, were collected in this program every day. The City paid dealers \$23 a ton for them to accept, process, and market the paper; the City paid an average of \$57 a ton for the processing of the other materials.

324,000 households in high-rise apartment complexes and nearly 200 institutions in 51 districts participated in a variation on this program, in which these segregated recyclable materials were placed in large storage containers (commonly called "dumpsters"), rather than being placed at the curb. Since it is more efficient to load containers of this sort than it is to collect material manually at the curb, the collection costs of this program averaged \$140 a ton, as opposed to an average cost of \$322 a ton for the manual curbside program.

"Bulk" wastes -- large materials such as discarded furniture and appliances -- are also collected separately at the curb, and are taken to facilities where the recyclable components are separated and processed for re-sale. Bulk waste is collected

from more than 300 New York City Housing Authority buildings throughout the five boroughs. Householders may also bring bulk waste themselves to seven designated locations. Other bulk-type wastes are collected and recycled when the Department cleans up vacant lots where wastes have been dumped illegally. 62,000 tons of material were collected and recycled in these programs in fiscal year 1991, at an average cost of \$53 per ton.

The Sanitation Department initially planned to provide recycling service to all New York City households by the end of fiscal year 1993. However, the City's fiscal problems at the end of fiscal year 1991 and throughout fiscal year 1992 forced the postponement of expansion into additional districts.

In fiscal year 1993, the Department plans to introduce recycling to nine new districts, and to add a metal-bulk collection to all programs. The Department also intends to standardize the materials collected in the 38 districts by the end of fiscal year 1993. This will allow the use of a more efficient public-education campaign, rather than targeted campaigns customized for individual districts.

The Sanitation Department has developed or supported a number of initiatives which are designed to supplement the curbside and containerized programs. During fiscal year 1991, the Department sponsored two privately operated buy-back ("cash for trash") centers, where individuals were paid by the pound for bringing in a variety of sorted, recyclable materials. The new Brooklyn center was managed by the company that developed the first buy-back center in the city (in the Bronx), to which the Sanitation Department had provided funding since 1985.

During fiscal year 1991, these two centers bought back 2,600 tons of newspaper, corrugated cardboard, glass, plastic, and metal. Each center was responsible for designing and implementing a comprehensive outreach and public-education program. The Bronx buy-back center also operated a mobile buy-back truck, which gave more New Yorkers access to the program. In fiscal year 1991, the Department provided \$911,000 in funding to the two centers.

The Department also provided funding for three voluntary drop-off centers in Manhattan in FY 91. These operations accept many kinds of recyclable materials, including white paper, but do not pay for them. The three centers collected a total of 600 tons of material. In Brooklyn, due to the market created by the buy-back centers, eight communities formed a network of drop-off locations.

The Department also provided start-up funding to We Can,

Inc., a non-profit organization that redeems bottles and cans from people who collect containers covered by the State's Beverage Container Deposit law. A collection network was also started so that business offices could donate redeemable containers to We Can. During this two-year contract, We Can redeemed almost 44 million containers, paying out over \$1.8 million to redeemers for 2,300 tons of material.

Materials for the Arts (MFA) is a re-use program which is funded by the Department of Sanitation and the Department of Cultural Affairs. MFA picks up donated surplus items such as office equipment and furniture so that they can be re-used by non-profit art organizations throughout the City. In FY 1991, MFA collected almost 400 tons of re-usable goods, and received \$117,000 in Sanitation Department funding.

In February, 1991, the Department began collecting newspapers and magazines from Grand Central Station.

The public was informed of these programs through: subway ads; direct mail campaigns; by posters and flyers distributed in apartment buildings, to landlords and building superintendents, to homeowners, neighborhood stores, churches, and community centers; and by Department outreach workers who met with local elected officials, tenants groups and building personnel, and community groups. In FY 91, this effort entailed nearly 5.5 million pieces of literature for 65 different projects. The Department also placed 16 paid newspaper and two radio advertisements to reach a combined audience of 3.7 million people, and succeeded in placing nearly 3,000 radio and print public service announcements. During the 1989-90 school year, assembly programs on recycling were presented in nearly 800 public and private schools to over 150,000 schoolchildren. Employees of the Department's telephone-"Action Center," (212-219-8090) answer questions and provide information about the Department's recycling programs. The Bureau of Public Affairs issues press releases and otherwise encourages press stories about the Department's recycling programs.

An enforcement program is used to increase compliance with the City's recycling program requirements. Those who do not separate their refuse are subject to fines that range from \$25 (for a first violation) to \$500 for each bag that improperly contains designated recyclable materials; buildings that have nine or more apartments, which have a history of persistent violations, can be fined up to \$10,000. After a six-month grace period, residential fines began to be issued in August, 1990. The Department began issuing warnings to commercial generators for failure to comply with recycling requirements shortly after the requirements were implemented for the first category of

materials (high-grade office paper, corrugated cardboard, metal and construction debris) in November, 1991.

In the areas serviced by the Department's curbside programs, an average of 37 percent of the total pool of materials designated for recycling was recycled. The lowest recycling rates, between 11 and 14 percent, occurred in the high-density/low-income districts of upper Manhattan; the highest rates, around 50 percent, occurred in the low-density/high-income districts of Staten Island and northern Queens. This means that somewhere from a third to a half of the people in these areas recycled most of the materials that they were asked to recycle.

A pilot program is being carried out in a medium-density Brooklyn area that contains approximately 6,100 households. In this program (in addition to the waste-prevention techniques described in section 3.1.1 above), the Department is experimenting with the recycling of additional materials (mixed paper, film plastics, styrofoam, and food waste), and testing ways to increase participation in recycling programs. This Brooklyn program also included a pilot household-hazardous-waste public-education and collection program, and is expected to include a household-battery outreach, education, and collection pilot program.

A pilot household hazardous waste (HHW) collection day was held in June, 1991, in Park Slope, Brooklyn. A total of 450 participants brought HHW on the collection day. Since many of them also brought HHW for neighbors and relatives, an estimated 700 households were served. 222 55-gallon drums of material -- including paint, cleaning products, batteries, pesticides, and hobby products -- were collected. Paint, paint cans, automotive batteries and some types of household batteries, motor oil and anti-freeze were targeted for recycling. The pilot collection day demonstrated that a successful HHW program can be implemented in New York City, and the Department learned much about participant profiles, the effectiveness of various publicity methods, and the extent to which the city's HHW can be recycled, and gained valuable experience in designing and implementing a program for reducing and managing HHW. A detailed report on the pilot household hazardous waste collection day is contained in Appendix Volume 4.2.

In early 1992, the Department is finalizing a request for proposals (RFP) for a household-battery project. A 1991 state law requires that by January, 1993, a Governor-appointed Task Force must produce a plan for battery management which includes identification of the appropriate role of battery manufacturers, retailers, consumers, recyclers and others in the implementation of a collection system, and provides an evaluation of the

feasibility of a battery-deposit system in New York State. In the Department's pilot program, drop-off collection centers for dry-cell batteries will be established in retail stores and public or private institutions within the Park Slope experimental zone. Data generated by the project will enable the Department to evaluate: the receptiveness of retail stores and institutions to voluntarily accepting batteries; public participation rates; types and quantities of collected batteries; proper handling and storage techniques; the availability of end-user markets; the rate at which non-targeted batteries are collected; handling, recycling, and disposal costs; legal, economic, and policy issues surrounding programs for chains of retail stores; and state regulatory requirements that need clarification. It is anticipated that this project will commence at the start of FY 1993.

(For more detailed descriptions of the Sanitation Department's recycling programs in the first two years under the mandatory recycling law, see "New York City Recycles," which was issued in October, 1990, and "Fiscal Year 1991 Recycling Report," which was issued in November, 1991.)

### 3.3.1.2 Institutional Recycling.

As of January, 1991, all City agencies and non-profit institutions located in a Community Board that had mandatory residential recycling were required to recycle the same materials mandated in that Board for residential recycling. All institutions are required to submit a recycling plan to the Department of Sanitation, and to appoint a Recycling Coordinator to implement the recycling plan and to serve as an information source.

Under the recycling regulations, an institution is defined as any non-residential location that receives municipal collection service. Many different types of institutions participate in the Department's recycling programs. These include all of the schools in Staten Island, and some of the schools in the other four boroughs, where administrative problems within the Board of Education have slowed the effort to get more schools into the program. The Department of Corrections has worked closely with the Sanitation Department to implement recycling programs in correctional facilities: four correctional facilities currently receive recycling collection service. Recycling programs also operate in nine shelters and kitchens operated by the Human Resources Administration, and the Parks Department has a yard waste composting program.

The Department of Transportation melts down and recycles the asphalt that is torn up when streets are reconstructed. In 1990,



63,000 tons of asphalt were re-used. The Sanitation Department provides crushed, mixed glass cullet to the Department of Transportation's "glassphalt" program, as do commercial glass processors; in 1990, the Department of Sanitation provided 10,000 tons of glass and commercial processors provided 20,000 tons. This mixed cullet comprised nearly 10% of the asphalt mix in 1990, and saved the City \$300,000 in reduced purchases of new aggregate material.

In addition to the mandated residential materials, institutions are required to recycle office-grade white paper. The Department administers a high-grade-office-paper recycling program for City agencies and non-profit organizations, in which a contractor absorbs collection and processing costs and pays the City for the paper collected. In FY 1991, about 5,000 tons of paper were collected in this program, generating \$243,000 in revenue (an average of \$49 per ton).

### 3.3.2 Private-Carter Recycling.

Regulations promulgated by the Departments of Sanitation and Consumer Affairs require all private businesses to make arrangements for recycling. The regulations specify an 18-month phase-in period during which these categories of materials must be added to the program at six-month intervals beginning at the end of November, 1991: high-grade office paper, corrugated cardboard, metal, and certain components of bulk and construction waste; newspapers, magazines and catalogs, and glass containers; then plastic containers; and finally, film plastic. Businesses may source-separate materials and arrange for separate recycling collection, arrange for post-collection separation by a private carter, or use a combination of both methods. Businesses must post a sign describing their recycling arrangements and notify tenants and employees about any new recycling procedures.

Although some degree of source-separation by commercial waste generators -- for high-value recyclable materials such as printers' paper and other high-grade paper, corrugated cardboard, and certain bulk and construction wastes -- has long been a standard operating practice, and although such practices may somewhat increase in response to the new regulatory mandates of Local Law 19, it is likely that the majority of the recyclables that will be diverted from the commercial waste-stream will be retrieved through the post-collection processing systems that are part of most private transfer stations (as noted in the description of transfer stations in section 3.2.1). However, because the higher-valued paper frequently becomes contaminated, and, therefore, less marketable, when mixed with other solid waste, the Department recommends that, at a minimum, Local Law 19 be amended to require source-separation of high-grade paper by

businesses that generate substantial quantities.

Prior to the introduction of the new recycling regulations, a survey of a sample of transfer stations revealed that transfer stations that handle putrescible ("wet") garbage separate two to six percent of this material (metal, wood, cardboard) for recycling, and that transfer stations that handle dry wastes and paper separate much higher fractions of the waste -- in the range of 40 to 60 percent -- that they receive. Transfer stations for construction and demolition waste recover for recycling close to half of the waste that they receive, including a significant amount of dirt (which is generally used for landfill cover), wood, metal, and cardboard. (This transfer station survey is documented in Appendix Volume 4.2.)

### 3.4 Composting Programs and Facilities.

#### 3.4.1 Composting Programs and Facilities for MSW.

A full-scale yard-waste compost facility was built at a site at the Fresh Kills landfill in 1990, following the completion of a pilot-scale leaf-composting test at the Edgemere landfill in Queens in 1989. It is a 43-acre windrow-type facility, in which leaves are debagged and piled into windrows 12 feet high on top of a graded, crushed-stone surface. The windrows are aerated periodically by a windrow-turning machine, and monitored regularly for moisture and temperature. The facility has a peak on-site capacity of 130,000 cubic yards; 18,000 cubic yards of leaves were delivered there in the fall of 1990. Most of the finished compost was used for closure purposes at the landfill; some was given to local residents and to community gardens.

The Sanitation Department also conducted several other pilot composting programs during 1991. Residents and institutions in the "intensive recycling" pilot area of Brooklyn were given assistance in setting up backyard composting systems throughout the spring. In the summer, in a grass-composting test, a private transfer station and several landscapers delivered approximately 1,000 cubic yards of grass to the Fresh Kills composting facility, where the grass was mixed and composted with wood chips. Testing of the finished compost is underway at the beginning of 1992. In the fall, in another test directed at yard waste collected by commercial landscapers, the Department opened its composting facility to private landscaping companies, for a fee of \$10 per cubic yard. As another part of the Brooklyn "intensive" program, the Department began its first residential food-waste collection program in November. The program will collect food waste at the curb from 3,200 households over a six-month period. The food waste is taken to the Fresh Kills

facility, where it is composted with leaves. Extensive testing and monitoring of the food-waste-composting process will be conducted.

### 3.4.2 Composting Programs and Facilities for Sludge.

In June, 1990, the Department of Environmental Protection began a compost demonstration project next to its sewage-treatment plant on Wards Island to assess the feasibility of composting a portion of New York's sludge and to begin to establish interagency markets for the compost. This aerated static-pile-type facility covered two-thirds of an acre, and processed one dry ton per day. Dewatered sludge was delivered to the outdoor facility, mixed with a bulking agent, piled on top of a wood-chip base embedded with aeration piping, and then covered with more wood chips. The regularly monitored piles were aerated via the piping for 29 days, then torn down, rebuilt, and aerated at a higher rate for another 29 days. The finished compost was distributed to the Parks Department, the Housing Authority, the Department of Transportation, a private landscaper, and a tennis club.

## 3.5 Incinerators.

### 3.5.1 Municipal Incinerators.

The City currently operates three municipal incinerators, each of which was designed to process a thousand tons of waste a day. The Betts Avenue incinerator in Queens began operating in 1950, the Greenpoint incinerator in Brooklyn began operating in 1958, and the Southwest Brooklyn incinerator began operating in 1962. All were retrofitted with new pollution-control equipment (electrostatic precipitators) in the 1970's in order to comply with air-quality regulations; further upgrades, to bring ~~them~~ the Southwest Brooklyn incinerator into compliance with the most recent (and anticipated) air-quality regulations are planned. Only one of these facilities, the Betts Avenue incinerator, is equipped with heat-recovery equipment; it produces hot water that is used to heat adjacent City facilities. The Southwest Brooklyn incinerator has been temporarily closed in anticipation of upgrades to its air-pollution-control and materials-handling systems.

Shortly before closure of the Southwest Brooklyn incinerator, the Department entered into a consent order with the DEC to bring the facility into compliance with NYCRR Part 360 operating requirements. Similar consent orders are currently being negotiated with the DEC for the Department's two other incinerators.

The existing incinerators burn only residential, institutional (including non-regulated "black-bag" waste from health-care facilities) and small quantities of commercial waste. They are not permitted to burn any regulated ("red-bag") medical waste. Nor will the proposed Brooklyn Navy Yard waste-to-energy facility be permitted to burn "red-bag" medical waste.

A more detailed description of the City's incinerators is contained in Appendix Volume 4.2.

These three incinerators are part of a once-larger network of municipal incinerators, the rest of which were closed over the years when it became too expensive to retrofit them to comply with new air-pollution-control regulations, or when their age made them uneconomical to maintain and operate. Some of these facilities still exist in varying degrees of desuetude. Since it would not be technically or economically feasible to retrofit the remaining furnace equipment in any of these facilities so that they could be re-opened as incinerators, any incineration equipment that remains in them is useless; nor is there any other original equipment of practical value. The building shells might, however, be adapted to new uses. Since they are vacant, existing shells in properly zoned, City-owned areas, these buildings may have potential use as recycling, composting, or other waste-management facilities.

### 3.5.2 Apartment House/On-Site Residential Incinerators.

According to data compiled by the Sanitation Department's Bureau of Cleaning and Collection, 731 residential buildings use on-site residential incinerators, which together produce 171 tons per day of ash, which equates to an estimated 570 tons of MSW a day.<sup>7</sup> (See Appendix Volume 6 for a quantification of the emissions from these facilities.) Pursuant to LL39 of 1989, these incinerators are required to be upgraded or closed by 1993.

### 3.5.3 Medical Incinerators.

There are no operating medical-waste incinerators at any City (Health and Hospitals Corporation) facilities, although the HHC plans to retrofit an incinerator constructed recently at the Coney Island Hospital to comply with the new DEC Part 219-3 regulations that became effective on January 1, 1992. This incinerator, which has a capacity of five tons a day, could incinerate approximately a quarter of the HHC's regulated medical waste. Eight other incinerators at private hospitals throughout the city also could be retrofitted cost-effectively to comply with the new DEC regulations. In 1990, there were a total of 36 on-site medical-waste incinerators operating in the city, and 44 pathological-waste incinerators. Together, these incinerators

burned an estimated 65 tons per day of medical waste. (Further information on these facilities is in Appendix Volume 8.)

### 3.6 Landfills.

#### 3.6.1 Within New York City.

##### 3.6.1.1 Closed Landfills.

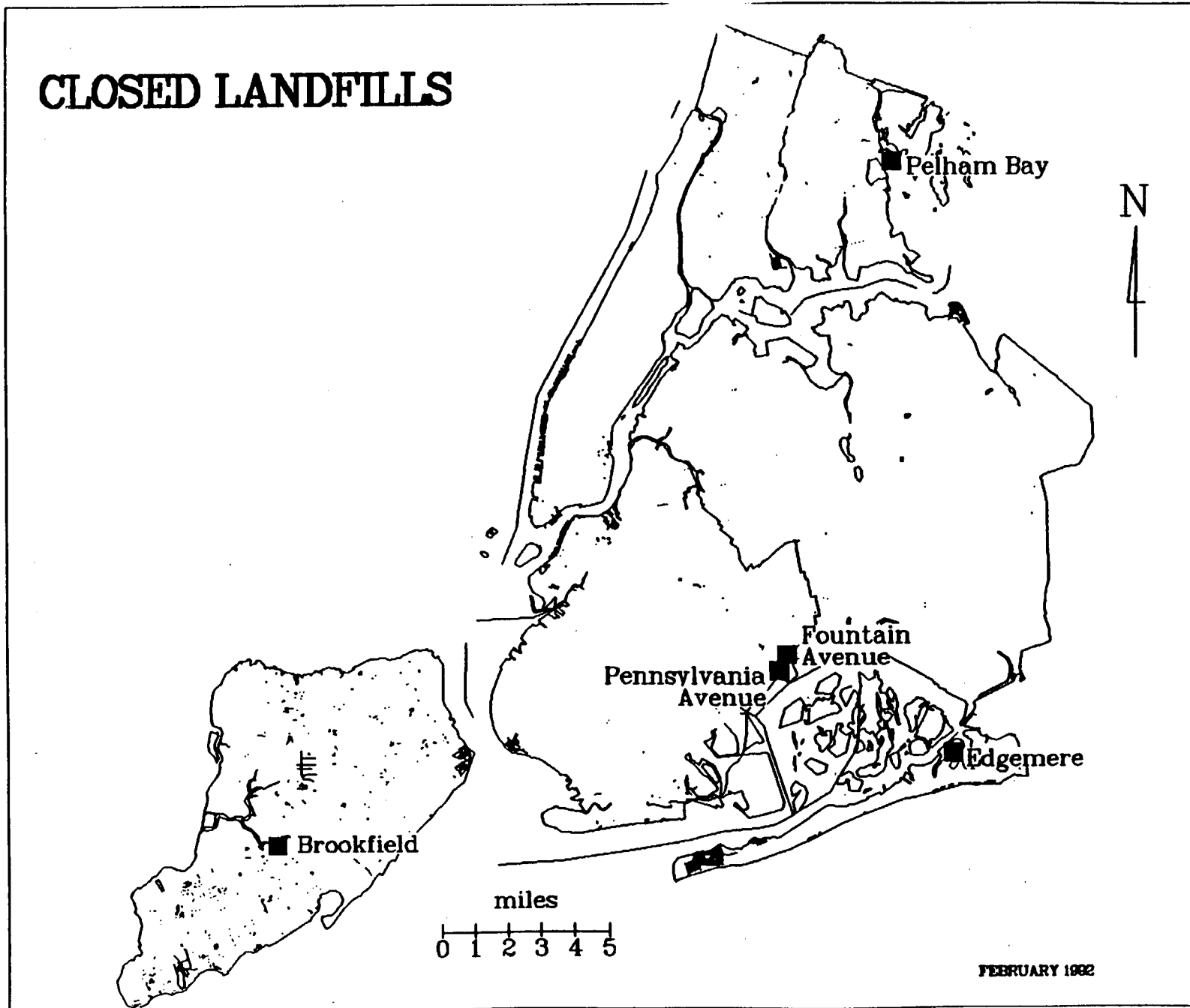
A list of 52 known inactive landfill sites in New York City, which provides available information on location, start and completion dates, acreage, proposed land use, and peak elevation, is presented in Appendix Volume 4.2.

Edgemere landfill, which was closed on July 1, 1991, covers a peninsula that juts northward into Jamaica Bay from the larger Rockaway peninsula in Queens. The landfill was filled to a height of 50 feet. At the entrance to the landfill, a facility is being constructed where householders will be able to drop off bulk wastes for recycling.

Years ago -- when it was a legal and commonly accepted practice -- drums of industrial residues were buried in a small area of the neck. These drums were discovered in 1982 when soil for cover material was being excavated from this area. The Department of Environmental Conservation designated Edgemere a Class 2 inactive hazardous waste disposal site (as defined in Article 27, Title 13 of the Environmental Conservation Law of the State of New York) in 1983. The City and State executed a consent order in 1987 which stipulated a procedure and schedule for remediating these conditions. The drums were removed according to accepted procedures for hazardous-waste clean-ups in 1990. Despite the former presence of drums in the neck section of Edgemere, leachate monitoring data collected between 1979 and 1990 show no indication of industrial-waste contamination, but only pollutant concentrations that are typical of old municipal solid-waste landfills. This leachate appears to discharge into Jamaica Bay (rather than into groundwater), where its effect cannot be detected. (It has been estimated that the landfill leachate contributes less than one percent of the total pollutant loadings to the Bay from all sources.) Landfill gas is vented to the air via a series of wells drilled for that purpose.

Because of evidence that illegal dumping of hazardous wastes took place at four other recently closed landfills (Pelham Bay, Pennsylvania Avenue, Brookfield Avenue, and Fountain Avenue, in order of closing), they too are all classified as Class 2 inactive hazardous waste sites. The City is under order by the State Department of Environmental Conservation to remediate these

Figure 3.6.1-1: Closed Landfills



sites, and is entitled to State funding to develop and implement the remediation plans (called "Remedial Investigation/Feasibility Studies") for them. In 1990, the Department of Environmental Protection took jurisdiction of these sites, and will undertake the remediation efforts in conjunction with its sludge-management program. (Chemically treated sludge may be applied as a "protection layer" over other capping material, as a substitute for clay, which would put this material to beneficial use).

Two of these former landfills, Fountain Avenue and Pennsylvania Avenue, after remediation efforts have been completed, will become part of the Gateway National Park, under the ownership of the National Park Service.

A more detailed description of these former landfills is presented in Appendix Volume 4.2.

#### 3.6.1.2 The Fresh Kills Landfill.

Today there is only one active landfill in New York City, the 2,900-acre Fresh Kills landfill in Staten Island, which has been in continuous operation since 1948. It is operated under a consent order with the State Department of Environmental Conservation because it does not fully comply with current regulatory requirements for the issuance of an operating permit. This is in large part due to the fact that it was begun before regulations governing the siting and operation of landfills were instituted. Under the Fresh Kills Consent Order, the Department must submit draft permit applications (for a solid-waste-management facility permit, for a state pollutant discharge elimination system permit, and for a tidal wetlands permit) by September 15, 1994. Variances must be granted from certain provisions of the DEC Part 360 regulations if permits are to be obtained, because the landfill cannot be retrofitted to meet certain permit requirements, particularly those with respect to liner construction and the method of collection and removal of leachate.

Fresh Kills, which operates 24 hours a day, six days a week, currently receives about 14,000 tons of refuse a day. Fewer than a thousand of those tons are collected from commercial establishments and delivered by private carters, who pay \$40 a cubic yard (about \$80 a ton) to dispose of their loads there. (Before this tipping fee was raised from \$18.50 in 1988, an average of 6-8,000 tons of private carter waste were delivered to Fresh Kills each day.) Most of the municipally collected refuse sent to Fresh Kills is delivered by barge; only about 1,000 tons of municipal refuse collected in Staten Island are delivered by truck. The trucks enter the landfill, pass over scales, drive on paved roads to that day's so-called "active face," and dump their

loads. The barges are unloaded by crawler cranes. The cranes drop the refuse onto a concrete pad which is surrounded on three sides by retaining walls (in order to minimize wind-blown litter). A front-end loader scoops the refuse from the fourth side and loads it onto heavy, rubber-wheeled transport vehicles. After these vehicles are filled, they are covered by tarpaulins, and then haul the refuse to the dump site.

Specially designed vehicles with heavy, cleated rollers and front-mounted blades drive over the refuse to push it into place, level it, and compact it. A layer of clean soil ("intermediate cover") is placed over each 15-foot refuse "lift" before the next layer of refuse is applied. After an area of the landfill is filled to its planned height, it is covered with a layer of clean "final" cover.

The layers of intermediate and final cover reduce the amount of precipitation that can enter the refuse mass and percolate through it, leaching pollutants from the refuse in the process. Beneath the Fresh Kills landfill are relatively uniform and impermeable layers of packed silts and clay, which prevent most of the leachate that is generated from entering underground aquifers. Natural "intragradient" hydraulic pressure -- the result of the relationship of certain refuse areas to surrounding geological strata -- keeps most leachate within the refuse mound, but some escapes. The escaping leachate, estimated to be on the order of one million gallons a day, is released primarily to the adjacent surface waters of the Arthur Kill, Fresh Kills, and Little Fresh Kills Creek. (The word "kill" is derived from the Dutch for "creek.") To reduce the amount of leachate that escapes from the landfill, the Sanitation Department is in the process of constructing underground barriers to cut off horizontal leachate flows, and a system of collection pipes and pumps that will direct the captured leachate to an on-site treatment facility. Treated effluent from this facility will be released to adjacent surface waters. Pursuant to the Fresh Kills Consent Order, construction of the leachate mitigation system must be completed by November, 1996, and leachate treatment must commence by December, 1996.

The Woodbridge and Fresh Kills Consent Orders also require several initiatives to improve water cleanliness. Under the consent orders, the Department adopted written operating procedures, collectively known as the "Clean Water Management Plan," installed a marine boom system to contain litter that escapes during barge unloading, developed a skimmer-boat fleet to collect litter from the waterways surrounding the marine unloading system, conducted a series of shoreline clean-ups, and installed litter-containment fences.



The inevitable decomposition of landfilled refuse also generates gaseous emissions. These "landfill gases" are composed of about equal parts methane (natural gas) and carbon dioxide, laced with a small percentage of other compounds. As gas is generated by decomposition it builds up pressure and moves through the cracks and crevices in the garbage. This movement results in the venting of landfill gas to the atmosphere or migration into soils adjacent to the landfill. Currently, most of the gases generated at the Fresh Kills landfill are safely vented to the atmosphere. To prevent the subsurface movement of landfill gas into surrounding soils, a series of vents is being installed around the perimeter of the landfill. In addition, gas is actively pumped from portions of the landfill to a facility owned by GSF Energy, which refines and polishes the gas to supply the needs of 20,000 residential customers of Brooklyn Union Gas on Staten Island. Proposals for installing gas-recovery systems in the remainder of the landfill are being solicited through an RFP. The Department is also in the process of installing additional landfill-gas-monitoring and -control systems.

In spite of the various technologies that are being used at Fresh Kills to manage gaseous emissions, odorous substances are released, and at times permeate the surrounding area. These molecules are also the result of microbial activity, and although they constitute only a small percentage of the gases produced, they have been offensive to local residents. A variety of odor-control chemicals have been tried to mask or oxidize the odorants, with only partial success. Because moisture is essential for the metabolism of the microorganisms, the odor problem will be mitigated as sections of the landfill are capped and closed.

Fresh Kills is divided into four major areas, each of which is essentially a separate landfill mound. The current design for the "completion" of these mounds calls for peak elevations that range from 150 to 435 feet. Under the consent order between the City and the DEC, two sections are required to close by November 30, 1992. There is space remaining inside the landfill for about 100 million cubic yards of material. A more stringent limitation on the City's available landfill capacity than this remaining volume, however, is the rate at which material can be "loaded" onto the existing "bases" because of the dynamics of the geological strata (primarily clays and fine silts) underlying these mounds. These soils, under the compressive weight of additional landfilled tons, collapse and consolidate as water, trapped between the soil grains, is expelled and the materials are forced together.

The majority of sediments underlying the Fresh Kills landfill consist of fine-grained, hydraulically restrictive

materials, although lenses of transmissive, generally discontinuous sand strata occur within the overburden soil matrix. The majority of leachate discharge, which is estimated to be on the order of 1.5 million gallons per day, is routed through the shallow-flow system (refuse or transmissive upper strata) into surrounding river channels: the Arthur Kill, Fresh Kills, Main Creek, and Richmond Creek. The potential for migration of leachate to deeper transmissive sand strata occurs only with portions of the southern landfill area.

The Sanitation Department is currently completing the first stage of a \$20-million engineering and hydrogeological investigation, which is being performed to support the design of leachate-control and -treatment facilities. Pursuant to the requirements of the Fresh Kills Consent Order, construction of the leachate-mitigation system must be completed by November, 1996, and the treatment of leachate initiated by December of that year.

A more detailed description of the Fresh Kills landfill is presented in Appendix Volume 4.2.

### 3.6.2 Export Outside New York City.

#### 3.6.2.1 Export to Landfills.

Landfill operators and regulatory officials in other states (and in upstate New York), along with waste brokers and transfer-station operators, were surveyed to discover where commercial waste that leaves New York City goes. The major purposes of this study were to find out: how much waste is sent to which landfills, how, and for what cost; what the future capacities of these landfills and of other potential landfills within the economically feasible haul range delineated by this study are; and what current and anticipated regulatory constraints may affect future waste export from the city. The study identified about 35 landfills that receive New York City waste. Only three of these receive waste by rail. Truck transport will continue to be the primary mode of transportation for the foreseeable future, but rail transport could become more competitive as disposal capacity in the East become less available and as shipments are accordingly sent further west. Tipping fees were found to drop off dramatically at distances greater than 500 miles. Although the number of landfills is expected to decrease dramatically, major expansions are planned for many of those that will remain in operation; the net result is that substantial capacity near New York City should be available (barring, of course, the imposition of regulatory restrictions) for at least the next 15 years.

If restrictions on waste export eventually require the disposal of this waste within the limits of New York City, it will be disposed of at the Fresh Kills landfill and/or in whatever waste-to-energy or in-vessel compost facilities then exist.

A detailed analysis of commercial waste exported to landfills outside New York City is presented in Appendix Volume 2.

#### **3.6.2.2 Export to Waste-to-Energy Facilities.**

There are many fewer waste-to-energy facilities, with much less available daily capacity, than there are landfills in the United States, and the disposal fee at these facilities is generally higher than is the fee for depositing waste at most landfills. Relatively little New York City waste is therefore exported to waste-to-energy facilities. A small amount of city commercial waste is disposed of at the Hempstead, Long Island waste-to-energy facility, and some commercial waste was disposed of at the Essex County, New Jersey facility. (A more detailed discussion of waste export to waste-to-energy facilities is also in Appendix Volume 2.)

#### **3.6.2.3 Export to Recycling Facilities (and Private Recyclables Processing Facilities Within the City).**

Beginning in 1990, in order to reduce the overflow at the City's one intermediate processing facility, in East Harlem, the Sanitation Department contracted with two facilities, one in Westbury, Long Island, and one in Newark, New Jersey, to process approximately half the commingled metals, glass, and plastic collected in the Department's programs. These contractors processed an average of about 90 tons per collection day during fiscal year 1991. These contracts were bid on a per-ton basis.

In a second round of bids in January, 1991, a number of private firms, both within the city and outside it, offered substantially more processing capacity. The two initial contractors in Westbury and Newark built new, larger plants, and received new contracts. In addition, one new facility within the city received a contract, and a contract for another such facility is under consideration. It is expected that private materials-recovery facilities, both inside and outside the city, will be able to handle a substantial proportion of the City's recyclables collections for the next three to five years.

### 3.7 Sludge.

There are 14 sewage treatment plants in the city. Two sludge dewatering facilities came on-line at the end of December 1991 and dewatered over 20 percent of the city's sludge production during the first half of 1992, as per the consent-decree requirements. Six additional facilities came on-line by June 30.

As noted in Chapter 1, New York City's sewage sludge has been dumped in the ocean since 1938. From 1938 until 1987, the dump site was located 12 miles from shore; from 1987 until June 29, 1991, the dump site was 106 miles from shore, at the Deep Water Municipal Sludge Dump Site; sludge was transported to the dump site by barge.

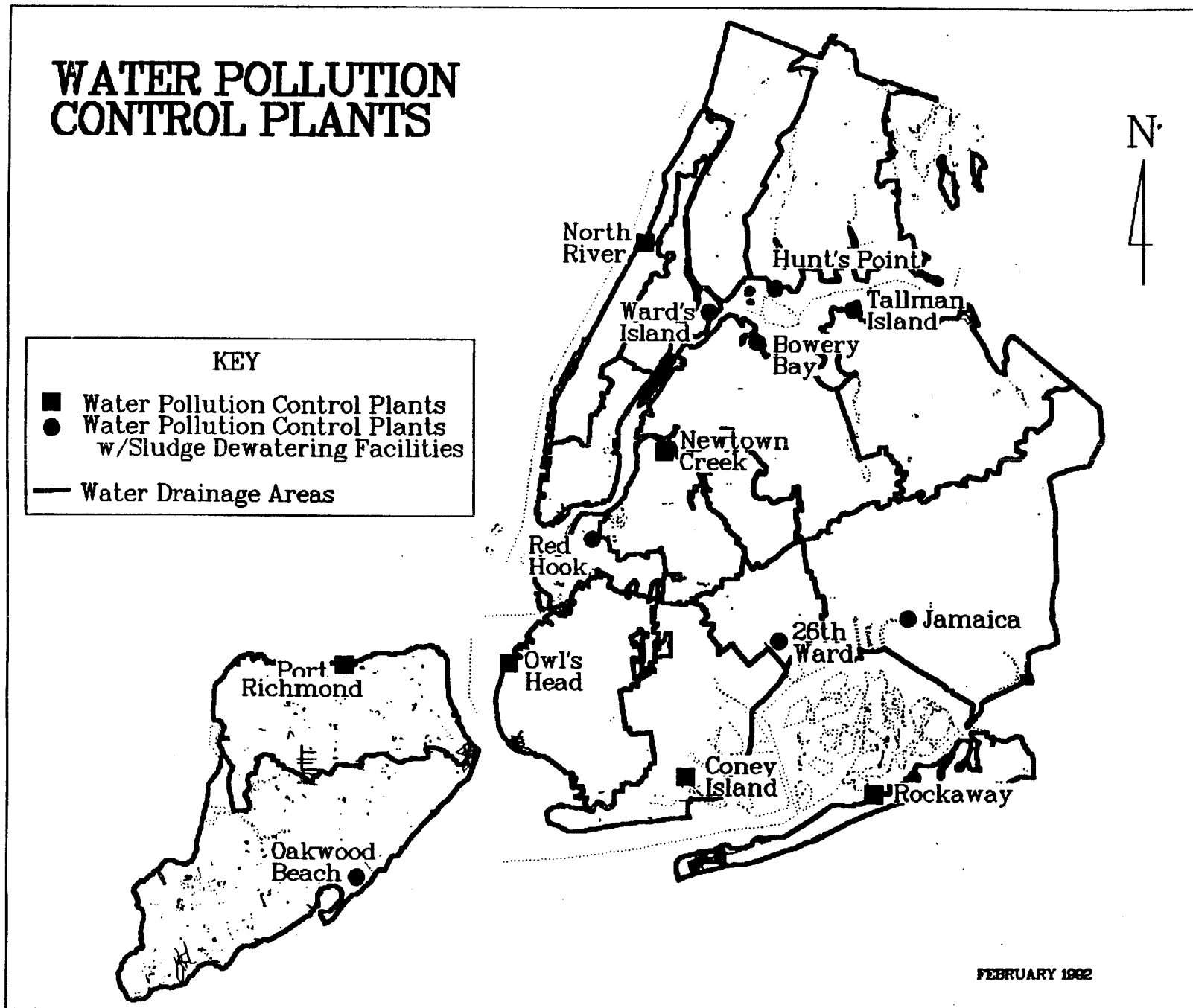
The City of New York and the U.S. Environmental Protection Agency signed a consent order pursuant to the 1988 Ocean Dumping Ban Act, which committed the City to end all ocean-dumping of sewage sludge on July 1, 1992, or pay a stipulated penalty. The City met that deadline: all of the city's sludge is now being managed through land-based alternatives. The Department of Environmental Protection has interim contracts to ship dewatered sludge to a landfill in Virginia, as well as land-application sites in the Western United States (until a sludge-drying facility is built in New York City), and to land-application sites in Texas. The DEP is currently reviewing proposals for additional sludge use and disposal capacity.

### 3.8 Medical Waste.

About half of New York City's medical wastes are incinerated (300 tons a day of black-bag medical waste in a Sanitation-Department incinerator and 70 tons of regulated and non-regulated waste in on-site hospital incinerators). The other half (a total of about 400 tons per day of red- and black-bag wastes) are exported out of the city; slightly more than a third of these exported tons are incinerated, the remainder are landfilled. Red-bag medical waste cannot be burned at the Sanitation Department's incinerators. The ash from on-site hospital and Sanitation-Department incinerators is landfilled at Fresh Kills.

The total cost of this disposal system in 1990 was estimated at \$150 million dollars, of which about \$45 million was the cost of exporting regulated waste, and \$10 million the cost of exporting black-bag waste. The Health and Hospitals Corporation's share of these overall waste-disposal costs was \$22 million, \$8 million of which were for red-bag wastes. These

Figure 3.7-1: Water Pollution Control Plants



costs represent a very significant increase over the recent past, due to new regulations for red-bag waste.

At present, all of the regulated medical waste generated by facilities of the Health and Hospitals Corporation is shipped out-of-state. While there is sufficient out-of-state capacity for the treatment and disposal of these wastes for the foreseeable future, that capacity may not be available for New York City wastes due to proposed regulations that would restrict the importation of waste. The HHC has no on-site capacity for treating red-bag waste so that it can be converted to black-bag waste. However, there are a number of autoclave/compaction units that are planned or in operation; some potential exists for retrofitting these units with shredders, so that treated waste would be classified as non-regulated medical waste. In addition, a new incineration facility constructed at Coney Island Hospital, which is not licensed for operation, may be retrofitted to comply with the new DEC regulations that became effective on January 1, 1992; this facility, with a capacity of 5 tons a day, could incinerate about a quarter of the red-bag waste generated by the HHC.

A more detailed discussion of current medical-waste-management methods is presented in Appendix Volume 8.

### 3.9 Harbor Debris.

The large pieces of wood and metal that are left when old pier structures are demolished or renovated are disposed of by private contractors upland, primarily in out-of-state landfills (landfills in New Jersey and Ohio have been used recently); there are also unsubstantiated reports of a Staten Island contractor who chips wood for use as fuel in an upstate power plant (if true, this practice is not sanctioned by the State DEC).

Most of the small pieces of floatable materials that are scooped from the surface of the rivers and harbor or collected from the shore -- primarily bits of wood, plastic, and paper -- are taken to the Fresh Kills landfill.

A more detailed discussion of management methods for harbor debris is presented in Appendix Volume 4.2.

### 3.10 Dredge Spoils.

The total quantity of dredged material generated in the New York/New Jersey Harbor averages 7.7 million cubic yards per year. Dredging and transport operations are typically performed by private companies. Ocean dumping has been the predominant

disposal technique because large quantities of uncontaminated and clean sand are generated from routine channel and berthage dredging and there has been no well-developed, economically and environmentally suitable alternative. However, the recently passed Water Resources Development Act of 1990 requires the EPA to identify a disposal site at least 20 miles from shore and to submit to Congress a long-term management plan for material dredged from the NY/NJ Harbor.

The Sanitation Department traditionally has disposed material generated from dredging operations at marine transfer stations in the ocean. However, the NYS DEC has denied ocean disposal permits to Sanitation Department projects due to unacceptable amounts of municipal solid wastes mixed with dredge spoils. Consequently, the Sanitation Department developed a dredge-spoil-dewatering facility at the Fresh Kills landfill for the management of the dredged material it generates.

#### 3.10.1 Ocean Disposal.

Historically, the bulk of material dredged from the NY/NJ Harbor area has been deposited in shallow ocean sites. During the period 1984 to 1990, the Mud Dump Site, which has been relied on almost exclusively for large and medium-sized dredging projects, received over 80 percent of the total volume of dredged material generated in the harbor. The Mud Dump site, which has been in operation for 90 years, is located approximately six nautical miles east of Sandy Hook, New Jersey. If the site continues to be used at the current level, it will reach capacity by 1998. The average cost of dumping dredged material at the Mud Dump site is \$5 per cubic yard, but in addition to this cost, the EPA requires expensive biological testing.

#### 3.10.2 Upland Disposal.

Rather than incur the expense of the biological testing required for ocean-disposal permits, many small-scale generators of dredge spoils (for projects producing less than 5,000 cubic yards) choose to dispose of their dredged material at upland sites. Dredged material is frequently piled or used as fill on land adjacent to the dredging activity.

The Sanitation Department has developed a pilot dewatering facility at the Fresh Kills landfill for the dredge spoils it generates. This facility, which began operating in 1986, can accommodate up to 10,000 cubic yards of spoils. The de-watered material is used for landfill cover. The site of this dewatering facility is the location for a proposed ash landfill. As of January, 1992, the Department is preparing a Request for Proposals for consultant services for the development of

alternatives for the replacement of this facility.

A more detailed discussion of current management methods for dredge spoils is presented in Appendix Volume 4.2.

### 3.11 Construction and Demolition Waste.

Most of the construction and demolition debris generated by the private sector is hauled to transfer stations where cardboard, wood, concrete, metal and dirt are recovered for recycling by equipment that crushes, shreds or screens. Clean dirt is accepted free at Fresh Kills and at landfills on Long Island for use as daily (or intermediate) cover material.

The Sanitation Department has a concrete recycling plant at Fresh Kills which crushes and screens concrete, asphalt, and soil debris from City-agency construction projects and from contractors who pay a tipping fee. The processed aggregate it produces is used at the landfill, primarily for road construction, and also for cover material. The facility consists of conveyors, a jaw crusher for size reduction, screens for particle sizing, and magnets for removal of metals.

A more detailed discussion of current management methods for construction and demolition debris is presented in Appendix Volume 4.2.

### 3.12 Regulatory Framework.

Management of municipal solid waste is subject to federal, state and local regulations. This section provides a brief overview of relevant statutes, and, where appropriate, recent amendments to them.

On the Federal Level, the Clean Air Act (CAA), the Resource Conservation and Recovery Act (RCRA), the Federal Ocean Dumping Ban Act, and the Medical Waste Tracking Act are the major statutes that place direct controls on the handling of solid waste. The Medical Waste Tracking Act established federal requirements for "cradle-to-grave" tracking of regulated medical waste. The Act, which expired in 1990, essentially mandated a medical-waste-tracking pilot program. Since the implementation of the federal pilot program, New York State has adopted medical-waste-handling requirements that are at least as strict as those tested in the federal program. As has been mentioned previously, the Ocean Dumping Ban Act prohibits ocean disposal of solid waste, including sewage sludge, as of July 1992.



The CAA, which establishes national ambient air quality standards, underwent comprehensive amendment in 1990. To assist in the achievement of these standards, the CAA places controls on specific sources or potential sources of polluting emissions, including municipal incinerators.

The 1990 amendments supplemented existing air-pollution-source permit requirements under Title V of the CAA. These amendments imposed additional requirements for an operating permit pursuant to section 305 of the CAA, which specifically regulates municipal incinerators. Both permits are to be issued simultaneously in accordance with a state and/or local permit program. To obtain permits, municipalities must demonstrate that systems are in place to control certain emissions. The section 305 operating permit can be issued for a period of up to 12 years, and must be reviewed every five years after the date of issuance or reissuance. The Title V permit is issued for up to five years. The five-year permit renewal under Title V may have an operational impact on existing incinerators, because the technological standard applied to these incinerators may require the installation of scrubbers, baghouses, and mercury controls.

Currently, RCRA's principal focus is on cradle-to-grave tracking of hazardous waste. However, RCRA is scheduled for reauthorization, and it is likely that its scope will be expanded to a broader range of solid-waste-management issues, including recycling and the interstate transport of solid waste. The City's priorities for RCRA reauthorization include federal initiatives for the development of markets for recyclable materials (including mandating minimum recycled content standards for certain products) and packaging reform. The City vigorously opposes proposals to prohibit, or impose, discriminatory fees on the interstate transport of solid waste, and believes the establishment of recycling mandates for municipalities, without consideration of recycling markets, is counterproductive. (See Section 19.3, Legislative Initiatives for Plan Implementation, for a detailed discussion of the City's federal legislative proposals.)

The Ocean Dumping Ban Act of 1988, which prohibits the dumping of sewage sludge at sea, and which is the basis for the US EPA/NYC DEP consent agreement that will end New York's dumping of sewage sludge at sea by July 1, 1992, has been mentioned above.

At the State level, the Solid Waste Management Act of 1988 (SWMA), Chapter 70 of the Laws of 1988, is the most recent major piece of solid-waste-management legislation. It was the 1988 SWMA that mandated the preparation of this plan. In addition to requiring each planning unit to prepare a solid-waste-management

plan that covers at least a ten-year period, the 1988 SWMA established the State solid-waste-management hierarchy (reduce, re-use, recycle, incinerate with energy recovery, landfill); created the State's Bureau of Waste Reduction and Recycling; mandated the adoption of state emblems to connote re-usability, recyclability and recycled content, and regulated the use of these emblems; established a 10 percent price preference for the purchase of paper products by the State and various other political entities; and required municipalities to adopt source-separation programs ~~for recyclable components of the waste stream for which economic markets exist~~ by September 1, 1992. (See Section 19.3 for the Department's recommendation regarding amendments to local source-separation mandates.)

The Act specified that no permit application to construct a solid-waste-management facility submitted to DEC after January 1, 1990 was to be considered unless a local solid-waste-management plan had been deemed acceptable by DEC. In the 1990 legislative session, this deadline was extended to April 1991. The Act further requires that every application for a permit to construct a solid-waste-management facility, or any renewal application for a permit to operate one, demonstrate how operation of the particular facility is consistent with the planning unit's approved solid-waste-management plan.

~~A predecessor to the SWMA of 1988 was Chapter 560 of the Laws of 1980, certain provisions of which also simultaneously amended section 120-w of the General Municipal Law.~~ Among other things, Chapter 560 provides the City with the authority to adopt a local flow-control ordinance. This authority is essential to the financing and development of an integrated solid-waste-management system because a flow-control ordinance provides local control over the movement of municipal solid waste, thereby ensuring that solid waste management facilities are used efficiently and economically. GML 120-w and Chapter 560 also provide the City with the ability to develop facilities through the use of long-term full-service contracts. However, the siting of solid-waste-management facilities established pursuant to these laws, with the exception of recycling and compost facilities, is specifically restricted to sites enumerated in GML Section 120-w(5)(a). (See Section 19.3 regarding the Department's proposal to remove these site restrictions.)

During the 1990 State legislative session, a Department-supported bill establishing a surcharge system for lead acid batteries was passed. The bill, which became effective in January 1991, requires consumers to pay a \$5 surcharge when purchasing a lead acid battery unless one is returned. Retailers of lead acid batteries are required to accept from a consumer up to two batteries per month, regardless of whether the consumer is

purchasing a replacement battery. During the 1991 State legislative session, with the support of the Department, a bill was enacted to mandate the reduction of toxic constituents in household batteries and a study of various disposal options for household batteries. The 1991 legislature also extended to all products, as opposed to just paper products, the 10 percent price preference provisions of the SWMA. A 15 percent price preference was authorized for products made from materials recovered from New York State's waste stream.

In addition to State laws regulating collection and disposal of solid waste, there are numerous rules, primarily administered by the DEC, that more specifically regulate solid-waste-management practices, particularly the construction, operation and maintenance of solid-waste-management facilities. Most significant are the requirements of 6 NYCRR Part 360, which regulates all solid-waste-management facilities, and 6 NYCRR Part 219, which governs emissions from municipal incinerators.

Part 360 regulations were comprehensively amended in 1988. The Department's marine transfer stations are permitted pursuant to those regulations. DEC consent orders designed to bring other major Department facilities that were in existence prior to 1988 into compliance with the updated requirements have been or are in the process of being negotiated. Where compliance upgrades are not feasible, the Department will eventually be required to seek a variance from the specific requirement if a DEC permit is to be obtained.

The local regulatory framework also affects solid-waste management. As discussed previously, Local Law 19 of 1989, New York City's mandatory recycling law, and Local Law 40 of 1990, which expanded the Department's regulatory purview over solid waste transfer stations, are of primary importance. In addition, Local Law 75 of 1989 contains local requirements for the handling of regulated medical waste, and includes a requirement that generators of regulated medical waste file with the Department a solid-waste-removal plan that sets forth planned disposal arrangements.

## Endnotes

1. Five-time-per-week collection was reduced to three-time-per-week collection in 1991.
2. The average collection time per route is between 5 and 6 hours.
3. These cost figures -- and all cost figures used throughout this plan for collection, processing, and disposal costs -- do not include administrative/supervisory overhead, or the "capital overhead" related to garages and other such ancillary facilities. Direct fringe benefits for labor are included, as are capital costs for facilities directly related to waste-management (i.e., transfer stations, and processing and disposal facilities). In parallel fashion, overhead and profit are not included in calculations of commercial waste costs.
4. Marjorie Anders, Associated Press, "Rail-Ferry Line Toting Ash from B'klyn to N.J.," Staten Island Advance, 4-16-89.
5. Crain's New York Business, 2-25-91, p.33. A proposal for another new rail-transfer operation, in Long Island City, was recently rejected by the Metropolitan Transportation Authority at the request of Governor Cuomo. Murray, Caryn Eve, "MTA Trashes Waste Facility," New York Newsday, 1-8-92.
6. Typically, six dealers have been involved in this program to date at any given time.
7. Martin Oestreicher to Benjamin Miller, 12-16-91. The DEP, in 1989, reported 2,300 certified on-site residential incinerators, which, according to DEP estimates, burned 1,100 tons of MSW a day.

CHAPTER 4.           EXISTING PROPOSALS FOR SYSTEM CHANGES AND IMPROVEMENTS.

4.1 Prevention Programs.

4.1.1           Currently Proposed Prevention Pilot Programs.

The Sanitation Department is planning a waste-prevention education program for small retail merchants, which will focus on the stores' efforts to reduce their own waste and on convincing consumers to minimize their purchases of packaging and their use of shopping bags. A pilot education campaign is also being planned which will be directed at low-income populations, since current pilot programs have demonstrated the ineffectiveness of the Department's existing education strategies in relation to these populations.

4.1.2           Currently Proposed Prevention Legislation and Executive Directives.

The Department of Sanitation is promoting federal legislative waste-prevention initiatives through its involvement in the Resource Conservation and Recovery Act (RCRA) re-authorization process. The Department is supporting the following specific proposals:

- Establishment of a national packaging hierarchy, which in order of priority would be as follows: (i) no packaging; (ii) minimal packaging; (iii) packaging which is recyclable and is composed of recycled material; (iv) packaging which is recyclable or is composed of recyclable material.
- Establishment of a products-and-packaging advisory board, as currently set forth in the Senate version of the RCRA bill, but with the further stipulations that the board be required to promulgate product and packaging guidelines, and that RCRA establish a schedule for the promulgation of regulations based on these guidelines.
- Reduction of toxic constituents in products and packaging.
- Incorporation of waste-prevention criteria into Federal procurement policy.

At the State level, as a member of the Advisory Group to the Source Reduction Task Force of the Council of Northeastern Governors (CONEG), the Department participated in drafting packaging-reduction legislation which was introduced by the Governor this session. The Department supports the proposed legislation, although it would like to see several of its provisions, such as the reduction (which includes recycling) goal and exemption criteria, strengthened. The Department is also

supporting legislation that would require waste-prevention criteria to be incorporated into State procurement policy.

At the municipal level, the Department has drafted a Mayoral Executive Order on waste prevention in City agencies. The New York City Department of Consumer Affairs, with the support of the Sanitation Department, is proposing legislation to authorize the establishment of exclusive licensing districts for commercial refuse removal. In addition to furthering commercial recycling goals, the exclusive licensing proposal will provide commercial-waste-prevention opportunities. The Department also intends to:

- seek a revision to Local Law 19 which would incorporate waste-prevention criteria in the City's procurement policy;
- eliminate municipal collection of grass clippings;
- require businesses and institutions to develop and implement waste-prevention plans for their facilities.

#### 4.2 Proposed Recycling Programs and Facilities for MSW and Non-Regulated Medical Waste.

##### 4.2.1 Planned Recycling Programs for Sanitation-Collected Waste.

##### 4.2.1.1 Planned Recycling Programs and Facilities for Residential Waste.

The following recycling programs and facilities are in the planning and development stages:

- A 600-ton-per-day Materials Recovery Facility on a site at the Fresh Kills landfill, which will be City-owned but privately designed, constructed, and operated (under a five-year operating contract). A vendor has been selected, and a contract is expected to be signed in the spring of 1992. Permits are expected in the summer of 1992. Construction will take two years.
- A proposed 500-ton-per-day MRF at Erie Basin, Brooklyn, for which a Uniform Land-Use Review Procedure (ULURP) application has been filed.
- Upgrades of the "self-help" bulk drop-off sites, so that metal can be separated for recycling and wood ground for recycling, and the acquisition of more "screen-alls" to facilitate recovery of material from lot-cleaning operations.

- Establishment of long-term paper-marketing agreements, with accompanying contracts for paper baling, and five-year paper-processing contracts with paper dealers.

#### 4.2.1.2 Proposed Institutional Recycling Programs.

The Sanitation Department plans a source-separated pilot program for institutional food waste in the summer of 1992, which will collect between 10 and 40 tons of food waste per week from Staten Island institutions for composting at Fresh Kills. The Department has begun an investigation of separation and collection methods and equipment, and has initiated discussions with Staten Island institutions and the State DEC.

#### 4.2.2 Sanitation Department Recycling Pilot Programs.

In addition to the on-going "Intensive Recycling Program" which is taking place in the Brooklyn Board 6 area, the Sanitation Department plans several test programs of alternative technologies and types of equipment: continuing tests of alternative post-collection separation systems (with varying degrees of manual and automated separation) will take place; equipment for automatically opening plastic bags filled with commingled recyclable containers will be tested at the East Harlem MRF; and 10 two-compartment compactor trucks will be ordered, under a contract with an option to purchase 20 more, so that this relatively new technology can be prototype-tested in terms of its potential operational benefits as well as in terms of its mechanical performance and reliability. The Department also plans to test a source-separated program that includes textiles.

#### 4.3 Compost Programs and Facilities Proposed for MSW.

The Sanitation Department has applied for a construction permit from the DEC for the proposed Edgemere leaf-composting facility.

As part of the "Intensive Recycling" program in Brooklyn, the source-separated food-waste program that began in November, 1991, will continue through August, 1992. Because of the costs and difficulties of distributing the cellophane-lined bags that have been distributed to each participating household, the Department will experiment with different types of bags during the summer.

#### 4.4 Incinerators/Waste-to-Energy/Thermal-Processing Facilities.

#### 4.4.1 Planned Changes for MSW Incinerators/Waste-to-Energy Facilities.

##### 4.4.1.1 Municipal Incinerator Upgrades.

~~The current~~ A \$375-million six-year upgrading program that began in FY' 91 ~~is~~ was designed to improve the environmental performance of these facilities, increase their operating efficiency, and increase their reliability and availability over a projected 20-year lifetime. The program has been revised so that only the planned upgrading of the Southwest Brooklyn incinerator will be undertaken. The Betts Avenue and Greenpoint incinerators are now scheduled to be closed down by the end of 1995. ~~Reciprocating grates (which are already used at the Southwest Brooklyn facility) will be installed at the other two incinerators. New furnace boxes will be installed at Greenpoint, and~~

At the Southwest Brooklyn incinerator, the expansion joints and dampers will be replaced ~~at the other facilities~~ to provide better control over the amount of air in the furnace. Computerized combustion controls and equipment to continuously monitor a variety of combustion and emissions conditions ~~have been installed at Greenpoint and will be added to the other two facilities.~~ Natural-gas-fired auxiliary burners will be installed to ensure that high furnace temperatures are maintained at all times. Fabric filters, which are highly effective in removing soot particles (particulate) from exhaust gases, and acid-gas scrubbers are to be installed ~~at the Betts Avenue and Southwest Brooklyn facilities, while the existing electrostatic precipitators (an alternative type of particulate removal device) have been upgraded to meet more stringent performance standards at the Greenpoint incinerator; acid gas controls will be installed at each of the facilities.~~ Each facility's ash-handling system will be improved to minimize the amount of dust that can escape into the air and to provide capability for off-site transport in sealed containers. Waste-water systems will be improved ~~at the Greenpoint and Southwest Brooklyn incinerators~~ to prevent water discharge into adjacent surface waters and to reduce the amount that is discharged to the sewage system. Retrofits to provide energy-recovery capability are planned ~~for all three facilities.~~

This retrofit program ~~began in FY '91, and is expected to be completed by FY'96 at all three facilities by FY '99.~~ When this program has been completed, the Southwest Brooklyn incinerator ~~these incinerators~~ should meet all applicable regulatory standards. The ~~three facilities together~~ upgraded facility will have the capacity to process approximately 3,000 750 tons of waste a day.



#### 4.4.1.2 Apartment House/On-Site Residential Incinerator Decommissioning.

By local law, all remaining apartment-building incinerators must be closed by 1994.

#### 4.4.1.3 Proposed Brooklyn Navy Yard Waste-to-Energy Facility; Other Municipal Waste-to-Energy Proposals.

In 1978, the Koch administration, based on planning and engineering studies conducted during the prior administration, proposed the construction of a 3,000 ton-per-day waste-to-energy facility at a site in the Brooklyn Navy Yard. A full-service request for proposals to design, build, and operate the proposed facility was issued in 1980, and a private developer was selected in 1981. An environmental impact statement for the project was completed and the project approved by the Board of Estimate in 1985. A Prevention of Significant Deterioration Permit was issued by the U.S. EPA Region II in September, 1990. On February 28, 1992, the EPA Administrator remanded the permit to Region II for the limited purpose of considering the viability of a reasonable materials-separation program for nitrogen-containing materials. A dredge and ocean-dump permit application to the U.S. Corps of Engineers was filed in 1986, and is pending. Permit proceedings before the Department of Environmental Conservation began in 1986, and have continued, intermittently, to the present. In November, 1989, the DEC Commissioner issued his fourth interim decision, which essentially endorsed all aspects of the proposed project's design and operation, but required the Sanitation Department to provide either a complete permit application for an ash landfill for residue from the facility, or evidence of a five-year capacity commitment for a landfill outside the City that is permitted to receive ash. The Sanitation Department submitted a permit application for an ash landfill with an accompanying Draft EIS (see section 4.5), both of which were certified as complete in March, 1991. The Department of Sanitation formally withdrew this permit application on September 1, 1992, in conjunction with the submission of this final solid-waste-management plan to the DEC.

In December, 1984, the Board of Estimate requested that the Sanitation Department prepare environmental impact statements for waste-to-energy facilities in the four boroughs other than Brooklyn. Work on these environmental impact statements began in the fall of 1985, but they were not completed when the Solid Waste Management Act of 1988 was enacted. In view of the requirements established by this Act (and by the regulations issued pursuant to it in 1989) -- that each locality in the State must develop a comprehensive solid-waste-management plan before a

permit application for the construction of any new waste-management facility can be certified as complete by the Department of Environmental Conservation -- the Sanitation Department decided to suspend any further consideration or analyses of these proposed projects until the present planning process is completed, so that any decision to proceed with one or more of these projects, either as originally proposed or as modified in light of more recent analyses, can be made on the basis of the recommendations contained in this comprehensive solid-waste-management plan.

#### 4.4.1.4 Proposed Private-Carter Waste-to-Energy Facilities.

There are no known private waste-to-energy facilities currently proposed in New York City.

#### 4.4.2 Proposed Private Incinerators for Regulated Medical Wastes; On-Site Incinerator Upgrades/Decommissioning; HHC Proposals; Proposed Autoclave Facility

The Bronx-Lebanon Hospital Center began start-up acceptance tests for a newly constructed 48-ton-per-day regional medical-waste incinerator in the South Bronx on July 3, 1992. The facility has not yet received a State operating permit. This plant uses two-stage starved-air technology, in two one-ton-per-hour modular, controlled-air incinerators. It will accept boxed regulated medical waste from all types of medical-waste generators in New York City. The plant is equipped with heat-recovery equipment. The air-pollution-control equipment consists of a dry-lime-injection scrubber for acid-gas control, and a fabric filter to control particulates. Auxiliary natural-gas burners will be used to maintain combustion temperatures at specified levels. The facility is equipped with computerized combustion controls, and continuous combustion and emission monitoring equipment. Flyash and bottom ash will be disposed of separately in landfills outside New York City.<sup>1</sup>

The volume of regulated medical waste is reduced by 95 percent when it is incinerated, and its weight by 90 percent. (Volume reduction for non-regulated medical waste is closer to 90 percent.) The addition of lime via acid-gas control systems, however, can add significantly to the final weight of the residue.

Air-modelling analyses of the Bronx Lebanon facility show that the maximum impacts would be substantially below all federal and State standards and guidelines.<sup>2</sup>

The Bronx-Lebanon facility has the capability of producing 120 million pounds of steam per year, but the existing market

demand is only a third of that; since the cost of constructing and operating a one-megawatt electrical turbine is uneconomic, any unsold steam will be condensed. The facility will use 10,900 million BTU of natural gas a year, and about 2.5 million kilowatt hours of electricity.

The net daily water usage of the Bronx-Lebanon incinerator is expected to be 8,400 gallons.

The Bronx-Lebanon incinerator generated an estimated 40 person-years of construction employment, and will provide 25 operating jobs.

The Bronx-Lebanon incinerator occupies one acre.

A different type of thermal process, autoclaving, has been proposed for New York City by a private company, Sani-Pak. Autoclaving is a technique for disinfecting medical waste by steam prior to its ultimate disposal by incineration or landfilling. Sani-Pak has proposed a system that combines autoclaving and compaction for on-site use at hospitals. Since the compacted wastes that emerge from the Sani-Pak system would still be recognizable as medical wastes, New York State law would require that they be manifested as "treated regulated medical waste" when they are shipped to landfills or incinerators. (A proposal for a regional autoclave facility at the Brooklyn Navy Yard, which was made by Browning Ferris Industries, was withdrawn in 1991.)

An autoclave facility would release volatile organic compounds into the air, because compounds in the raw waste would be volatilized by contact with the steam, and because other compounds would be produced as the result of organic reactions inside the autoclave. It is difficult to estimate emissions of these organic compounds due to the heterogeneity of this waste stream, the complexity of their reaction processes, and the paucity of data on air emissions from autoclave facilities; it is likely, however, that hydrocarbons would be among the compounds of greatest concern. (Additional air emissions would be due to the eventual incineration or landfilling of the autoclaved wastes.)

Odors, described as "much like styrofoam cups tossed in a campfire,"<sup>3</sup> have been reported at autoclave facilities, but condensers would reduce their effect. Since odors have been reported from wastes for a period of hours after they have been autoclaved, and since no existing facility shreds and heat-presses autoclaved waste, it is not known to what extent this secondary process might affect odor generation.

Autoclaving per se does not reduce the weight or volume of waste.

The principal difference in transportation impacts between an autoclave facility and an incinerator is that there may be an extra transport step, since all of the autoclaved material may be transported to an incinerator before the residue is transported to a landfill, or that the amount of material that must be transported to a landfill is significantly greater in volume than the amount of residue that must be shipped from an incinerator to a landfill.

The scarcity of data on liquid effluent from autoclaves makes it difficult to estimate pollutant quantities or concentrations, but waste-water tests from some existing facilities show pollutant concentrations that are well below the limits established by the NYC Department of Environmental Protection for discharge to the City's sewers.<sup>4</sup>

The Health and Hospitals Corporation's Coney Island Hospital has a recently constructed 5-ton-per-day incinerator which has not been licensed. It is likely that that facility will be upgraded to comply with the new DEC regulations that went into effect on January 1, 1992.

The HHC also has several existing and planned on-site autoclaving/compaction units. Some of these units may be retrofitted with shredding equipment capable of converting red-bag wastes into non-regulated waste.

More detailed descriptions of these facilities are presented in Appendix Volume 8.

#### 4.5 Upgrades of Current Landfills and Remediation of Closed Landfills.

Some of the major initiatives being taken to upgrade environmental and operating conditions at the Fresh Kills landfill were outlined in Chapter 3. In addition to those projects already cited, the Sanitation Department is studying options for a covered barge-unloading facility in the Main Fresh Kills Creek.<sup>5</sup> This facility is being considered as a measure to reduce further the amount of waste that is spilled from barges during unloading operations at Fresh Kills and to aid in the containment and capture of such spilled waste. Construction of such a facility would take approximately five years, and cost between \$50-125 million, depending on the amount of material that would be unloaded through it.

One of the provisions of the Fresh Kills consent order requires the development of plans to address the disposal of incinerator ash at the landfill. At present, ash residues from the City's three existing incinerators are landfilled together with other waste.

The Sanitation Department submitted a plan to the State DEC in December 1990 that proposed the construction of a new, state-of-the-art ash landfill on a 75-acre inactive site within the current Fresh Kills landfill complex. The site contains dredge spoils drainage basins, which ~~are~~ were proposed to be relocated. Located along the Arthur Kill and Fresh Kills creek west of the West Shore Expressway, the site contains some amount of old fill material but has not been used for landfilling for many years. ~~The facility would be designed and constructed to exceed the environmental standards required by the Part 360 ash landfill regulations.~~

The Department does not intend to proceed with this project and will withdraw the permit application when this plan is submitted to State DEC. Out-of-City ash-disposal capacity, instead, will be sought through an RFP process.

~~The ashfill would occupy 40 acres and provide a total of about 3.6 million cubic yards of ash disposal capacity. It is designed to accept all of the ash generated by the three existing City incinerators after they have been completely upgraded (about 900 tons per day), as well as ash from the proposed Brooklyn Navy Yard waste to energy facility (also about 900 tons per day). It would have a useful life of between 10 and 20 years.~~

~~The facility would be constructed and operated in phases: the six individual cells would be filled, closed, and capped sequentially, so that overall environmental impacts would be minimized. To protect groundwater from leachate contamination, each of the cells would be constructed with a double composite liner (two layers of plastic and clay separated by two drainage layers with pipes) and an impermeable cut off wall would be constructed around the entire perimeter of the site. The double liner system would provide primary leachate collection capability as well as a leak detection and secondary leachate collection mechanism, if necessary. An additional level of protection would be provided by the facility's "intragradient design," by which the liner system would be installed below the current groundwater level so that the groundwater would exert upward pressure on the liner to preclude leachate leakage.~~

~~All of the collected leachate would be treated at an on site facility so that it will be acceptable for discharge directly to the adjacent waterways under a State discharge permit. The~~

~~operating plans for the facility will include regular monitoring of groundwater (10 monitoring wells will be installed around the perimeter of the site), surface water, and leachate quality.~~

~~The total capital cost of the facility, including final closure, is estimated to be \$45 million.~~

Steps being taken to remediate closed landfills were cited in section 3.6, and are discussed in detail in Appendix Volume 4.2.

#### 4.6 Sludge-Management Facilities.

The Department of Environmental Protection has a three-phase plan to end the ocean-disposal of sewage sludge. The "immediate-range" plan involved constructing de-watering facilities at eight of the City's existing water-pollution-control plants. The "intermediate-range" plan involves operating the de-watering facilities and selecting and contracting with private companies to manage the City's sludge until the "long-range" plan is operational. The long-range plan includes the construction of processing facilities capable of producing a sludge product that can be put to "beneficial use." These plans are presented in detail in a series of three generic environmental impact statements prepared by the DEP.

The construction of de-watering facilities is completed, and the process of contracting with private companies for the intermediate-phase plan is well underway. The long-range plan is for a system of six processing facilities to produce compost, or thermally dried or chemically stabilized sludge. "Back-up options" to the proposed plan include the use of additional sites for sludge processing and/or increasing the capacity of facilities at the six preferred sites. Users of these sludge products are expected to include both City agencies and private parties.

The intermediate plan calls for building several facilities. One of them is a 300-dry-ton-per-day (DPTD) (peak-capacity) thermal-drying plant in the South Bronx, which would produce pellets to be marketed to manufacturers of fertilizers and landscaping products. Between July 1, 1992, when ocean-disposal ceased, and the time that this plant is operational (which is expected to be in August, 1993), the sludge allocated to this facility will be exported out of the City for processing elsewhere. An additional up-to-277 DTPD will be shipped by rail cars (which will be barged across the Harbor by the Cross Harbor Railway) to land-application sites in Texas and other western states. An additional up-to-132 DTPD will be transported by

truck to a landfill in Maryland.

The proposed long-range plan calls for building facilities with the following peak capacities: two processing facilities on Wards Island, one of which would chemically stabilize 180 DTPD, the other of which would compost 40 DTPD; a thermal-drying facility in the Hunts Point section of the Bronx which would handle up to 300 DTPD; a South Brooklyn composting facility to process 128 DTPD; and a composting facility at Newark Bay in Staten Island, which would process up to 70 DTPD.

#### 4.7 Currently Proposed Changes for Managing Harbor Debris.

Federal law prohibits the ocean burning of harbor debris after December 31, 1992. However, because of the difficulty of meeting the regulatory standards established by the EPA, the Corps of Engineers no longer issues ocean-burning permits. The EPA and the COE instead recommend that harbor debris be processed for incineration in waste-to-energy facilities, or used as a source of fuel in other suitable types of combustion facilities.

#### 4.8 Currently Proposed Changes for Managing Dredge Spoils.

The Dredged Material Disposal Management Plan prepared by the U.S. Army Corps of Engineers, New York District, evaluates alternatives for the disposal of dredged materials. The disposal options for clean dredged material include unrestricted ocean dumping, wetlands disposal, beach nourishment, landfill cover, and other beneficial uses. The life of the Mud Dump Site can be extended if some of these options are implemented. The major problem facing the New York/New Jersey Harbor is the disposal of contaminated dredged material -- about two to five percent of the annual volume -- which does not meet the criteria for unrestricted ocean disposal. The Mud Dump Site can continue to be used for uncontaminated dredge spoils until alternative disposal methods are developed. The most practical near-term alternative for the disposal of contaminated dredge spoils (other than the use of the Sanitation Department's dredge-spoils dewatering facility, which will be dedicated to material dredged by the Department) is the use of existing or newly constructed subaqueous borrow pits in the seafloor of the New York Lower Bay, accompanied by appropriate capping to prevent the escape of pollutants.

## Endnotes

1. Additional information concerning the Bronx Lebanon incinerator is contained in "Bronx-Lebanon Hospital Center Medical Waste Disposal Facility, Project Summary and Expanded Environmental Assessment," n.d., Metro New York Health Waste Processing Inc., 141 Fifth Avenue, New York, NY 10010, and in permit application documents on file at the Department of Environmental Conservation's Region 2 office.
2. The analysis of air-quality impacts from this facility is presented in Appendix E of the Metro New York Health Waste Processing, Inc. report cited above.
3. Spurgin, R.A., Medical Waste Treatment Technologies, Office of Technology Assessment Contract Number N3-2045.0, March 16, 1990, quoted on p. 10, "Review of Autoclaving Technology," in Appendix Volume 8.
4. Sive, Paget & Riesel, "Questions and Responses Concerning BFI Autoclave" (prepared in response to questions posed by Brooklyn Borough President Howard Golden, 8-24-90), pp. 6, 9.
5. For a more detailed description of the proposed barge-unloading facility, see: Department of Sanitation, "A Plan for the Design and Construction of a Single-Barge Enclosed Unloading System at Fresh Kills," 6-15-90.