CHAPTER 17.2 ENVIRONMENTAL AND ECONOMIC IMPACTS OF THE PLAN: Impacts of the Individual Program and Waste-Stream Components.

The preceding section provided an overview of the approach used for environmental-impact assessment. The analysis in this section, in which the individual programs of an integrated waste-management system (prevention, recycling, composting, waste-to-energy, landfilling) and the individual waste streams are broken apart for comparative purposes, is inherently an artificial one, since in the real world the effects of an integrated waste-management system are necessarily combined. Nor is it realistic to treat environmental impacts as if they affected separate environmental media, since effluents flow between media and have cumulative ecological, public-health, and quality-of-life effects. Nonetheless, in order to better understand the individual components of alternative systems for planning and decision-making purposes, what follows is an attempt to focus on the factors that are most directly relevant to particular programs so that the impacts of alternative program elements can be compared.

This analysis does not provide a total picture of the impacts of any one type of program, since, for example, each waste-management technique also has some disposal component (e.g., recycling facilities produce residue that must then be composted, burned, or landfilled; compost facilities produce residue that must be burned or landfilled; waste-to-energy facilities produce residue that must be landfilled). Nor are "overall" impacts such as public health discussed in this section, since these impacts are either secondary to direct impacts (e.g., water pollution), or are cumulative. These general impacts will therefore be addressed in the section after this, in which overall system alternatives are addressed.

Short-term construction-type impacts are not considered in this generic environmental impact statement, since they are relatively equal between various systems and facility types, and thus have little bearing on the system-level decisions with which this plan is concerned. These impacts, which generally relate to noise, air-borne particulate, and traffic, are best examined in a site-specific context, and therefore will be considered in the supplemental environmental impact statements for each of the facilities that are developed in the implementation phases of this planning effort.

17.2.1 Prevention-Program Impacts.

There are considerable difficulties in quantifying prevention estimates, due to the lack of experience with prevention programs, the lack of adequate measurements of the preventable components of the waste stream, and difficulties in assessing future waste-stream growth. The estimates that follow are based on assumptions documented in Appendix Volumes 3 and 7.1.

The proposed prevention program is expected to produce reductions in New York City's waste stream of about four percent in 1995, and of about seven percent by the year 2000, when the program would be fully implemented. (See Appendix Volume 7.1 for a detailed analysis of modeled prevention-program impacts using a range of waste-stream projections.) In the year 2000, this would amount to approximately 600,000 tons a year, composed primarily of the following types of materials: office and computer paper, corrugated cardboard, and mixed paper; grass; glass; and furniture and large appliances (bulk waste). Based on calculations obtained by modeling the City's proposed waste-management system with and without these prevention programs in place, the"avoided costs" to the City's waste-management system due to these reductions are estimated to be in the range of $87 to $92 million in the year 2000, or $700 to $800 million cumulatively between 1992 and 2010 (in net-present-value terms).

On the collection side, a reduction of 600,000 tons a year would reduce collection costs by $26 to $29 million in the year 2000 (because the number of truckshifts would be reduced by four to five percent). Vehicle miles traveled would be reduced by 1.6 million miles per year (using System B for illustrative purposes): a three-percent decrease, which would reduce vehicular air emissions by a comparable amount (but have only a negligible effect on reducing collection noise).

On the processing side, a reduction of 600,000 tons a year would reduce <u>facility capital and operating costs</u> by $58 to $60 million; require 750 million fewer gallons of <u>water</u> a year for rinsing recyclables (by generators)[1] and 100 to 200 million fewer gallons of water in waste-processing facilities;[2] reduce <u>air emissions</u> from recycling facilities by about five percent,[3] from waste-to-energy facilities by six (System A) or seven (System B) percent, from landfills by 18 to 22 percent (A, B), and from ashfills by six to seven (B, A) percent; reduce facility <u>acreage</u> requirements by about 14 acres; demands on <u>landfill capacity</u> by about 15 percent, and <u>ashfill capacity</u> by about 8 percent.

The estimated cost of a partial prevention program (for backyard composting and public education) is $20 per ton in the year 2000, while the full avoided cost would be on the order of $140 per ton for System A and $150 per ton for System B. As much as $120 to $130 per ton in prevention programs therefore could be added before costs would exceed benefits. The effects of a moreeffective-than-projected prevention program and of a less-effective-than-projected program are represented in Figure 17.2.1-1, which shows that prevention programs become increasingly cost-effective as prevented percentages increase. The reason for this is that larger prevented tonnages allow relatively greater reductions in truck shifts and facility capacity; conversely, when reductions are smaller, fewer savings are captured through reduced collection and facility costs.

In addition to the economic costs of prevention programs, there are facility requirements, notably the costs of operating re-use-type centers. Given the range of businesses (many of them charitable non-profit organizations) and circumstances under which such operations are conducted, a useful estimate of the range of facility costs and size requirements in relation to "tonnage throughput" has not been established.

The secondary economic impacts of prevention programs are mixed. Jobs, sales, and taxes would be lost due to the reduction in materials produced and sold, and due to reduced expenditures on the waste-management system. Conversely, reduced costs for waste-management would allow financial resources to go to other (potentially more productive) uses, and the establishment of re-use centers for repairing and/or re-using products would generate new business and employment opportunities.

An illustration of the potential "externality costs" that would be avoided because prevented wastes would not be collected, processed, or disposed of through the waste-management system was presented in Chapter 7. These "<u>disposal</u>-cost savings," however, are far outstripped by the cost savings that would be due to pollutants that could be avoided by <u>producing</u> fewer materials in the first place.[4]

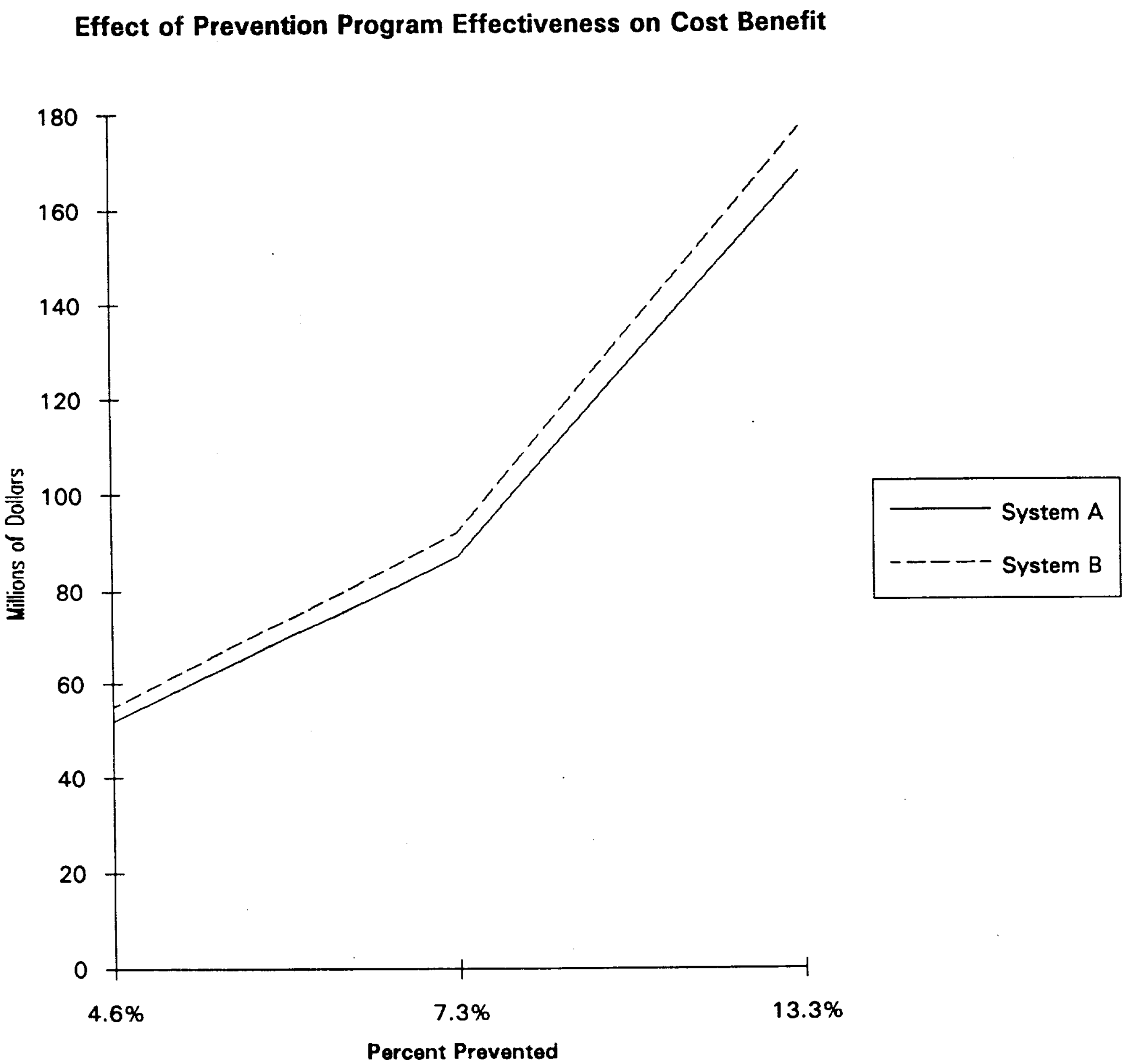
<u>The prevention of an estimated 8,000 tons of medical waste</u> in the year 2000 would cost approximately $21 million (in year 2000 dollars), but would produce overall cost savings on the order of $23 million (due to avoided disposal and operating costs on the order of $44 million). An estimated 39 million gallons of water would be consumed due to these prevention programs, primarily for washing re-usable hospital linens and dinnerware.

In addition, reductions in the amount of medical waste generated may have impacts on worker safety. Among these are the following:

- o Use of more re-usables may increase hospital-induced (nosocomial) infections.

- o Return of food-service trays to kitchen may introduce

Figure 17.2.1-1



pathogens to food stream of institution.

- Less use of disposables may reduce protection of bacteria inhibitors that are often not available in re-usables.
- Greater use of re-usable apparatus that require sterilization could increase worker exposure to two commonly used sterilants, ethylene oxide and formaldehyde, which are probable human carcinogens.
- Use of rigid, re-usable containers instead of red bags would reduce the opportunities for workers to be punctured while moving bags from patient rooms to storage and disposal areas, or while cleaning up plastic bags torn by vermin in storage areas.
- Use of re-usable diapers that necessitate emptying feces before laundering would increase the potential for worker exposure to bacteria and other pathogens.
- Use of re-usable linens could increase the incidence of needle-sticks due to handling and laundering of linens in which used sharps have been improperly discarded.
- Reduction of shipping waste off site would reduce the need for boxing, which often places the packer at risk of needle stick, since there is an incentive to stuff boxes to their fullest.
- Use of fabric gowns in operating rooms would remove the plastic barrier on disposable gowns and scrub suits that has been considered a barrier to bacteria.
- Handling of linens for laundering could increase the potential for needle sticks.
- Emptying re-usable diapers and bedpans could expose workers to bacteria and other pathogens, although there is no evidence of HIV or HBV in feces.[5]

Planned reductions in the amount of harbor debris generated will depend largely on efforts to dismantle aging pier structures before they collapse into the water, a "collection" effort which is likely to require increased, rather than decreased expenditures. Nor are reduced floatables-"collection" expenditures likely, since a fleet of skimmer boats will still be required to operate at approximately the same level even if less material is being picked up. Changes in net disposal costs and environmental impacts are likewise anticipated to be modest, given the already-insignificant tonnages involved. Reductions in harbor debris may have significant aesthetic impacts, however, because even small changes in quantities can have an appreciable effect when minor amounts of material are strewn along recreational beaches and shorefront. The most significant effects of reductions in harbor debris are likely to be the secondary economic impacts associated with fewer beach closings, which produced billions of dollars of lost revenues in New York and New Jersey during the 1988 beach closings.[6]

Minor reductions in the amount of dredge spoils projected to be generated due to planned programs would be difficult to quantify, and the costs and environmental impacts minor. Reductions in the generation of construction and demolition debris would be encouraged through public-education programs, but again, there is no basis for estimating projected tonnage reductions. Avoided costs due to reduced tonnages for these two waste streams, on a per-ton basis, based on the analyses presented below, would amount to approximately $150 and $200 respectively.

There would be no anticipated reductions in sludge tonnage.

17.2.2 Recycling Program Impacts.

Two types of recycling programs are proposed in this plan. The first type involves separate collection systems as well as post-collection processing and sorting; the second involves only post-collection processing of mixed waste to separate recyclable materials before the refuse is composted or incinerated. The first type of program, with separate collection and dedicated processing facilities, includes the "high-quality" program and the bulk-waste program, each of which imposes its own collection costs. The post-collection recovery of recyclables from mixed waste, on the other hand, involves no incremental collection costs.

17.2.2.1 Municipal Solid Waste Recycling Program.

17.2.2.1.1 Municipal Solid Waste Recycling Program: Collection Impacts.

Table 17.2.2-1 presents the tonnage and cost impacts for each type of recycling program modelled for this plan. The tonnage and per-ton cost figures refer to tons recovered as opposed to tons collected.

Tons "recovered" are tons sent to market, i.e., they are tons delivered to processing facilities less processing residue.

Table 17.2.2-1: MSW Recycling Collection Tons and Costs (Year 2000)

Tons Per Year Recovered (000s)[7]:	System A	System B	No-Burn System	Maximum-Burn System
Bulk	183	183	183	183
Res. and Inst. Recyclables	786	786	786	NA
Commercial Recyclables	256	256	256	258
Commercial Paper	673	673	673	646
Commercial Mixed Waste	436	437	436	447
Incinerators	302	328	NA	168
Mixed Waste Composting	NA	NA	370	NA
Total	2,636	2,667	2,702	1,701
Percentage Recovered	31.6%	31.9%	32.4%	20.4%
Annual Collection Costs ($M):				
Bulk	$51	$51	$51	$51
Res. and Inst. Recyclables	$161	$161	$161	NA
Commercial Recyclables	$25	$25	$25	$28
Commercial Paper	$67	$67	$67	$64
Total Collection Costs	$304	$304	$304	$143
Total Collection Costs per Recovered Ton[8]	$160	$160	$160	$132
Collection Costs/Ton by Program:				
Bulk	$281	$281	$281	$281
Res. and Inst. Recyclables[9]	$172	$172	$172	NA
Commercial Recyclables[10]	$75	$75	$75	$84
Commercial Paper[11]	$70	$70	$70	$70

Tons of municipal solid waste recovered in each of the four alternate systems in the year 2000 are divided into seven distinct programs. The bulk collection and processing programs for all four systems are the same, and the programs for residential and institutional recyclables, commercial recyclables and commercial paper programs are the same in Systems A, B, and the No-Burn System. All these programs have both collection and processing components. The three programs that differ between Systems A, B, and N-B -- commercial mixed-waste recovery, pre-processing recovery in conjunction with waste-to-energy facilities, and mixed-waste composting facilities -- have only a processing component.

In the Maximum-Burn System, there are no programs for collecting or recovering residential and institutional recyclables. Commercial recyclables and commercial-paper collection programs differ from those in the other three systems because there are no source-separated composting programs in the M-B System, which would divert significant quantities of paper from the "recyclable" waste stream. This adds to the cost of the recyclables program in the M-B System relative to the other three systems.

The proposed two-truck collection system that would be involved in either System A or B (as well as in the No-Burn System), would involve an annual increase (averaged between Systems A and B) of almost 7 million miles over the Maximum-Burn System, an increase of almost 17 percent. This increase in vehicular mileage would increase vehicular air emissions proportionately, but have a negligible effect on New Yorkers' perceptions of collection noise (although there may be some slight difference in the perception of noise produced by compacting commingled containers only compared to the compaction noise produced when recyclable materials are muffled within bags of unsorted refuse).

17.2.2.1.2 Municipal Solid Waste Recycling Program: Facility Impacts.

Among the four systems there are seven processing programs. Four processing programs correspond directly to the above four collection programs. Residential and institutional recyclables are delivered to six proposed 500-ton-per-day materials recovery facilities, where 786,000 tons of residential and institutional recyclables in Systems A, B, and No-Burn are recovered. There is no residential and institutional recycling in the Maximum-Burn System. In all four systems, bulk materials are delivered to private vendors. Commercial recyclables are delivered to commercial materials-recovery facilities with an overall capacity of approximately 1,100 tons per day. At these facilities, 256,000 tons are recovered in Systems A, B, and No-Burn, and slightly more tons in the Maximum-Burn System.[12] The last of the four programs with both collection and processing components is the commercial paper program. Approximately 673,000 tons of paper are recovered in each of Systems A, B, and No-Burn at paper recycling facilities with an overall processing capacity of approximately 3,000 tons per day. Beyond these programs, there are programs to recover additional unrecovered recyclables at commercial mixed-waste processing facilities, incinerators, and mixed-waste composting facilities.

The mixed-waste processing facilities are designed to serve a dual purpose as both commercial transfer stations and commercial waste recovery facilities. In keeping with the mandates of Local Law 19, these facilities are designed to process all incoming commercial waste and recover as many recyclables as possible. Because these facilities receive a mixed waste stream, the recovery rate is low. In Systems A, B, and No-Burn, almost a quarter of the incoming waste would be recovered for shipment to markets; in the Maximum-Burn D, the recovery rate would be about 20 percent. This lower estimated recovery rate in the Maximum-Burn System reflects the potential for increased contamination of the mixed-waste stream in the absence of a source-separated organics program.

As noted in Chapter 16, there are two potential variations on the type of waste-to-energy facilities that might be constructed, either of which would be acceptable, neither of which has clear advantages over the other. One option is refuse-derived-fuel (RDF) facilities, the other is mass-burn facilities equipped with pre-processing equipment to recover some recyclables prior to combustion. The most likely implementation outcome -- as noted above, somewhere between the bounds defined by System A and System B -- would be some combination of both types of facilities. For purposes of the system comparisions presented below, Systems A and B are presumed to include some pre-processing/mass-burn facilities, and the Maximum-Burn System is presumed to include some RDF facilities. (All system combinations were modeled; these cost and tonnage calculations are presented in Appendix Volume 7.1.) An estimated ten percent more recyclable material would be recovered from these pre-processors in System B than in System A, at less cost, because the source-separated organics program in System B would be expected to produce less contamination of the recyclable materials.

In the Maximum-Burn System, where 168,000 tons of high quality materials are recovered at the incinerators, there are no associated processing costs. These materials are recovered as a result of the refuse-derived-fuel incineration technology employed in this scenario, which recovers materials from the waste stream in order to maintain a high average BTU value for the waste passing across the grate. Because there were no costs associated with the recovery of the materials beyond those inherent in the RDF technology, no processing costs were allocated to the recovery of materials at the incinerators in the Maximum-Burn System.

In the No-Burn System, mixed-waste composting and processing is used to process the mixed waste stream remaining after the targeting of materials in the source-separation programs. As with the incinerators in Systems A and B, these composting facilities have been modified from standard in-vessel composting facilities to include processing capacity capable of recovering high-quality materials that remain in the refuse stream. It is only the net costs of this pre-processing that are reported in the Table 17.2.2-2.

Table 17.2.2-2: MSW Recycling Program Facility Costs and Requirements

($M, Year 2000)	System A	System B	No-Burn System	Maximum-Burn System
Bulk	$15	$15	$15	$15
Res. and Inst. MRFs	$62	$62	$62	NA
Commercial MRFs	$25	$25	$25	$25
Commercial Paper	$56	$56	$56	$56
Commercial Mixed Waste	$20	$20	$19	$23
WTE*	$54	$57	NA	NA
Mixed-Waste Composting*	NA	NA	$52	NA
Total Facility Costs	$232	$236	$229	$118
Total Facility Costs per Ton	$88	$89	$85	$70
Facility Costs/Ton by Program[13]				
Bulk	$84	$84	$84	$84
Res. and Inst. MRFs	$78	$78	$78	NA
Commercial MRFs	$98	$98	$98	$97
Commercial Paper	$83	$83	$83	$87
Commercial Mixed Waste	$46	$46	$44	$52
WTE	$179	$175	NA	$0
Mixed Waste Composting	NA	NA	$142	NA
Land Requirements (acres)**	50	50	50	20
Avoided Landfill Volume Requirements (M cu.yds)	3	3	3	3

* "Recycling facility" costs for waste-to-energy facilities and mixed-waste composting facilities include only those costs directly associated with that portion of the facility that is dedicated to the recovery of materials.

** Not including commercial transfer/processing facilities, nor acreage requirements for pre-processing equipment (which would be partially offset by decreased disposal-facility acreage).

The noise and odor impacts of these proposed recycling facilities would be negligible (as demonstrated in Appendix Volume 6). Potential traffic impacts have likewise been shown to be negligible, since the analysis of sample regions of the city shows that there are a sufficient number of candidate locations that could accept these types of facilities with minimal decreases in levels of service.

It is unlikely that New York City's recycling program would attract or stimulate the growth of a significant amount of new industry for the re-manufacture of secondary-materials (e.g., paper mills, smelters, glass manufacturers), for reasons having to do with the economics of such manufacturing industries in New York City (see the analysis of secondary economic impacts in Appendix Volume 7.2 and the forthcoming City Planning Department study of industries in New York City). "Lighter" types of recycling industries, however, might be attracted to the city.

These industries would be those that are relatively labor-intensive (and not land intensive). To the extent that such businesses would be spurred to develop in New York City, the adverse environmental impacts of manufacturing processes that rely on secondary materials are generally less than those that rely on virgin materials.

Net air emissions and water usage and discharge requirements for these facilities are summarized in Tables 17.2.2-3 and 17.2.2-4 (and in more detail in Appendix Volume 7.2). No water pollutant concentrations are reported because, as noted in section 17.1, there are no process water discharges anticipated from the types of recycling facilities proposed. (These facilities would not emit measurable quantities of sulfur dioxide, arsenic, hydrogen chloride, or dioxins -- the pollutants that are used as examples for the waste-to-energy facilities; in order to compare differences in recycling-facility emissions between scenarios, the four pollutants with the highest emission levels have been added to the standard examples of nitrogen oxides and particulates.)

Table 17.2.2-3: Net Air Emissions from Proposed MSW-Recycling Program

(Tons Per Year)	Nitrogen Oxides	Particulate (TSP/ PM10)	Carbon Monoxide	Lead	Mercury	Volatile Organics
1990 Baseline*	0.01	0.10	0.04	0.00006	0.000007	0.10
2000 Projected Baseline	0.10	0.90	0.30	0.00060	0.000060	0.80
System A (HQ/R)	1.60	20.00	5.00	0.00400	0.000700	9.00
System B (HQ/O/R)	1.60	20.00	5.00	0.00400	0.000700	9.00
No-Burn System	1.60	20.00	5.00	0.00400	0.000700	9.00
Maximum-Burn System	1.20	10/00	4.00	0.00200	0.000500	6.00

Table 17.2.2-4: Net Water Usage and Discharge Requirements for MSW Recycling Facilities

(Thousands of Gallons Per Year)	Avg Intake	Peak Intake	Avg Outflow	Avg Outflow
1990 Baseline	290	340	290	340
2000 Projected Baseline	4,300	5,000	4,300	5,000
A: (HQ/R): RDF	54,000	64,000	54,000	64,000
B: (HQ/O/R): RDF	54,000	64,000	54,000	64,000
C: (HQ/O/R): MWP only	54,000	64,000	54,000	64,000
D: Maximum-Burn	36,000	42,000	36,000	42,000

17.2.2.1.3 Municipal Solid Waste Recycling Program: Total Program Cost Impacts.

As noted earlier, the diseconomies in the commercial mixed-waste-processing facilities displayed in the Maximum-Burn System result from the higher level of contamination of the mixed waste stream entering those facilities relative to those of Systems A, B, or No-Burn. Table 17.2.2-5 summarizes total costs for the recovery of materials in the various recycling programs in the four final systems.

Table 17.2.2-5 Summary of MSW Recycling Program Costs and System Requirements (Year 2000)

Total Annual Costs ($M):	System A	System B	No-Burn System	Maximum-Burn System
Bulk	$67	$67	$67	$67
Res. and Inst. Recyclables	$223	$223	$223	--
Commercial Recyclables	$50	$50	$50	$53
Commercial Paper	$123	$123	$123	$120
Commercial Mixed Waste	$20	$20	$19	$23
Incinerators	$54	$57	--	--
Mixed Waste Composting	--	--	$52	--
TOTAL COSTS	$536	$539	$533	$263
TOTAL COSTS/TON[14]	$203	$202	$197	$155
Total Costs/Ton by Program:				
Bulk	$365	$365	$365	$365
Res. and Inst. Recyclables	$283	$283	$283	NA
Commercial Recyclables	$194	$194	$194	$205
Commercial Paper	$183	$183	$183	$186
Commercial Mixed Waste	$46	$46	$44	$52
Incinerators	$179	$175	NA	--
Mixed Waste Composting	NA	NA	$142	NA

The recycling of bulk materials, residential and institutional recyclables, commercial paper, and commercial high-quality recyclables is identical in Systems A, B, and No-Burn. The cost of recovering recyclables at commercial-mixed-waste facilities is also relatively constant across these three systems. The per-ton cost of recycling in System A is the highest of all four scenarios due to the high cost of recycling materials at the incinerators. The mixed waste stream entering the incinerators in System A is relatively more contaminated than in System B because there is not a source-separated organics program in System A.

Overall recycling costs in the No-Burn System are lower than in either A or B because the pre-processing system at the mixed waste composting facilities is much less costly to operate than those at the incinerators. Whereas recovery of materials at the incinerators costs approximately $170 per ton, at the mixed-waste compost facilities the comparable cost is only $140 per ton. Though the capital cost associated with the mixed-waste compost preprocessor is far higher than its incinerator counterpart, the operating costs are much lower, and the recovery rates higher.

The Maximum-Burn System produces the lowest overall per-ton recycling costs (as well as the lowest recycling rate).

17.2.2.2 Regulated Medical Waste Recycling Program.

At present, a certain amount of otherwise-recoverable paper is included in the regulated-medical-waste stream. This paper is part of the regulated stream only because it is disposed of in containers that hold medical waste, not because the paper is contaminated and merits handling as a regulated medical waste. The recommended regulated-medical-waste-management plan focuses on recovering recyclable paper from the regulated-medical-waste stream.

Under the proposed program, in the year 2000, 1,600 tons of paper would be diverted from regulated-medical-waste containers through source-separated collection programs and taken to the City's materials-recovery facilities. Of that amount (as shown in Table 17.2.2-6), approximately 1,250 tons would be recycled, at a cost of approximately $150 per recovered ton.[15]

Table 17.2.2-6 Medical Waste Recycling-Program Costs (Year 2000)

Tons Recycled	1,251
Collection Costs	$97,000
Collection Costs per Ton	$77
Facility Costs	$183,000
Facility Costs/Ton	$146
Total Costs	$280,000
Total Costs/Ton	$224

17.2.2.3 Construction and Demolition Waste Recycling Program.

Under the proposed program, in the year 2000 an estimated 2.5 million cubic yards of construction and demolition debris would be collected in 40-cubic-yard roll-off trucks and delivered to construction-and-demolition-debris processing facilities, where about half of the delivered material would be recovered for recycling. An average daily processing capacity of about 8,300 tons would be required. Since these construction-and-demolition-debris-processing facilities would serve a dual purpose -- materials-recovery and residue-transfer -- only about half of their total costs (i.e., about $78 million of a projected total of $156 million in the year 2000) would be due to the recycling program per se.[16]

Table 17.2.2-7 Construction and Demolition Recycling Program Costs (Year 2000)

Tons Recycled	1,246,000
Collection Costs	$118 M
Collection Costs per Recovered Ton	$94
Facility Costs	$78 M
Facility Costs per Recovered Ton	$63
Total Costs	$196 M
Total Costs per Recovered Ton	$157
Facility Acreage Requirements	50 acres

Table 17.2.2-8: Net Air Emissions from Proposed Construction & Demolition Processing Program (Tons Per Year)

Nitrogen Oxides	TSP/PM10	Lead	Cadmium	Chromium	Mercury
5	110	0.00067	0.0014	0.0042	0.00072

Table 17.2.2-9: Construction & Demolition Processing Water Supply/Sewer Discharge (000s of Gallons Per Year)

Avg Intake	Peak Intake	Avg Outflow	Peak Outflow
19,000	23,000	19,000	23,000

17.2.2.4 Dredge-Material Recycling Program.

Dredge spoils originate from many different sources and activities. "Collection" costs for dredge spoils are synonymous with the costs of "generating" or "producing" them in the first place, so they are not properly considered part of the solid-waste-management system. Rather, the only cost that is associated with their management is the cost of disposal. In the year 2000, an estimated 87,000 cubic yards of material are expected to be dredged by the Department of Sanitation in the course of its barging and landfilling operations. Dredged material is not recycled in the traditional sense. However, dewatered dredge spoils (whose volume is half that of non-dewatered dredge spoils), can be used as landfill cover. A proposed dredge-spoil-dewatering facility, operating 365 days per year and capable of processing 80 tons per day, could handle the amount of material that would be generated by the Sanitation Department. The total cost for dewatering all harbor dredge generated by the Department of Sanitation would be about $4.5 million in the year 2000, representing a cost of $150 per wet (non-dewatered) ton. The bulk of this cost is attributable to land costs (33 acres at an estimated $1 million per acre).

The proposed plan for all dredged material not generated by the Sanitation Department is that it be disposed of at sea under the U.S. Army Corps of Engineers' auspices. The estimated cost of this program in the year 2000, assuming a disposal site 20 miles off the coast of New York City, is $12.50 per cubic yard ($37 per ton).

The proposed dredge-spoils dewatering facility is the only type of proposed waste-management facility that would discharge any water directly to surface waters, but the quality of this discharge would not differ markedly from the quality of the surface waters into which it would be discharged. The quality of this discharge is characterized on a pollutant-specific basis in Appendix Volume 5.

This facility would emit no appreciable quantities of air pollutants.

17.2.2.5 Harbor Debris Recycling Program.

Under the proposed program, an estimated 850 tons of metals from pier removal would be recycled in the year 2000. The costs and environmental impacts for this recycling program are subsumed in the costs of the proposed harbor-debris-incineration program in section 17.2.4.3.2.

17.2.3 Compost Program Impacts.

Two types of compost programs are described in this section. The first addresses the municipal solid waste stream, including non-regulated medical waste. The second addresses sludge and describes, in summary form, the sludge plan developed by the New York City Department of Environmental Protection. For each program the following impacts are described: costs, system requirements, air emissions, water usage and emissions, noise impacts, odor impacts and traffic impacts.

17.2.3.1 MSW Compost Program (for residential, commercial, and institutional [including medical] MSW).

Table 17.2.3-1 presents the projected tons and system costs for the various types of proposed MSW-compost collection programs.

The proposed MSW-compost programs in System A are a residential leaf-collection program, and source-separated organics collection programs for institutional and commercial wastes (only). In proposed System B (and in the "benchmark" No-Burn System), there is a year-round source-separated organics-collection program for residential wastes (which obviates the need for the separate six-week leaf-collection program proposed in System A.) The No-Burn System, in addition to including the same source-separated organics program as B, also includes facilities for processing and composting the remaining mixed refuse.

Table 17.2.3-1: MSW-Compost Collection: Tons and Costs

	System A	System B	No-Burn System (organics)	No-Burn System (garbage)
Collection Tons (000s):				
Leaf Waste	10	--	--	--
Source-Separated Organics	570	1210	1210	--
Mixed Garbage	--	--	--	4110
Total Tons	580	1210	1210	4110
Collection Costs ($M):				
Leaf Waste	$13	--	--	--
Source-Separated Organics	$30	$148	$148[17]	--
Mixed Garbage	--	--	--	$429
Transfer Cost	--	$22[18]	$22	$86[19]
Total Collection/Transfer Costs	$43	$170	$170	$516
Total Cost/Ton	$74	$140	$140	$125

There are three types of compost facilities in Systems A, B, and No-Burn. System A would require two windrow leaf-and-yardwaste compost facilies (with a combined capacity of 38 TPD), and three in-vessel compost facilities (with a combined capacity of 1900 TPD) to process institutional and commercial source-separated organics. System B would require only in-vessel facilities (with a combined 4015 TPD of capacity). The No-Burn System would require the same source-separated organics capacity as B, and in addition, another 12,100 TPD of mixed-waste composting/processing capacity. Table 17.2.3-2 summarizes the tons processed and costs of the facilities in these systems.

Because compost facilities exhibit only slight economies of scale, there is not an appreciable difference in per-ton costs between the larger in-vessel facilities in System B and the smaller in-vessel facilities in System A. The mixed-waste facilities in the No-Burn System are significantly more expensive than the facilities for source-separated organics because more tons are processed and more residue produced.

The major cost differences between Systems A and B on a per-ton basis, as reflected in Table 17.2.3-3 (see Appendix Volume 7.1, Table 17.1.11-4, Documents #7, 8 and 9, for more detailed costs), are due to the fact that the collection cost per ton for the institutional and commercial source-separated organics programs is approximately $55, while the collection program for residential source-separated organics would cost $170, because collecting source-separated organics from large-volume generators is much more efficient.

Table 17.2.3-2 Compost Facility Costs and Requirements (Year 2000)

	System A		System B		No-Burn System			
	Total		Total		(organics)		(garbage)	
	Tons		Tons		Total		Total	
	(000s)	TPD	(000s)	TPD	(000s)	TPD	(000s)	TPD
Leaf Compost Facility	10	40	--	--	--	--	--	--
In-Vessel Facility	570	1900	1200	4000	1200	4000	--	--
Mixed Waste Compost	--	--	--	--	--	--	3300	12000
Total Capacity	580	1900	1200	4000	1200	4000	3700	12000
Total Residue	40	140	90	280	90	280	1400	12000
Total Composted	540	1860	1130	3720	1130	3700	1900	6100
Percent of Total Waste		7%		14%		14%		22%
Costs ($M):								
Leaf Compost Facility		$2		--		--		--
In-Vessel Facility		$31		$63		$63		--
Mixed-Waste Compost* Facility		--		--		--		$220
TOTAL COST		$33		$63		$63		$220
Total Cost/Ton		$61		$57		$57		$119
Land Requirements (acres)		96		59		59		220
Avoided Landfill Volume Requirements (M cu. yds)		.8		1.7		1.7		9.3

* Does not include materials-recovery portion of mixed-waste processing/composting facility.

Table 17.2.3-3 Summary of Compost Program Costs (Year 2000)

	System A	System B	No-Burn System (organics)	No-Burn System (garbage)
Total Collection Costs ($M)	$43	$170	$170	$516
Total Facility Costs ($M)	$33	$63	$63	$220
Total Cost ($M)	$76	$233	$233	$736
Total Composted Tons (000s)	543	1128	1128	1897
Compost Program Cost/Ton	$140	$207	$207	$388

The source-separated compost-collection programs in System A (residential leaf and yard waste and institutional and commercial organics) would require an additional 2.4 million vehicle miles annually (year 2000) over a program without a dedicated compost collections, and the System B and No-Burn System organics collection programs would require an estimated increment of 4.4 million vehicle miles. These would represent increases over these systems without compost collections of eight percent and 15 percent respectively: air emissions due to increased vehicular miles travelled would be approximately proportional to this increase. Noise impacts, due to either collection or facility noise, would not be significantly increased. Traffic impacts would not be significant for a properly sited facility, as the analysis of facility-specific and cumulative traffic impacts for potentially suitable areas, presented in Appendix Volumes 6 and 7.2, demonstrates. Odor impacts for a properly sited, designed, and operated facility would not be significant.

Some of the compost product produced by this proposed program would be used within New York City, and some would be used outside the City, but none would be used for agricultural purposes. Since the compost would be handled and applied under controlled conditions, few of the pollutants in the compost would enter the human food chain. The range of pollutant concentrations for the kinds of compost that would be expected to be produced by the City's proposed programs is presented in Table 17.2.3-4.

Table 17.2.3-4: Heavy Metals in Solid Waste Compost[20]
(Concentration in mg/kg)

Heavy Metal	Systems A and B*	No-Burn System*	Sludge Compost: NOAEL**
Cadmium	2	4	20
Chromium	30	40	2000
Copper	70	190	1200
Lead	150	260	300
Mercury	1	2	20
Nickel	20	30	500
Zinc	350	560	2700

* Based on data from source-separated-organics compost and on data from mixed-waste compost.
** The EPA, based on a rigorous risk analysis for different exposure pathways, has determined that these levels of metals found in sludge represent a NOAEL (No Observed Adverse Effect Levels).

An illustration of the relative air emissions impacts due to alternative composting systems is presented in Table 17.2.3-5, which highlights pollutants for which there are the greatest emissions. (Sulfur dioxide, particulates, arsenic, hydrogen chloride, and dioxins, all of which are emitted in measurable quantities from waste-to-energy facilities are not known to be emitted in appreciable quantities from composting facilities.)

Table 17.2.3-5: Net Facility Air Emissions from MSW Compost Programs

(Tons Per Year)	Nitrogen Oxides	TSP/ PM10	Carbon Monoxide	Volatile Org Compounds	Ammonia	Methane
System A: (HQ/R)	3.0	11	11	63	4.2	850
System B: (HQ/O/R)	4.6	16	17	130	8.9	1800
System C: (HQ/O/R): with Mixed-Waste Comp	6.8	32	24	150	8.9	1800

Differences in water usage and discharge between the alternative composting programs are presented in Table 17.2.3-6.

Table 17.2.3-6: Net Facility Water Usage and Sewage Discharge Requirements for Proposed Compost Programs

(Thousands of Gallons Per Year)	Avg Intake	Peak Intake	Avg Outflow	Peak Outflow
System A: (HQ/R)	66,000	67,000	5,000	6,000
System B: (HQ/O/R)	140,000	140,000	10,000	12,000
System C: (HQ/O/R): with Mixed-Waste Comp	160,000	170,000	32,000	37,000

17.2.3.2 Sludge Composting Program.

The sludge plan developed by the NYC DEP is summarized in Table 17.2.3-7.

Table 17.2.3-7: Proposed Sludge-Management Program (Year 2000)

Total System Tons (000s):	
Tons Composted	184
Tons Landfilled	22
Total System Costs ($M):	
Collection Program	$6
Compost Facilities	$202
Landfill Facilities	$3
Total Cost/Ton:	
Collection Program	$30
Compost Facility	$1,098
Landfill Facility	$152
Total Collection Cost/Ton	$30
Total Facility Cost/Ton	$998
Total System Cost/Ton	$1,027

If MSW were co-composted with sludge in the facilities proposed in the Department of Environmental Protection's plan, in place of the bulking agent that would otherwise be required, the cost figures in the table above would not change appreciably, nor would there be significantly different environmental impacts, because there would be no substantial changes in facility design or operation. Conversely, if sludge were composted in the proposed MSW in-vessel facilities, given the relatively small quantities of sludge in relation to MSW quantities, there would be no significant changes in the costs or environmental impacts of those facilities.

A detailed examination of the environmental impacts of the compost program proposed by the Department of Environmental Protection is presented in the series of environmental impact statements recently issued by that agency. Tables 17.2.3-8 and 17.2.3-9 present air emissions for sample pollutants and water-usage and -discharge requirements. (Because sludge-compost facilities emit negligible quantities of sulfur dioxide, hydrogen chloride, and dioxins -- pollutants which are used as examples in tables for waste-to-energy facility impacts -- Table 17.2.3-8 shows instead the three other pollutants that would be emitted in the highest concentrations from these facilities.)

Table 17.2.3-8: Net Facility Air Emissions from Proposed Sludge Compost Program (Tons Per Year)

TSP/PM10	Carbon Monoxide	Vol Org Compounds	Ammonia	Hydrogen Sulfide	Methane
28	29	30	17	0.53	5,860

Table 17.2.3-9: Net Water Usage and Sewage Discharge Requirements of Proposed Sludge Compost Program (000s of Gallons/Year)

Avg Intake	Peak Intake	Avg Outflow	Peak Outflow
17,000	17,000	50,000	52,000

17.2.3.3 Medical-Waste Composting Program.

The tonnage and cost impacts of the proposed medical waste composting program are summarized in Table 17.2.3-10. The organics included in it are food wastes from kitchens and patients' rooms, some of which currently is "entrained" with the regulated-medical-waste stream. The environmental impacts of this proposed medical-waste composting program are included in the discussion of the MSW-composting program above, since these wastes would constitute (a small) part of that tonnage.

Table 17.2.3-10: Medical Waste Composting Program (Year 2000)

Tons Composted	1,526
Collection Costs	$155,000
Collection Cost/Ton	$101
Facility Costs	$78,000
Facility Costs/Ton	$51
Total Costs	$232,000
Total Cost/Ton	$153

17.2.4 Waste-To-Energy Program Impacts.

Portions of the MSW, regulated-medical-waste, and harbor-debris waste streams would be processed in waste-to-energy facilities in proposed Systems A and B. Sludge, dredge spoils, and construction and demolition debris are not candidates for incineration in any of the alternative systems considered.

17.2.4.1 MSW Incineration.

In Systems A, B, and Maximum-Burn, two types of waste-to-energy facilities were modelled. One type includes pre-processing equipment in front of mass-burn incinerators to recover recyclable materials. The other is a standard Refuse-Derived-Fuel-type of facility, which recovers fewer recyclable materials through a more automated process (i.e., with less hand-picking). In the comparative Tables 17.2.4-1 and 17.2.4-2 (as elsewhere in this chapter), Systems A and B are assumed to have pre-processing/mass-burn facilities, and the Maximum-Burn System is assumed to have RDF facilities. (Analyses of System A and B with RDF systems are presented in Appendix Volume 7.1).

Because the majority of high-moisture-content organics would be out of the waste stream in System B, the average Btu content of waste in System B is higher than in System A. Because the Btu content of the recyclable waste stream removed by both A and B is generally lower than that of the nonrecyclable waste, the Btu content of Maximum-Burn System waste (from which none of the residential recyclables have been source-separated) is lower than that of System A or B waste.

The cost per ton for burning waste in System A and B is roughly equivalent. Removing both the recyclables and the by-pass waste in A and B through pre-processing facilities significantly reduces the amount of incinerator capacity required, as well as the amount of ash residue produced. However, the pre-processing equipment of Systems A and B are a more expensive way of removing by-pass waste than the straight RDF Maximum-Burn System. The net effect of these impacts are that the RDF facilities of the Maximum-Burn System are slightly ($7 per ton) less expensive than the Mass Burn with Pre-processing facilities of System's A and B. In addition, as noted in Section 17.2.2, the System A and B recycling-program costs are significantly increased by including the relatively expensive pre-processing system to remove additional recyclables from the non-source-separated waste stream.

Table 17.2.4-1: Waste-to-Energy Program Tonnages and Acreage and Landfill Requirements (Year 2000)

(000s of Tons/%)	System A		System B		Maximum-Burn System	
Total Tons Delivered*	4,181	50%[21]	3,723	45%	5,354	64%
Recycled	302	7%[22]	328	9%[23]	168	3%
Landfilled	353	8%	304	8%	194	3%
Incinerated	3,527	84%	3,091	83%	4,992	93%
Ash	514	12/15%[24]	491	13/16%	747	14/15%
Tons/Day of Capacity (000s)		12		10		17
Average Btu/lb[25]		5142		5418		5053
Land Requirements (Acres)		110		100		140
Avoided Landfill Volume Requirements (M cubic yds)		3.4		3.3		4.7
Ashfill Volume Requirements (000s cubic yards)		330		320		480

* "Total Tons Delivered" is not the same as "total tons collected" (as in Table 17.2.4-2), because total tons collected includes "overflow" waste that cannot be delivered to a facility due to downtime or surges, and recyclables that are recovered from commercial waste that has been processed through commercial transfer stations.

Table 17.2.4-2: Waste-to-Energy Facilities Costs (Year 2000)

	System A	System B	Maximum-Burn System
Total Tons Incinerated (000s)	3526	3091	4992
Total Facility Cost ($M) (not including ash landfill)	$247[26]	$209[27]	$310[28]
Facilty Cost/Ton (not incl ash)	$70	$68	$62
Total Facility Cost ($M) (incl ash)	$349	$307	$459
Incineration Cost/Ton (incl ash)	$99	$99	$92

The collection program that feeds the MSW incinerators is the regular refuse collection program. Table 17.2.4-3 summarizes all of the refuse-collection programs that feed eitherthe incinerators or the transfer stations that in turn feed the incinerators. (The assumptions and cost factors behind these collection programs are identified in Appendix Volume 7, Table 17.1.11-5, while the transfer stations are described in Table 17.1.11-6, 7 and 9.) For System B, only that portion of the "Final Collection" costs that is not attributable to the organics collection program is attributed to the MSW waste-to-energy program.

Overall, the total per-ton cost of collection is dominated by two major programmatic differences. The difference between Systems A and B is that in A, a more-efficient, less-expensive single-compartment truck is used to collect refuse, while in B, a dual-compartment truck collects refuse along with source-separated organics. The difference between System A and Maximum-Burn is that in M-B, because there are no residential recycling and organics collection programs, refuse needs to be collected more frequently.[29]

Table 17.2.4-3: MSW WTE Collection Cost (Year 2000)

	System A	System B	Maximum-Burn System
Total Collected Tons (000s)	4742	4115	6256
Total Collection Cost ($M)	$453	$429[30]	$604
Total Transfer Cost ($M)	$108[31]	$98[32]	$155[33]
Total Collection:			
System Cost ($M)	$561	$528	$759
Total Cost/Ton	$118	$128	$121

No incremental collection miles are due to incineration programs, because no dedicated collections are required, so there are also no incremental vehicular air emissions or noise impacts. Facility noise, traffic, and odor impacts for properly sited, designed, and operated facilities would not be significant.

Air emissions for sample pollutants are presented in Table 17.2.4-4. These calculated emissions overstate the actual net-loading impacts to New York City, however, since they would be partially offset by decreased emissions from electricity- and steam-generating facilities that burn oil and natural gas.

Table 17.2.4-4: Facility Air Emissions from Proposed MSW Waste-to-Energy Programs**

(Tons Per Year)	000s of Tons/Year	Sulfur Dioxide	Nitrogen Oxides	TSP/PM10	Carbon Monoxide	Volatile Org Compounds	Hydrogen Chloride
1990 Baseline*	374	500	600	300	200	100	1600
2000 Projected Baseline	931	180	1500	90	500	2000	200
A (HQ/R) : RDF	3,527	1000	4000	500	3500	2200	500
A (HQ/R) : MB & Pre-Processing	3,527	1000	4000	300	1000	1700	600
B (HQ/O/R): RDF	3,091	900	3500	400	3000	2100	500
B (HQ/O/R): MB & Pre-Proc.	3,091	800	3000	400	2500	1700	400
Maximum-Burn	4,992	1300	5000	700	5000	2200	600

*The 1990 Baseline emissions are understated insofar as they do not include existing non-municipal facilities that are being phased-out of operation. (See explanatory note, Chapter 17.1, p.4.)
**This table does not reflect the reductions in emissions from other energy sources that would be offset by the operation of waste-to-energy facilities.

Water-usage and -discharge requirements are presented in

Table 17.2.4-5.

Table 17.2.4-5: Net Water Impacts from Proposed MSW Waste-to-Energy Programs

(Millions of Gallons Per Year)	Avg Intake	Peak Intake	Avg Outflow	Peak Outflow
1990 Baseline	260	260	2	2
2000 Projected Baseline	660	660	5	5
A : (HQ/R): RDF	910	900	12	14
A1: (HQ/R): MB&P	720	720	8	9
B : (HQ/O/R): RDF	2200	2200	17	20
B1: (HQ/O/R): MB&P	650	660	7	8
D : Maximum-Burn	3500	3500	27	32

17.2.4.2 Regulated-Medical-Waste Waste-to-Energy Program.

Table 17.2.4-6 summarizes the regulated medical waste collection and incineration program proposed in this plan.

Table 17.2.4-6: Regulated-Medical-Waste Waste-to-Energy Program (Year 2000)

Total Collected Tons	48,000
Total Tons Incinerated	48,000
Total Collection System Cost	$3 M
Total Facility Cost (incl ash)	$16 M
TOTAL SYSTEM COST	$19 M
Total System Cost/Ton	$393
Facjlity Acreage Requirements	8
Ashfill Volume Requirements (cubic yards)[34]	5,000

There would be no incremental collection impacts from this proposed incineration program. Facility noise, odor, and traffic impacts from properly sited, designed, and operated facilities would be insignificant. Air emissions for sample pollutants, and water-usage and -discharge requirements are presented in Table 17.2.4-8.

Table 17.2.4-7: Net Facility Air Emissions from Proposed Medical Waste-to-Energy Program

(Tons Per Year)	Sulfur Dioxide	Nitrogen Oxides	TSP/PM10	Carbon Monoxide	Hydrogen Chloride	Lead
TOTAL Medical Incineration:	5.3	77	0.76	51	46	0.04
On-Site Incinerators	0.9	12	0.12	8	8	0.003
Regional Incinerator	4.5	65	0.62	43	39	0.04
Pathological Incinerator	D	D	0.02	D	0.004	D

D = No data reported, but process emissions of the pollutant are considered insignificant.

Table 17.2.4-8: Net Water-Pollutant Loadings to Sewer System from Proposed Medical WTE Program

(Grams Per Day)	CL2 residual	Phosphorous	C.O.D.	T.O.C	Nitrate	Lead
On-Site Chop & Bleach	280,000	3,000	420,000	280,000	10,000	0
On-Site Incinerator	0	0	0	0	0	580
Regional Incinerator	0	0	0	0	0	0

Table 17.2.4-9: Net Water Usage and Sewage Discharge Requirements for Proposed Medical WTE Program

(Thousands of Gallons Per Year)	Avg Intake	Peak Intake	Avg Outflow	Peak Outflow
TOTAL Medical Incineration	8,310	8450	1,200	1,330
On-Site Incin (dry inj)	200	230	200	230
Regional Incinerator	8,030	8,120	910	1000
Pathological Incinerator	90	100	90	100

The noise, odor, and traffic impacts associated with these proposed facilities would be negligible (as documented in Appendix Volumes 5 and 7.2).

17.2.4.3 Harbor-Debris Waste-to-Energy Program.

Table 17.2.4-10 summarizes the tonnage and cost impacts of the proposed harbor-debris incineration program.

Table 17.2.4-10: Harbor-Debris Waste-to-Energy Program (Year 2000)

Total Collected Tons	23,000
Total Tons Incinerated	22,000
Total Collection System Cost	$3 M
Total Facility Cost (incl ash)	$3 M
Total System Cost	$7 M
Total System Cost/Ton Incinerated	$312

The environmental impacts of this program are negligible, and, because this tonnage represents a small fraction of the MSW incineration program, they are encompassed in the impacts described in the MSW waste-to-energy section above.

17.2.5 Landfill Program Impacts.

All six of the waste streams managed by New York City will require some amount of landfill and/or ashfill capacity over the next 20 years. The impacts associated with landfilling each of these waste streams are described below.

17.2.5.1 MSW Landfill Program Impacts.

Table 17.2.5-1 summarizes the landfill and ashfill requirements for the four scenarios.

Table 17.2.5-1: Landfill Tons and Volume Requirements (Year 2000)

	System A	System B	No-Burn System	Maximum-Burn System	Projected Baseline
Total Tons Landfilled (000s)	1018	847	2048	989	1839
Total Tons Ashfilled (000s)	514	491	--	747	219
Percent Landfilled	12%	10%	25%	12%	22%
Percent Ashfilled	6%	6%	--	9%	3%
Tons/Day Landfilled*	3372	2804	6782	3275	6089
Tons/Day Ashfilled	1701	1625	--	2474	725
Cubic Yds/Day Landfilled**	4500	3590	8834	4811	7611
Cubic Yds/Day Ashfilled***	1330	1300	--	1928	580
Total Cubic Yds/Day: Land- & Ashfill	5830	4890	8834	6739	8191
Total Landfill CuYds Used (1990-2010)[35](M)	62	59	99	73	
Total Ashfill CuYds Used (1990-2010)[36](M)	6	6	0.4	8	

* Based on 302 operating days per year.
** Assumes in-place density of 1600 lbs/cy.
*** Assumes in-place density of 2500 lbs/cy.

Each of the four scenarios is designed to process as much waste as possible in order to minimize landfilling requirements. The differences in landfill capacity required between the systems (as opposed to ashfill capacity required) are due to three factors. First is the relative residue rate from recycling and composting facilities. Second is the amount of waste incinerated (which also obviously accounts for differences in ashfill requirements). Third is the amount of by-pass and "overflow" waste that goes from the incinerators to the landfills without being burned. The only system that would use all of the remaining Fresh Kills capacity of roughly 100 million cubic yards during this planning period is the No-Burn Scenario, which, including the capacity required for cover material, would use almost 116 million cubic yards. All three scenarios that include incineration would fill the proposed Fresh Kills ashfill (with a capacity 3.8 million cubic yards) by around 2003.

Table 17.2.5-2 summarizes the costs of the proposed MSW landfill program. The costs for the ashfill have all been included in the Incineration Program cost in Section 17.2.4.

The per-ton cost for landfilling waste in the baseline year (1990) was established at $103 per ton. Inflated at four percent a year, the year 2000 cost would be $152 per ton. This cost is based on the National Economics Research Associates study conducted for the Department of Sanitation in 1988, which formed the basis for the revised Fresh Kills commercial tipping fees.

This cost includes, in addition to the capital and operating cost of Fresh Kills, the "opportunity" cost associated with depleting this non-renewable city resource. The NERA landfill cost measures how much the landfill is worth today based on projected future export costs.

The ashfill cost was estimated, based on the NERA report and the relationship between the projected Fresh Kills ashfill costs and landfill costs, to be $135 per ton in 1990; at four percent inflation, this would amount to $199 per ton in the year 2000.

Table 17.2.5-2: Costs of MSW Landfill Facilities

	System A	System B	No-Burn System	Maximum-Burn System
Total Tons Landfilled	1,018,000	847,000	2,048,000	989,000
Total Cost	$155 M	$129 M	$312 M	$151 M
Total Cost/Ton	$152	$152	$152	$152

Air emissions for the tonnages landfilled and ashfilled in the alternate systems are presented in the Table 17.2.5-3.

Table 17.2.5-3: Net Air Emissions from Landfills and Ashfills in Alternative MSW Programs

(Tons Per Year)	Nitrogen Oxides	TSP/ PM10	Carbon Monoxide	Copper	Vinyl Chloride	Methane
1990 Baseline	37	71	48	0	0.0092	279,000
2000 Projected Baseline	25	47	32	0.000005	0.0060	184,000
A (RDF)	8	14	10	0.000018	0.0017	53,000
A (Pre-proc)	10	17	12	0.000015	0.0022	66,000
B (RDF)	7	11	8	0.000018	0.0014	42,000
B (Pre-proc)	8	14	10	0.000014	0.0018	55,000
No-Burn System (w/o Composting)	18	34	23	NR	0.0044	133,000
No-Burn System (w/ Composting)	33	63	42	NR	0.0081	248,000
Maximum-Burn System	10	17	12	0.000022	0.0021	64,000
Non-MSW Waste-Stream Effects Common to All Scenarios	11	21	14	0.0000002	0.0027	83,000

A site-specific environmental impact statement on the the Fresh Kills landfill will be prepared as part of the permit application process for upgrading that facility. A site-specific Draft EIS on the proposed ashfill has been prepared and submitted to the State DEC.

17.2.5.2 Waste-Water Residuals (Grit, Scum, and Screenings) and Regulated Medical-Waste Landfill Program Impacts.

The environmental impacts of the relatively small quantities of these materials that would be landfilled in the proposed plan are insignificant. (Regulated medical waste would be landfilled outside the City.) On a per-ton basis, these impacts would be comparable to the impacts of the MSW landfill discussed above. The cost impacts of landfilling these materials as proposed are presented in the Tables 17.2.5-4 and 17.2.5-5.

Table 17.2.5-4: Cost of Landfill Disposal for Waste-Water Residuals (Year 2000)

Total Tons Landfilled	22,000
Total Cost	$3 M
Total Cost/Ton	$152

Table 17.2.5-5: Cost of Landfill Disposal for Medical Waste (Year 2000)

Total Tons Landfilled	10,000
Total Cost	$2 M
Total Cost/Ton	$152

17.2.5.3 Construction and Demolition Debris and Harbor Debris Landfill Program Impacts.

The environmental impacts of landfilling these materials, on a per-ton basis, would be comparable to those discussed above in the section on MSW landfilling. The projected tonnages of these wastes to be landfilled, and the estimated costs, are presented in Tables 17.2.5-6 and 17.2.5-7.

Table 17.2.5-6: Cost of Landfill Disposal for Construction and Demolition Debris (Year 2000)

Total Tons Landfilled	1,248,500
Total Cost	$190 M
Total Cost/Ton	$152

Table 17.2.5-7: Cost of Landfill Disposal for Harbor Debris (Year 2000)

Total Tons Landfilled	727
Total Cost	$110,846
Total Cost/Ton	$152

17.2.6 Transfer-/Transport-System Impacts.

The proposed continued use of the City's marine-transfer system would be more cost-effective and environmentally benign than the use of truck-transfer. Projected per-ton barge transfer costs (for the year 2000) are $3 while truck-transfer costs are about $15. The relative transfer miles by truck and barge for the four alternative systems are compared in the Table 17.2.6-1.

Table 17.2.6-1: Transfer Miles in Alternate MSW-Management Systems.

	System A	System B	No-Burn System	Maximum-Burn System
Total Tons Transferred/Year (m)	1.5	1.7	1.3	2.1
Truck-Transfer Miles/Year (000s)	956	835	407	1,400
Tug-Transfer Miles/Year (000s)	72	73	111	78

The differential costs of the marine-transfer system for the four alternative MSW-management systems are presented in Table 17.2.6-2.

Table 17.2.6-2: Marine-Transfer System Costs for Alternative MSW-Management Systems.*

	System A	System B	No-Burn System	Maximum-Burn System
Total Annual Marine System Cost (Facilities and Barging)	$41 M	$44 M	$33 M	$49 M
Marine System Costs/Ton	$28	$25	$25	$23

* Costs are for the year 2000, in 2000$.

The air-pollutant emission produced by these truck- and tug-transfer miles in the alternative systems are presented in the tables in the vehicular-air-pollutant analysis in Appendix Volume 7.2.

Endnotes

1. Based on assumptions explained in Chapter 7: 5 gallons per pound x 2,000 lbs/ton x 75,000 tons of recyclable containers in 600,000 tons/year of prevented waste.

2. 71 million gallons of water would be saved by the prevention program in System A, and 187 million in System B; the waste-to-energy facilities in System A use less water than the facilities in System B because their larger size makes the use of air-cooled condensers, rather than water-cooled condensers, more practical.

3. These percentages based on average net loadings of the 5 leading pollutants in volume, plus lead, according to Table A17.2.1-1 in Appendix Volume 7.

4. See "Impacts of Production and Disposal of Packaging Materials: Methods and Case Studies," prepared for the Council of State Governments by Tellus Institute, 11-91.

5. Appendix Volume 8, "Task 4," Appendix B, "Summary of Worker Safety Considerations Associated with Medical Waste Management Strategies."

6. New York Times, September __, 1991.

7. "Recovered," as distinguished from "collected." The tonnages listed in this table are tons of material eventually recovered for market. The tons collected are the sum of the tons recovered <u>and</u> of the tons of residue.

8. These per-ton collection costs reflect total collection costs in the bulk, residential, institutional, and commercial recycling programs, and commercial paper programs, divided by the tons recovered in those programs only. Tons recovered from the commercial mixed-waste processors and waste-to-energy facilities are <u>not</u> included in this calculation.

9. This per-ton cost is calculated from the $160,900,000 residential and institutional recyclables collection cost divided by the 935,871 tons of material collected in the program. This tonnage figure includes 786,371 tons of recovered recyclables and 149,500 tons of residue generated at materials recovery facilities.

10. This per-ton cost is calculated from a $24,590,297 commercial recyclables collection cost (which is $27,851,714 in the Maximum-Burn System) divided by the 328,078 tons of material collected in the program (331,370 in the M-B System). This tonnage figure includes 255,755 tons of recovered recyclables (257,759 in the M-B System) and 72,323 tons of residue generated at commercial recycling facilities (73,611 in the M-B System).

11. This per-ton cost is calculated from a $66,664,137 commercial-paper collection cost ($63,972,783 in the Maximum-Burn System) divided by 957,340 tons of material collected in the program (918,912 in the M-B System). This tonnage figure includes 673,228 tons of recovered paper (646,096 in the M-B System) and 284,112 tons of residue generated at the commercial-paper recycling facilities (272,816 in the M-B System).

12. In the Maximum-Burn System, more tons of commercial materials are recovered than in Systems A, B, or No-Burn, because more tons are delivered to the commercial materials-recovery facilities. This results from the elimination of source-separated organics programs in the Maximum-Burn System. Whereas in Systems A, B, and No-Burn a proportion of commercial paper was targeted for the organics programs, in the Maximum-Burn System that material is targeted for the commercial high-quality programs. Though more materials are recovered at the commercial MRFs in Maximum-Burn, the recovery rate is lower than in the previous three systems because more contamination in the high-quality stream results from the elimination of the source-separated organics program.

13. All per-ton costs are based on the total tons recovered by each facility.

14. All total system per-ton costs are based on the tons of material recovered by each processing option.

15. Collection costs are based on information provided by Waste-Tech, Inc., and is reported in their Task 4 report dated June 24, 1991. These costs are modeled in the Tellus document dated October 21, 1991, and titled *Medical Waste Management Plan* (Reference Document #64).

16. See Reference Document #63--*Construction & Demolition, Harbor Dredge, and Harbor Drift Scenarios*--dated November 25, 1991.

17. The costs for the System B organics collection program were calculated by first determining the costs for collecting the solid waste collected in Systems B and No-Burn, using the standard solid-waste collection vehicles and collection efficiency-parameters used in System A. (See Collection Assumptions Appendix 7.1, Document #7). Solid waste and organics were assumed to be collected in a single, dual compacting vehicle, with a 20% lower collection efficiency. The cost difference between these two scenarios was attributed to the System B/No-Burn organics collection program.

18. These are the additional operating costs for handling the source separated organics processed through the city's marine transfer station system. See Appendix Volume 7.1, Document #8.

19. $86.5 M = $22.6 M + (83.0 M x .77) where $22.6 M is the cost of the MTS system in the No-Burn System, $83.0 is the cost of the Commercial Waste Processing facilities and .77 is the percent of waste processed by the CWP facilities that goes on to the Mixed Waste Composting facilities.

20. From Epstein, Elliot, "Human and Environmental Health," in Proceedings of the Northeast Regional Solid Waste Composting Conference, June 24-25, 1991, Albany, NY, p. 32.

21. This is a percent of the total year-2000 waste stream; all other percents are of the total waste delivered to the waste-to-energy facilities.

22. Because the proposed Brooklyn Navy Yard facility site does not allow room for pre-processing equipment, only 3,250,000 tons of waste of the total 4,181,000 tons of waste delivered to incinerators are processed. Recycling as a percent of actually preprocessed waste is 9.3%.

23. Recyclables as percent of preprocessed waste is 11.8%.

24. The first number is ash as a percent of delivered waste, the second number is ash as a percent of waste actually burned.

25. See Btu spreadsheet in Appendix Volume 7.1.

26. The total annualized capital and operating costs of the incinerators are allocated here based on the proportion of the Mass Burn with Preprocessor facility cost that was required for the incineration process. The Preprocessor costs have been assigned in section 17.2.2 to the recycling program. Total incineration costs are $300.7 million, 7.2%

is recycled and 92.8% is disposed, but $246.6 M is attributable to the incineration program and $50.1 M is attributable to the recycling program. See reference facility and the Mass Burn with Preprocessor cost fact sheets and accompanying sources in Appendix Volume 7.

27. The total annualized capital and operating costs of the incinerators are allocated here based on the proportion of the Mass Burn with Preprocessor facility cost that was required for the incineration process. The Preprocessor costs have been assigned in section 17.2.2 to the recycling program. Total incineration costs are $300.7 million, 7.2% is recycled and 92.8% is disposed, but $246.6 M is attributable to the incineration program and $50.1 M is attributable to the recycling program. See reference facility and the Mass Burn with Preprocessor cost fact sheets and accompanying sources in Appendix Volume 7.

28. In System D, since the recovery of any recyclables is an incidental component of the process of preparing RDF for combustion, all of the facility costs are assigned to the incineration program.

33. Details are provided in Appendix Volume 7.1 in the table in Document #7.

29. The total cost of the dual chamber, organics and solid waste collection program is $342.5M for collecting the 1,658,224 tons of solid waste and the 617,502 tons of organics. The cost of just collecting the 1,658,224 tons of solid waste in the 20% more efficient, cheaper 25 cuyd rear loading packer truck was $236.1M. Thus, this $236.1M was assigned to the solid waste program and the remaining $106.4M was assigned to the compost collection program.

30. Marine Transfer Stations are $41.0 M and commercial transfer/processing facilities are $87.3 M. However, 23% of the material that goes into the Commercial Transfer Station is recycled so only 77%, or $67.3 M were assigned to the MSW Incineration Collection Program.

31. Total Transfer costs attributable to the disposal system is $98.3 = $34.4 M + ($83.0 M x .77) where $34.4 M is the solid waste portion of the transfer station costs, $83.0 M is the cost of the commercial transfer/processing facilities and .77 is the percent of throughput that is not recycled and goes into the incinerators.

32. MSW transfer costs = $155.5 M = $49.2 + ($131.3 x .81) where $49.2 is the residential/institutional marine transfer costs, $131.3 is the commercial waste transfer costs and .81 is the percent of waste delivered to the Commercial Waste Processing/Transfer facilities that is sent on to the incinerators.

34. 6,318 tons of ash, assuming an in-place density of 2,500 lbs/cy.

35. Not including cover material. Cover material would add approximately 18 percent more volume to the landfill based on a refuse-to-cover volume ratio of 6/1.

36. Not including cover. The projected ash-to-cover volume ratio is 14/1.

CHAPTER 17.3 ENVIRONMENTAL AND ECONOMIC IMPACTS OF THE PLAN: Cumulative Impacts of Proposed Waste-Management Systems.

In the prior chapter, impacts were discussed on a program-specific (i.e., prevention, recycling, composting, waste-to-energy, landfilling) and waste-stream-specific basis. In this chapter, cumulative waste-stream and cost impacts will be presented first for each waste stream, then quantifiable environmental impacts for all waste-streams will be presented, and lastly, the general effects of the overall 20-year integrated waste-management system for all of New York City's solid wastes will be discussed. As noted in prior chapters, in order to present the most inclusive/most conservative case, all of the quantitative analyses that follow include all of the commercial waste generated in the city, as well as all residential and institutional waste.

17.3.1 Costs and Waste-Stream Impacts.

MSW.

The figures and tables below summarize the overall MSW-management program impacts, and compare them to the two benchmark systems.

MSW Tonnage Impacts.

Table 17.3.1-1: Cost-per-Ton Comparison of Proposed MSW Systems, Compared to Maximum-WTE, No-WTE, and Projected-Baseline Benchmarks

	System A	System B	No-Burn System	Maximum-Burn System	Projected Baseline
TOTAL COST PER TON	$203	$210	$219	$198	$243

Table 17.3.1-2: Summary of Capital & Operating Costs in Systems A, B, No-Burn, Maximum-Burn[1]

	System A	System B	No Burn System	Maximum-Burn System
Collection	($M)	($M)	($M)	($M)
Operating Costs	$676	$743	$743	$632
Annualized Capital Costs	$137	$151	$151	$128
Total Collection Costs	$813	$894	$894	$760
Facility				
Operating Costs	$589	$553	$659	$569
Annualized Capital Costs	$283	$286	$256	$311
Total Facility Costs	$873	$839	$915	$880
Total Costs				
Operating Costs	$1,265	$1,296	$1,402	$943
Annualized Capital Costs	$420	$437	$407	$439
TOTAL COSTS	$1,685	$1,733	$1,809	$1,640

.The two benchmark systems are the most- and least-capital intensive, respectively, and also (but inversely), the most- and least-labor-intensive.

The fact that the maximum-burn system is the most capital-intensive means that, although its overall capital-and-operating costs in the year 2000 are least, it would cost about the same as System A on a 20-year net-present-value basis. This result is shown in Table 17.3.1-3.

Table 17.3.1-3: Net-Present-Value Costs and Waste-Management Percentages Over 20 Years

	System A	System B	No-Burn System	Maximum-Burn System	Projected Baseline
Percentages:					
Prevented	6%	6%	6%	6%	0%
Recycled	28%	28%	28%	17%	11%
Composted	4%	9%	23%	0%	0.25%
Incinerated	30%	27%	0%	41%	11%
Exported*	8%	8%	9%	9%	42%
Landfilled (excluding ash)	24%	23%	35%	28%	35%
Ash	5%	5%	< 1%	6%	2%
Total Costs (Billions):					
Collection	$8.0	$8.8	$8.8	$7.6	$8.7
Facilities	$10.1	$9.8	$10.0	$10.5	$11.3
TOTAL SYSTEM	$18.1	$18.6	$18.7	$18.0	$20.0
Cost/Ton					
Collection	$46	$50	$50	$43	$50
Facilities	$61	$60	$61	$63	$64
TOTAL SYSTEM	$103	$106	$108	$103	$114

*The amounts exported over the 20-year period refer to the modeling assumption (which was common to all scenarios) that commercial wastes (only) continue to be exported until 1995 (i.e., in this 20-year calculation, that a significant proportion of commercial wastes is exported for the years 1990 to 1995).

Figure 17.3.1-1: Percent of Wastes Handled by Program in Alternative MSW-Management Systems (Year 2000)

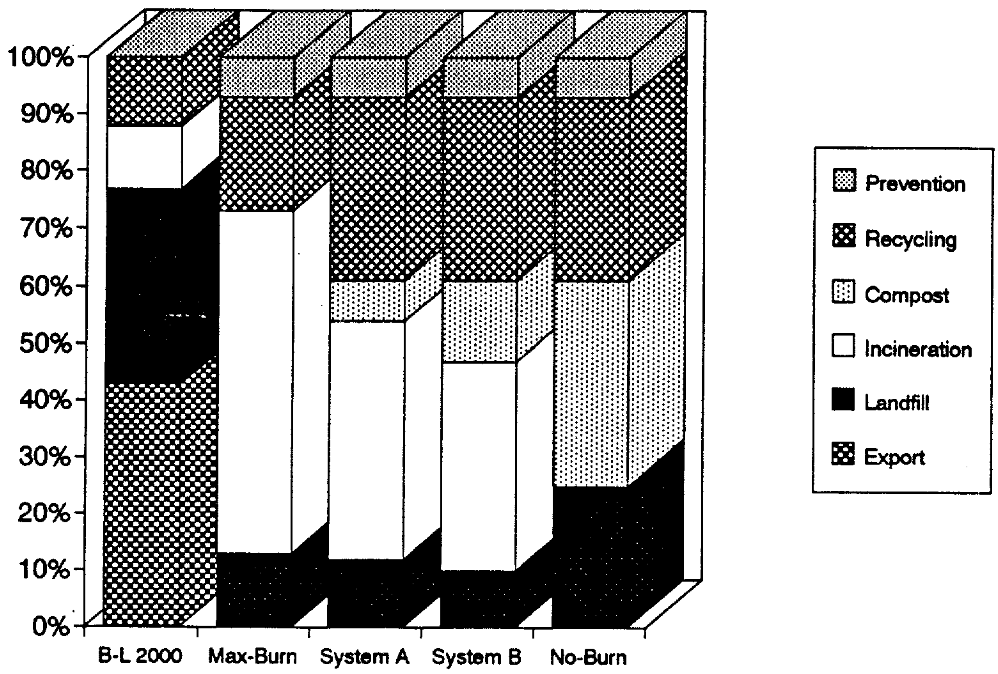
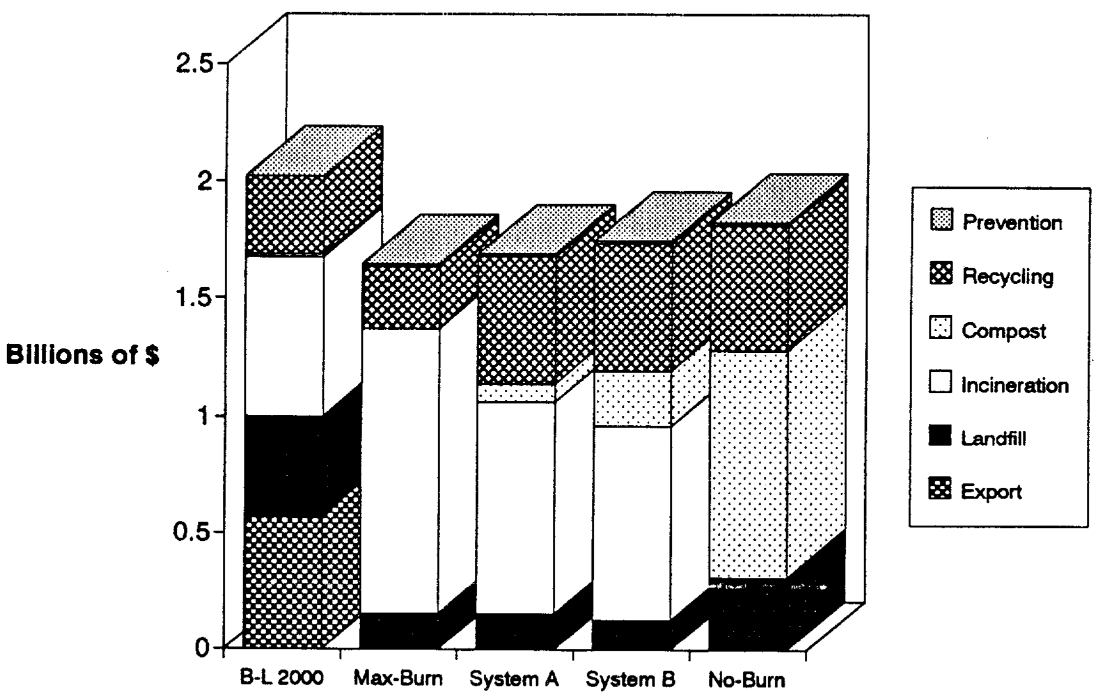


Figure 17.3.1-2: Program Costs of Alternative MSW-Management Systems (Year 2000)



Acreage Requirements for MSW Facilities.

Table 17.3.1-4: MSW-System Acreage Requirements

(Acres)	System A	System B	No-Burn System	Maximum-Burn System	Projected Baseline
Residential MRFs	30	30	30	-	6
Commercial Recycling Facility	24	24	24	26	17
Leaf & Yd Waste Compost Fac	68	-	-	-	68
In-Vessel Compost Facility	28	59	59	-	0
Mixed Waste Compost Facility	-	-	221	-	0
Marine Transfer Station	28	28	28	28	28
Comb Waste Proc/Transfer Sta	27	27	25	37	0
Brooklyn Navy Yard	13	13	-	13	0
New WTE Facilities	69	56	-	103	0
Existing Incins w/ Upgrades	28	28	-	23	23
TOTAL	315	265	389'	228	142

The primary acreage difference between Systems A and B is due to the large land area that has already been developed for windrow composting at Fresh Kills and which is being developed at Edgemere, which would be used in System A for the Leaf and Yardwaste composting program. Given the limited usefulness of these acres atop landfilled areas, using this space for this purpose would not have the same significance as would using other sites.

Sludge Costs and Tonnage Impacts.

Table 17.3.1-5: Sludge Management Summary: Year 2000

Tonnages:	Tons (000s)	Percent
Prevention Program	--	--
Recycling Program	--	--
Compost Program	184	89%
Incineration Program	--	--
Landfill Program	22	11%
TOTAL TONS	206	100%
Costs:		($M)
Compost Program		$208
Incineration Prog (incl Ashfill)		--
Landfill Program (w/ Ashfill)		$3
TOTAL COSTS		$211
Cost/Ton:		
Compost Program		$1,128
Incineration Program		--
Landfill Program		$152
TOTAL COST PER TON		$1,027

The total cost of the proposed sludge management program -- consisting of two chemical stabilization plants, one dry pelletization plan, seven sludge-composting facilities, and some landfilling -- in the year 2000 would be just over a thousand dollars a ton.

Regulated-Medical-Waste Costs and Tonnage Impacts.

Table 17.3.1-6: Regulated-Medical-Waste Management Summary (Year 2000)

Tonnages:	Tons (000s)	Percent
Prevention Program	8	14%
Recycling Program	1	2%
Compost Program	2	3%
Incineration Program	48	81%
Landfill Program	.5	.8%
TOTAL TONNAGES	60	100%
Costs:		($M)
Prevention Program		$3
Recycling Program		$0.3
Compost Program		$0.2
Incineration Prog (incl Ashfill)		$19
Landfill Program (w/ Ashfill)		$.07
TOTAL COSTS		$23
Cost/Ton:		
Recycling Program		$390
Compost Program		$224
Compost Program		$152
Incineration Program		$388
Landfill Program		$152
TOTAL COST PER TON		$377

Construction and Demolition Debris Costs and Tonnage Impacts.

Table 17.3.1-7: Construction & Demolition Debris Summary (Year 2000)

Tonnages:	Tons (000s)	Percent
Prevention Program	--	--
Recycling Program	1246	50%
Compost Program	--	--
Incineration Program	--	--
Landfill Program	1248	50%
TOTAL TONS	2495	100%
Costs:		($M)
Recycling Program		$274
Landfill Program (w/ Ashfill)		$249
TOTAL COSTS		$523
Cost/Ton:		
Recycling Program		$220
Landfill Program		$200
TOTAL COST PER TON		$210

Harbor-Debris Costs and Tonnage Impacts.

Table 17.3.1-8: Harbor-Debris Management Summary (Year 2000)

Tonnages:	Tons (000s)	Percent
Recycling Program	--	--
Compost Program	--	--
Incineration Program	22	81%
Landfill Program (w/o ash)	1	3%
Export Program	5	17%
TOTAL TONS	28	100%
Costs:		($M)
Prevention Program		--
Recycling Program		--
Compost Program		--
Incineration Prog (incl Ashfill)		$6
Landfill Program (w/ Ashfill)		$5
Export Program		--
TOTAL COSTS		$11
Cost/Ton:		
Prevention Program		--
Recycling Program		--
Compost Program		--
Incineration Program		$299
Landfill Program		$6249
Export Program		--
TOTAL COST PER TON		$402

In the proposed harbor-debris management program, in the year 2000, an estimated three percent of this material -- "floatables" -- would be collected by skimmer boats and landfilled at Fresh Kills; 80 percent would be collected through the shoreline pier-removal program and incinerated after shredding and metal-recovery at a municipal waste-to-energy facility; and the remaining 17 percent, the amount projected to be collected on New Jersey beaches in that state's shoreline clean-up program, would be disposed of outside the City.

Dredge Spoils Costs and Tonnage Impacts.

Table 17.3.1-9: Dredge-Spoils Management Summary (Year 2000)

Tonnages:	Tons (000s)	Percent
Compost Program	--	--
Recycling Program	30	100%
Incineration Program	--	--
Landfill Program	--	--
Export Program	--	--
TOTAL TONS	30	100%
Costs:		($M)
Recycling Program		$4
		--
Cost/Ton:		--
Recycling Program		$151

In the proposed dredge-spoils-management program, in the year 2000 the Sanitation Department will dredge an estimated one percent of the total amount of material that will be dredged from the New York Harbor. It will dewater these 30,000 tons for use as landfill cover. All other material dredged from the Harbor will be disposed of at sea under the Corps of Engineers' auspices, or at upland locations outside the City.

17.3.2 Cumulative Environmental Impacts of Integrated Waste-Management Systems.

Air Emissions.

Net Air Loadings: Stationary Sources.

Net loadings and air-modeling impacts from the proposed systems and benchmark cases are compared in summary form in the Tables 17.3.2-1, 17.3.2-2 and 17.2.3-3, and in detail in Appendix Volume 7.2. Isopleth maps showing the predicted distribution of particulate matter impacts are shown on the following pages. No exceedances of pollutant standards were predicted for either

System A or B. Table 17.3.2-3 indicates that the standards are many times higher than the pollutant concentrations predicted.

Table 17.3.2-1: Net Air Emissions From All Facilities in Integrated Waste-Management Systems

(Tons Per Year)	Sulfur Dioxide	Nitrogen Oxides	TSP/PM10	Arsenic	Hydrogen Chloride	PCDD/PCDF
1990 Baseline**	488	645	371	0.064	1604	2.8e-5
2000 Projected Baseline	181	1535	149	0.020	200	8.8e-6
A: RDF Version	1000	3869	550	0.072	510	1.2e-5
A: Pre-Processing Version	1000	3700	330	0.055	590	1.2e-5
B: RDF Version	930	3571	480	0.064	480	1.1e-5
B: Pre-Processing Version	850	3200	300	0.048	510	1.0e-5
N-B: No-Compost Version	D	28	98	NR	NR	NR
N-B: Compost Version	D	51	151	NR	NR	NR
Maximum-Burn (RDF)	1300	4628	720	0.091	590	1.2e-5
Common to All Scenarios*	18	131	201	0.002	48	7.9e-8

D = No data reported, but process emissions of the pollutant are considered insignificant.
NR = No data reported, but emissions may exist
* These emissions include those due to all other (non-MSW) waste streams, and are included here so that order-of-magnitude impacts between MSW and other impacts can be compared.
** The 1990 Baseline emissions are understated insofar as they do not include emissions from existing non-municipal facilities that are being phased out of operation.

Net Air Loadings: Vehicular Emissions.

Table 17.3.2-2 Net Air Emissions From All Vehicles Related to MSW Management Systems

(Tons Per Year)*	Carbon Monoxide	Hydro-carbons	Oxides of Nitrogen	Diesel Particulates	Carbon Dioxide
1990 Baseline	1,200	130	460	90	660,000
2000 Projected Baseline	1,400	160	560	110	650,000
System A	1,500	160	530	100	570,000
System B	1,600	170	560	110	720,000
No-Burn System	1,500	170	550	100	710,000
Maximum-Burn System	1,300	140	490	90	500,000

*Total of employee passenger cars, heavy trucks, and tugs.

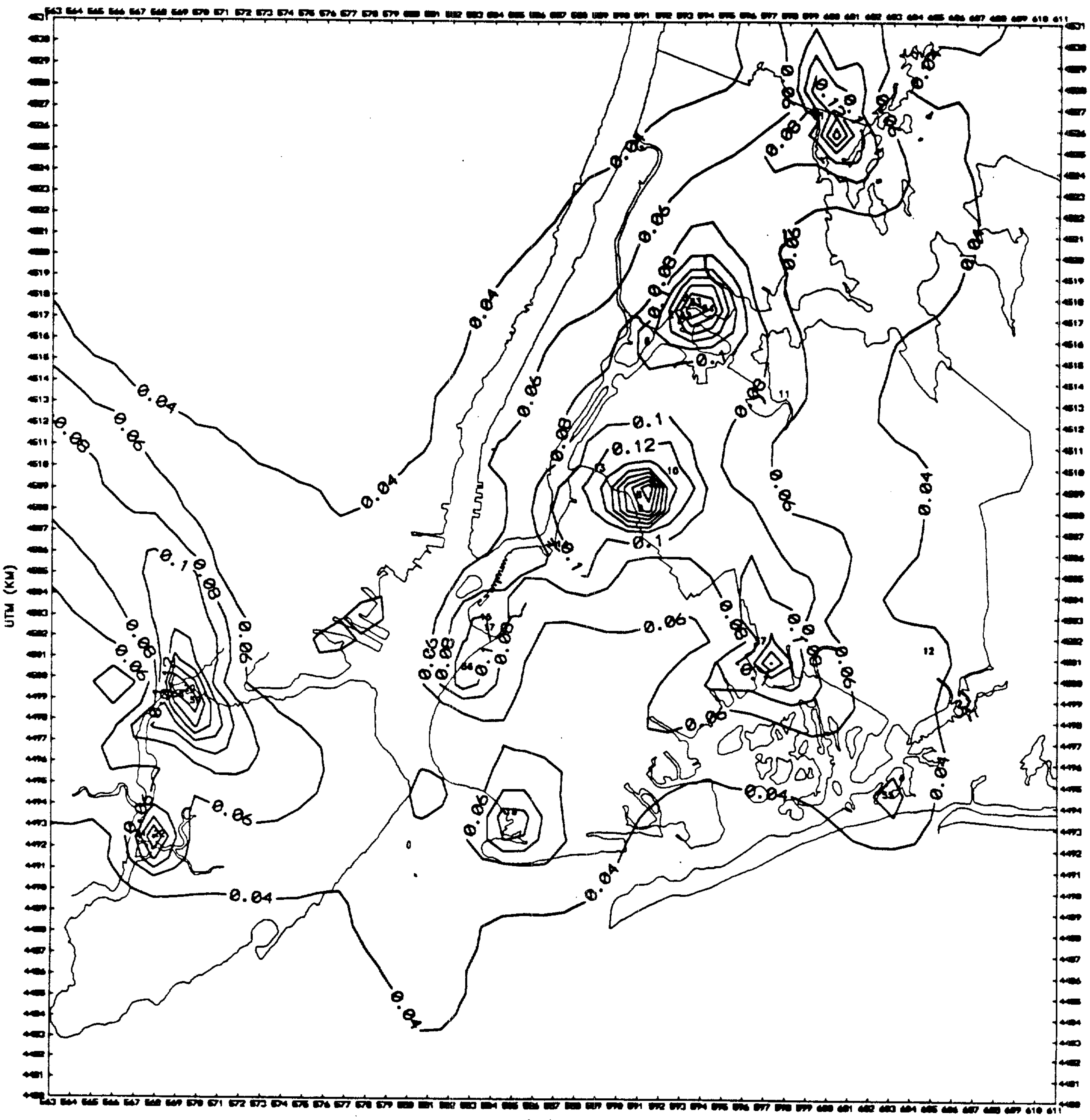
Dispersion Modeling of Facility Air Emissions.

Table 17.3.2-3: Ambient Air-Pollutant Concentrations From All Major Facilities in Integrated Management Systems

Ratio of Standard to Maximum Ground Level Concentrations*	HCl (1-hr)	TSP/PM10 (24-hr)	SO2 (24-hr)	NOx (Annual)	Dioxin (Annual)	Arsenic (Annual)
Standard Guideline (ug/m3)	1.40e+02	2.80e+01	6.80e+01	6.00e+00	4.60e-08	2.30e-04
A: RDF Version, Including Major Non-MSW Facilities	14	10	17	2	3	6
B: RDF Version, Including Major Non-MSW Facilities	14	10	17	2	3	6

* Assuming urban conditions, GEP stacks.

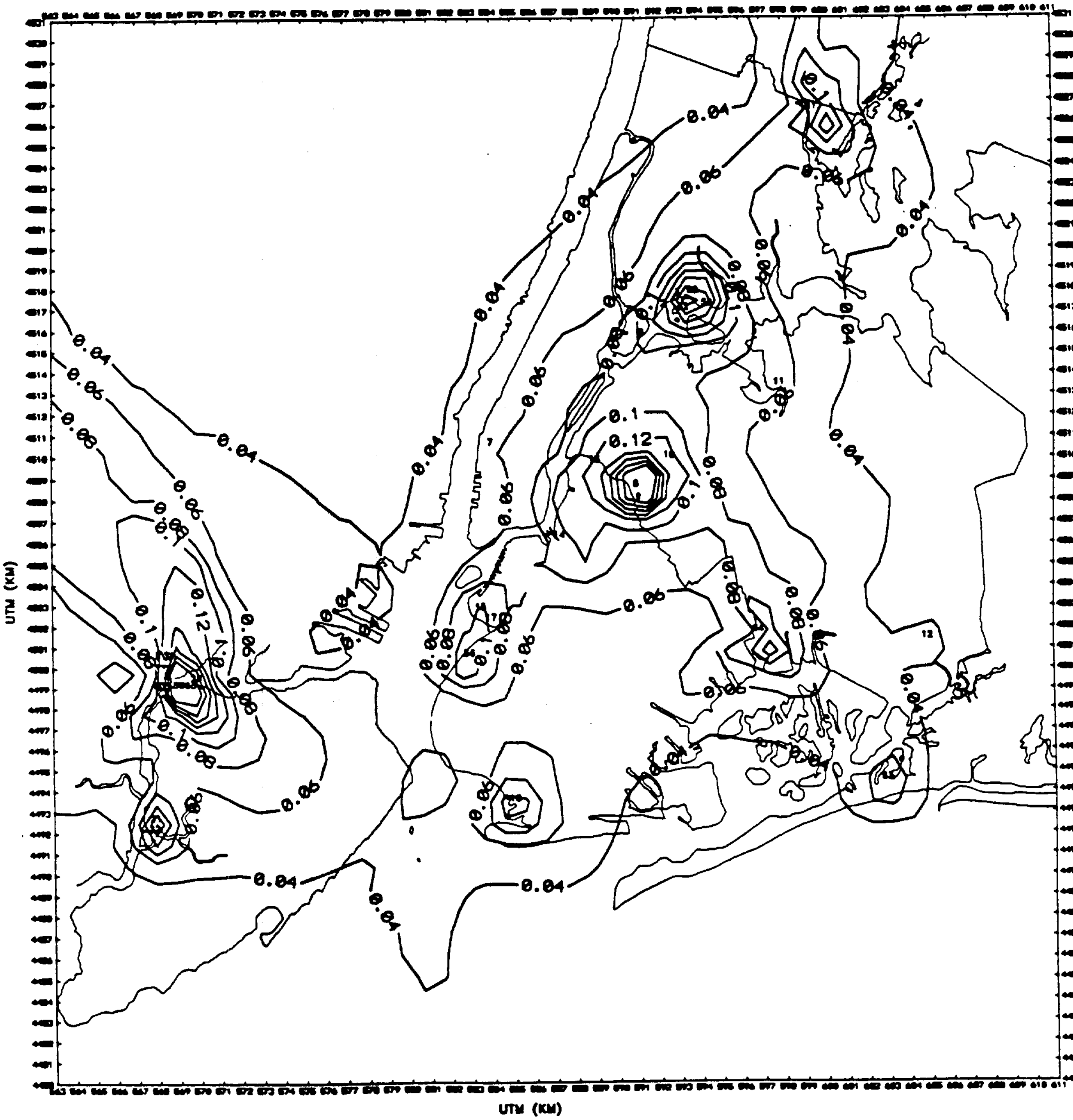
Figure 17.3.2-1: Isopleth Map of Ambirent Air-Pollutant Concentrations Due to Facility Emissions
System A (Annual PM10 Concentrations)



NYC SOLID WASTE MANAGEMENT PLAN
CUMULATIVE AIR QUALITY MODELING
SCENARIO A WITH RDF
ANNUAL PM10 CONCENTRATIONS (UG/M3)

TAMS CONSULTANTS, Inc.

Figure 17.3.2-2: Isopleth Map of Ambient Air-Pollutant Concentrations Due to Facility Emissions
System B (Annual PM10 Concentrations)



NYC SOLID WASTE MANAGEMENT PLAN
CUMULATIVE AIR QUALITY MODELING
SCENARIO B WITH RDF
ANNUAL PM10 CONCENTRATIONS (UG/M3)

TAMS CONSULTANTS, Inc.

Modeling of Deposition of Airborne Pollutants From Facilities to New York Harbor and Surface Waters.

Table 17.3.2-4: Air Pollutants From All Major Facilities in Integrated Waste-Management Plan Deposited on Surface Waters

Total Loadings to NY Harbor Due to Deposition of Air Pollutants*	Existing Harbor Loading (kg/day)	Incremental Loading Due to Scenario A (kg/day)	Scenario A Loading as % of Total Loading	Incremental Loading Due to Scenario B (kg/day)	Scenario B Loading as % of Total Loading
Arsenic	110	0.02	0.02%	0.01	0.01%
Cadmium	630	0.01	0.00%	0.05	0.01%
Lead	1200	0.96	0.08%	0.91	0.08%
Mercury	30	2.00	6.97%	2.39	6.95%
Nickel	890	0.35	0.04%	0.30	0.03%
Zinc	5300	2.00	0.04%	2.11	0.04%
PCB	4	0.0002	0.01%	0.00019	0.01%
(PCDD/F)**	NA	0.0000032	NA	0.0000032	NA

* Includes air emissions from all major non-MSW facilities.

** No data are available on background PCDD/PCDF (dioxin/furan) levels.

Table 17.3.2-4 shows that levels of only one pollutant -- mercury -- might be increased significantly as a result of the proposed integrated waste-management systems. Given the already-high levels of mercury in certain reaches of the New York Harbor system, all practicable steps to reduce mercury loadings should be taken. Actual incremental mercury loadings, however, would be expected to be considerably less than the extremely conservative figure in the above table. This figure overstates incremental loadings for the following reasons:

o Mercury emissions, which are largely due to MSW incineration, would be less than a tenth of the conservative emissions factors used because: (1) No credit is taken for the carbon-adsorption mercury-removal systems that would be part of the air-pollution-control system of each incinerator, which would be expected to cut mercury emissions by at least half.[2] (2) No credit is taken for anticipated reductions of mercury in the waste-stream, which will be due to reductions in mercury in batteries (the source of 88 percent of the mercury in MSW)[3] due to the battery industry's formal goal of reducing mercury levels to 1/40th of those that existed when the stack measurements used in the emissions data base for this plan were made. A recently-enacted NYS law requires that alkaline manganese batteries sold in NYS contain no more than .025 percent mercury by weight, and that zinc carbon batteries sold after January 1, 1993 contain no more than .0001 percent mercury by weight.[4] (3) No credit is taken for the battery-collection programs proposed in this plan, i.e., voluntary drop-off centers and designation of batteries for the paper-textile portion of the source-separated portion of the high-quality waste-stream, and for the effect of the pre-processing equipment ~~or RDF equipment~~ at the proposed ~~waste-to-energy and~~ in-vessel compost facilities, which would remove virtually all batteries that still remained in the refuse stream prior to ~~incineration or~~ composting.[5]

- The amount of emitted mercury that is actually deposited would probably be half of that projected in the calculations for Table 17.3.2-4, since the small-sized particles emitted from an MSW-incinerator air-pollution-control system would be likely to fall to the ground at less than half the velocity of the larger particles which were conservatively assumed to be emitted from waste-management facilities of all types.

- The amount of mercury (and all other pollutants) that would be washed into surface waters through run-off would, in the real world, be about 25 percent less than the 100 percent which was conservatively assumed for this purpose.[6]

Dispersion Modeling of Vehicular Air Emissions.

The analysis of potential ambient air-pollutant (carbon monoxide) concentrations at intersections that would be likely to be affected by overlapping traffic flows associated with the facilities proposed in Systems A and B is presented in Appendix Volume 7.2. It shows that there would be no significant impacts associated with cumulative traffic flows due to the alternative systems at these representative intersections. No violations of standards would occur, nor would the "de minimus" criteria established by the City and State be exceeded.

Cumulative Traffic Impacts.

Based on an analysis of potential waste-sheds associated with the facilities proposed in Systems A and B, three intersections throughout the City were identified as being most likely to be affected by overlapping traffic flows. This analysis is presented in detail in Appendix Volume 7.2. Effects on "levels of service" and "seconds of delay" are generally insignificant, and within the range of impacts that could be minimized through simple mitigation techniques, such as changes in traffic-signal-light timing. These levels-of-service and delay impacts are shown in Table 17.3.2-4a.

Table 17.3.2-4a: Cumulative Traffic Impacts -- Levels of Service and Seconds of Delay at Sampled Intersections

NO BUILD vs. BUILD TRAFFIC LEVELS OF SERVICE: SIGNALIZED INTERSECTIONS (AM PEAK HOUR)

INTERSECTION and APPROACH		NO BUILD Mvt.	NO BUILD V/C	NO BUILD Delay	NO BUILD LOS	BUILD Mvt.	BUILD V/C	BUILD Delay	BUILD LOS	DIFFERENCE V/C	DIFFERENCE Delay	DOS FACILITY CONSIDERED	MITIGATION LEVEL REQUIRED
QUEENS: ROCKAWAY BOULEVARD & WOODHAVEN BOULEVARD/CROSS BAY BOULEVARD													
Rockaway Blvd.	EB	L	1.069	148.7	F	L	1.095	163.9	F	0.026	15.2 **	MSW WTE (RDF) -- (1,800 tpd)	Signal Timing/
		TR	0.589	19.2	C	TR	0.630	22.6	C	0.041	3.4		Phasing Change
	WB	LTR	1.327	*	F	LTR	1.376	*	F	0.049 **	NA	In-Vessel MSW Composting --	
Woodhaven Blvd./	NB	L	0.240	8.0	B	L	0.240	8.0	B	0.000	0.0	(666 tpd)	
Cross Bay Blvd.		TR	0.917	21.7	C	TR	0.921	21.9	C	0.004	0.2		
	SB	L	0.290	8.3	B	L	0.290	8.3	B	0.000	0.0	Materials Recovery --	
		TR	0.587	25.0	C	TR	0.594	25.1	D	0.007	0.1	(500 tpd)	
Overall Intersection		--	0.956	*	F	--	0.975	*	F	0.019	NA		
QUEENS: LIBERTY AVENUE & WOODHAVEN BOULEVARD/CROSS BAY BOULEVARD													
Liberty Ave.	EB	LTR	0.794	43.6	E	LTR	0.794	43.6	E	0.000	0.0	Same as above	Signal Timing/
Woodhaven Blvd./	NB	TR	0.804	22.1	C	TR	0.807	22.2	C	0.003	0.1		Phasing Change
Cross Bay Blvd.	SB	T	0.455	5.0	A	T	0.460	5.0	A	0.005	0.0		
Overall Intersection		--	0.667	17.1	C	--	0.717	17.1	C	0.050	0.0		
BROOKLYN: ATLANTIC AVENUE & NOSTRAND AVENUE													
Atlantic Ave.	EB	TR	0.714	15.5	C	TR	0.714	15.5	C	0.000	0.0	Materials Recovery --	Signal Timing Change
	WB	T	1.048	48.5	E	T	1.054	50.6	E	0.006	2.1 **	(500 tpd)	
	SB	LT	0.386	29.2	D	LT	0.840	29.4	D	0.454	0.2		
		R	0.306	19.3	C	R	0.306	19.3	C	0.000	0.0	Incinerator -- (500 tpd)	
Overall Intersection		--	0.961	34.1	D	--	0.965	35.2	D	0.004	1.1		
STATEN ISLAND: VICTORY BOULEVARD & RICHMOND AVENUE													
Victory Blvd.	EB	L	0.290	18.5	C	L	0.300	18.6	C	0.010	0.1	MSW WTE (RDF) -- (3,000 tpd)	N/A
		TR	0.811	28.3	D	TR	0.811	28.3	D	0.000	0.0		
	WB	L	1.005	50.1	E	L	1.005	50.1	E	0.000	0.0	In-Vessel MSW Composting --	
		TR	0.215	10.8	B	TR	0.234	11.0	B	0.019	0.2	(1,500 tpd)	
Richmond Ave.	NB	L	0.039	9.9	B	L	0.040	9.9	B	0.001	0.0		
		T	0.573	13.7	B	T	0.587	13.8	B	0.014	0.1	Materials Recovery --	
		R	0.627	1.0	A	R	0.627	1.0	A	0.000	0.0	(500 tpd)	
	SB	L	0.320	11.7	B	L	0.320	11.7	B	0.000	0.0		
		TR	0.427	12.3	B	TR	0.432	12.3	B	0.005	0.0		
Overall Intersection		--	1.067	17.3	C	--	1.067	17.3	C	0.000	0.0		

NOTE:

1. Delay is in seconds per vehicle.
2. * Indicates a V/C ratio greater than 1.20 (oversaturated condition).
3. ** Indicates a significant traffic impact.

ENG-WONG, TAUB & ASSOCIATES

NO BUILD vs. BUILD TRAFFIC LEVELS OF SERVICE:
SIGNALIZED INTERSECTIONS
(PM PEAK HOUR)

INTERSECTION and APPROACH		NO BUILD Mvt.	NO BUILD V/C	NO BUILD Delay	NO BUILD LOS	BUILD Mvt.	BUILD V/C	BUILD Delay	BUILD LOS	DIFFERENCE V/C	DIFFERENCE Delay	DOS FACILITY CONSIDERED	MITIGATION LEVEL REQUIRED
QUEENS: ROCKAWAY BOULEVARD & WOODHAVEN BOULEVARD/CROSS BAY BOULEVARD													
Rockaway Blvd.	EB	L	1.661	*	F	L	1.802	*	F	0.151 **	NA	MSW WTE (RDF) -- (1,800 tpd)	Signal Timing/
		TR	0.940	57.6	E	TR	0.940	57.6	E	0.000	0.0		Phasing Change
	WB	LTR	1.617	*	F	LTR	1.673	*	F	0.056 **	NA	In-Vessel MSW Composting --	
Woodhaven Blvd./	NB	L	0.404	9.5	B	L	0.407	9.5	B	0.003	0.0	(665 tpd)	
Cross Bay Blvd.		TR	0.760	26.0	D	TR	0.771	26.2	D	0.011	0.2		
	SB	L	0.992	56.9	E	L	0.992	56.9	E	0.000	0.0	Materials Recovery --	
		TR	1.009	32.0	D	TR	1.016	33.6	D	0.007	1.6	(800 tpd)	
Overall Intersection		–	1.231	*	F	–	1.288	*	F	0.057	NA		
QUEENS: LIBERTY AVENUE & WOODHAVEN BOULEVARD/CROSS BAY BOULEVARD													
Liberty Ave.	EB	LTR	0.677	60.7	E	LTR	0.677	60.7	E	0.000	0.0	Same as above	Signal Timing/
Woodhaven Blvd./	NB	TR	0.722	25.0	C	TR	0.732	25.2	D	0.010	0.2		Phasing Change
[illegible] Bay Blvd.	SB	T	0.784	9.2	B	T	0.790	9.2	B	0.006	0.0		
Overall Intersection		–	0.817	18.2	C	–	0.820	18.3	C	0.003	0.1		
BROOKLYN: ATLANTIC AVENUE & NOSTRAND AVENUE													
Atlantic Ave.	EB	TR	0.974	28.8	D	TR	0.980	29.7	D	0.006	0.9	Materials Recovery --	Signal Timing Change
	WB	T	0.720	15.7	C	T	0.720	15.7	C	0.000	0.0	(800 tpd)	
Nostrand Ave.	SB	LT	0.779	32.7	D	LT	0.783	32.9	D	0.004	0.2		
		R	0.481	29.4	D	R	0.481	29.4	D	0.000	0.0	Incinerator -- (800 tpd)	
Overall Intersection		–	0.804	24.9	C	–	0.809	25.3	D	0.005	0.4		
[illegible]D: VICTORY BOULEVARD & RICHMOND AVENUE													
[illegible]	EB	L	0.440	20.2	C	L	0.440	20.2	C	0.000	0.0	MSW WTE (RDF) -- (3,000 tpd)	N/A
		TR	0.764	26.0	D	TR	0.786	27.0	D	0.022	1.0		
	WB	L	1.672	*	F	L	1.672	*	F	0.000	NA	In-Vessel MSW Composting --	
		TR	0.347	9.6	B	TR	0.347	9.6	B	0.000	0.0	(1,600 tpd)	
[illegible]d Ave.	NB	L	0.433	16.2	C	L	0.437	16.4	C	0.004	0.2		
		T	0.534	15.5	C	T	0.550	15.7	C	0.016	0.2	Materials Recovery --	
		R	0.546	0.7	A	R	0.546	0.7	A	0.000	0.0	(800 tpd)	
	SB	L	0.262	13.4	B	L	0.262	13.4	B	0.000	0.0		
		TR	0.852	22.0	C	TR	0.856	22.2	C	0.004	0.2		
Overall Intersection		–	1.190	*	F	–	1.197	*	F	0.007	NA		

NOTE:
1. D[illegible]y is in seconds per vehicle.
2. * Indicates a V/C ratio greater than 1.20 (oversaturated condition).
3. ** Indicates a significant traffic impact.

Water-Pollutant Loadings to Sewage Treatment Plants.

Table 17.3.2-5: Pollutant Loadings from Process Water Discharged by All Facilities in Integrated Waste-Management Plan.

(Grams Per Day)	Cadmium DEP Std:2 mg/L	Chromium DEP Std:5 mg/L	Copper DEP Std:5 mg/L	Lead DEP Std:2 mg/L	Mercury DEP Std:.05 mg/L	Zinc DEP Std:5mg/L
11 Sludge Compost	0	0	20	0	0	0
12 Sludge Pelletizer	0	0	0	0	0	0
13 Chemical Stabilization	0	0	20	0	0	20
20 Med: On-Site Chop & Bleach	0	0	0	0	0	0
31 Med: On-Site Incinerator	NA	NA	0	580	NA	NA
32 Med: Regional Incinerator	0	0	0	0	0	0

Water Usage and Sewage Discharge.

Table 17.3.2-6: Total Water Usage and Sewer Discharge from All Facilities in Integrated Waste-Management Plan

(Thousands of Gallons Per Day)	Avg Intake	Peak Intake	Avg Outflow	Peak Outflow
1990 Baseline	271	272	9	11
2000 Projected Baseline	665	668	15	17
A: RDF Version	1,029	1,042	74	87
A: Pre-Processing Version	919	931	72	84
B: RDF Version	2,398	2,412	85	99
B: Pre-Processing Version	922	935	76	89
N-B: No-Compost Version	220	235	90	105
N-B: Compost Version	599	618	91	107
Maximum-Burn (RDF)	3,534	3,545	66	78
Non-MSW Waste-Stream Impacts Common to All Systems	304	316	287	298

Figure 17.3.2-3 shows how the proposed distribution of MSW facilities would affect current and projected flows in individual water-pollution-control-plant drainage areas. Only one water-pollution-control plant, in the drainage areas that would be affected by proposed new facilities, currently exceeds its permitted levels (i.e., the level specified in its State Pollution Discharge Elimination System -- SPDES -- permit). That facility, the Newtown Creek WPCP, exceeds its permitted capacity by eight million gallons a day, and that exceedance -- without the proposed MSW facilities -- is projected to increase to 21 million gallons a day in 2010. Two proposed MSW facilities, the Brooklyn Navy Yard WTE facility and a Manhattan MRF, together, would increase that exceedance by 28,000 gallons (0.1 percent). A second water-pollution-control plant, the Oakwood Beach plant in Staten Island, currently does not exceed its permitted capacity, but an exceedance of six million gallons a day is projected for 2010. The proposed Staten Island MRF and ashfill would, together, increase that exceedance by 13,000 gallons (0.2 percent). The other proposed MSW facilities would not exacerbate

Figure 17.3.2-3: Facility Sewer Discharge Impacts on WPCP Drainage Areas

Facilities						YEAR 1991					YEAR 2010 - Projected			
	TPD	# EMP	Average Discharge gal/day	Drainage Areas (WPCP)	SPDES Permit (mgd)	Annual Average (mgd)	Maximum Monthly (mgd)	Excess Capacity (mgd)	Facility Discharge to WPCP (mgd)	% of WPCP Excess Capacity	Annual Average (mgd)	Maximum Monthly (mgd)	Excess Capacity (mgd)	% of WPCP Excess Capacity
System A1: TOTAL			**101,139**		**980**	**814**	**934**	**166**	**0.10**	**0.06%**	**859**		**121**	**0.08%**
Manhattan MRF	500	142	10,650											
Brooklyn Navy Yard	3000	86	6,450	Newtown Creek	310	318	362	(8)	0.02	NA	331	375	(21)	NA
Bronx MRF	500	142	10,650											
Bronx In-Vessel	460	164	3,772											
Bronx WTE*	1843	72	4,423	Hunts Point	200	153	181	47	0.02	0.04%	155	183	45	0.04%
N Queens MRF	500	142	10,650	Tallman Island	80	60	65	20	0.01	0.05%	63	68	17	0.06%
S Queens MRF	500	142	10,650	Jamaica	100	81	84	19	0.01	0.06%	82	85	18	0.06%
Brooklyn MRF	500	142	10,650	Red Hook	60	39	45	21	0.01	0.05%	41	47	19	0.06%
Jamaica Bay In-Vessel	665	164	5,453	Rockaway	45	33	40	12	0.01	0.05%	35	42	10	0.05%
SE Brooklyn WTE*	1843	72	4,423	26th Ward	85	60	80	25	0.00	0.02%	63	83	22	0.02%
Staten Is In-Vessel	620	164	5,084											
Staten Is WTE*	2457	86	5,283	Port Richmond	60	40	45	20	0.01	0.05%	43	48	17	0.06%
Staten Is MRF	500	142	10,650											
Staten Is Ashfill	2090	15	2,351	Oakwood Beach	40	30	32	10	0.01	0.13%	46	48	(6)	NA
System B1: TOTAL			**114,127**		**980**	**814**	**934**	**166**	**0.03**	**0.02%**	**859**		**121**	**0.03%**
Manhattan MRF	500	142	10,650											
Brooklyn Navy Yard	3000	86	6,450	Newtown Creek	310	318	362	(8)	0.02	NA	331	375	(21)	NA
Bronx MRF	500	142	10,650											
Bronx In-Vessel	470	164	3,854											
Bronx WTE*	1165	72	2,796	Hunts Point	200	153	181	47	0.02	0.04%	155	183	45	0.04%
N Queens MRF	500	142	10,650											
N Queens MRF	600	142	4,920	Tallman Island	80	60	65	20	0.02	0.02%	63	68	17	0.03%
S Queens MRF	500	142	10,650	Jamaica	100	81	84	19	0.00	0.06%	82	85	18	0.06%
Brooklyn MRF	500	142	10,650	Red Hook	60	39	45	21	0.01	0.05%	41	47	19	0.06%
Jamaica Bay In-Vessel	1020	164	8,364	Rockaway	45	33	40	12	0.01	0.07%	35	42	10	0.08%
SE Brooklyn WTE*	1165	72	2,796	26th Ward	85	60	80	25	0.01	0.00%	63	83	22	0.00%
Staten Is In-Vessel	1680	164	13,776											
Staten Is WTE*	2325	86	4,999	Port Richmond	60	40	45	20	0.02	0.00%	43	48	17	0.00%
Staten Is MRF	500	142	10,650											
Staten Is Ashfill	2020	15	2,273	Oakwood Beach	40	30	32	10	0.02	0.00%	46	48	(6)	NA

*With Pre-Processing Systems

or cause a SPDES flow violation.

Energy Impacts.

MSW System Energy Impacts.

Solid-waste-management systems can use energy, produce energy, and "save" energy. Collection programs, processing and transfer facilities, and landfills all use energy. Usable energy is also produced by two types of solid-waste-management practices: methane gas can be collected from landfills, and steam and electricity can be generated by waste-to-energy facilities. And energy is saved when recycled materials are used in place of virgin materials in manufacturing processes.[7]

Table 17.3.2-7: Energy Impacts of Alternative Systems

ENERGY USED (E+10 Btus):	System A	System B	No-Burn System	Maximum-Burn System
Collection	(200)	(210)	(210)	(190)
Processing	(70)	(80)	(90)	(30)
Transport	(2)	(3)	(1)	(3)
Disposal	(230)	(200)	(2)	(320)
TOTAL ENERGY USED	(500)	(490)	(300)	(540)
ENERGY GENERATED:				
Waste-to-Energy	530	450	--	700
Landfill Gas	190	160	370	180
TOTAL ENERGY GENERATED	720	610	370	880
NET ENERGY IMPACTS	220	120	70	340
Energy Saved by Using Secondary Materials	4170	4210	4220	1750
TOTAL MSW ENERGY IMPACTS	4390	4330	4290	2090

In both proposed systems (as well as in the benchmark cases) -- unlike the no-action/projected baseline system -- more energy would be produced than would be used. By far the most significant beneficial energy impacts, however, would be the savings due to using secondary materials rather than virgin materials in the manufacture of new products (an impact which, as noted in the discussion of secondary economic impacts, would in all likelihood take place predominantly outside of New York City). When the effects of these savings are included in the calculation, the positive energy impacts increase by an order of magnitude.

If the savings from re-using secondary materials are ignored, the Maximum-Burn System would produce the most beneficial energy impacts because, although it would use the most energy in energy-intensive incineration facilities, these facilities are net energy-producers. The No-Burn System would use the least energy, because the compost facilities and landfills on which it primarily relies are low energy-consumers. Systems A and B (and the No-Burn System) require relatively energy-intensive collection programs, but this impact is minor within the calculus of overall system impacts.

Although the Maximum-Burn System would use the most energy, it would also generate the most energy. Thus, in a net-energy analysis, if the energy savings from the use of secondary materials in manufacturing processes are not included, the Systems would be ranked in relation to the amount of waste-to-energy capacity they included. If the production savings due to the use of secondary materials are included, however, these dominate the overall analysis. Because the amount of recycling in Systems A, B, and the No-Burn System differs by less than one percent, the amount of energy saved in A, B, and N-B is very similar.[8]

Energy Impacts of Non-MSW Waste Streams.

The energy impacts of the five non-MSW waste streams are described in Table 17.3.2-8.

Only sludge management has potential energy impacts that are comparable in scale to impacts associated with MSW-management. The impacts from all other waste streams (either negative or positive) differ from the MSW system by at least one order of magnitude. Energy impacts from sludge management are dominated by the relatively energy-intensive sludge composting process. (As with the MSW system, no energy credits have been assumed for the use of sludge compost in place of other soil enhancers.)

Table 17.3.2-8: Energy Impacts of Non-MSW Waste Streams

Source of Energy Use (E+10 btus):	Sludge	Med Waste	C & D	Harbor Drift	Harbor Dredge
Collection	--	(4)	(54)	(.2)	-
Processing	(160)	(7)	(8)	(.3)	(.04)
Transport	(.01)	(.01)	(.5)	(.01)	(.01)
Disposal	(.02)	(6)	(1)	(1)	-
Total Energy Used	(160)	(17)	(64)	(2)	(.05)
Sources of Energy Generation:					
Waste-to-Energy	--	22	--	4	-
Landfill Gas	--	--	--	--	-
Total Energy Generated	--	22	--	4	-
Net Waste Stream Energy Impacts	(160)	5	(64)	2	(.05)

Secondary Economic Impacts.

The relative proportions of operating versus capital costs in the alternative systems, combined with the proportions of products purchased from outside New York City, explain the differences between the "secondary economic impacts" they would induce. The more capital-intensive the system is, the fewer local jobs, sales, and tax revenues would be generated, because the labor components of the operating costs produce the greatest secondary economic benefits.

These results are reflected in Table 17.3.2-9. Because the commercial waste-stream is not in the City's direct control, and because not including the beneficial secondary-economic impacts that would be due to the management of these wastes provides a conservative "worst-case" assessment of potential impacts, commercial wastes were not included in this analysis.[9] Three measures of the impacts of the four alternative systems are shown relative to the "no-action" alternative represented by the projected year-2000 baseline. The first measure, "output," represents the total dollar value of sales that would be produced in New York City as a result of the capital and operating expenditures from implementing each system. "Earnings" describes the wages that would accrue to New York City workers as a result of both direct and indirect spending on the solid-waste system. The third measure is total number of jobs that would be created by both the direct and indirect activity produced by the implementation of the system.

Each of the types of measures in the table above is used to assess three different types of impacts. The first is the impact associated with direct and indirect spending on the solid-waste-management system itself. The second type of impact concerns the tax effects that would be associated with each system relative to the projected baseline solid waste program. Third are the potential impacts that would be associated with the recycling industries that would be required to utilize each of the secondary materials generated by the implementation of the given system. These recycling impacts would affect New York City only if the industries that utilize these secondary materials locate in the city, which eventuality, as noted above in section 17.2, is unlikely.

Both proposed systems (as well as the two benchmark cases) would have more beneficial secondary economic impacts than would the no-action/projected baseline system. If the potential (but unlikely) local impacts of recycling industries are not included, System A has the most favorable impacts in all categories. A's impacts are more favorable than the Maximum-Burn System's (even though Mass-Burn is less expensive), because more workers are employed, and more favorable than B's because it is less expensive (thereby leaving more money in taxpayers' pockets to spend on other consumer purchases). If the potential benefits due to local recycling industries are included, since these are significantly greater than other types of impacts, the rank-ordering of the alternate systems corresponds to the amount of recycling that would take place, so that the No-Burn System would have the most favorable impacts, followed by B, A, and Maximum-Burn.

Table 17.3.2-9: Secondary Economic Impacts Due to Proposed MSW Systems

(Discounted and Summed Over 1997-2010)	Output ($M)	Earnings ($M)	Employment (Jobs)
Solid Waste System Spending Impacts:			
System A	$1900	$120	1700
System B	$1500	$80	880
No-Burn System	$700	$90	2400
Maximum-Burn System	$560	($190)	(7400)
Tax Cost Impacts:			
System A	$450	$1800	7700
System B	$150	$1800	6400
No-Burn System	($770)	$1700	2300
Maximum-Burn System	$1500	$1900	12400
Total Impacts (Not Including Recycling Industries):			
System A	$2300	$1900	9400
System B	$1700	$1900	7200
No-Burn System	($70)	$1800	4700
Maximum-Burn System	$2100	$1700	5000
Potential Impacts From Recycling Industries:			
System A	$2600	$540	12000
System B	$3000	$650	15000
No-Burn System	$5100	$1100	25000
Maximum-Burn System	$190	$40	1000
Total Impacts Including Recycling Industries:			
System A	$4900	$2500	22000
System B	$4700	$2500	22000
No-Burn System	$5000	$2900	30000
Maximum-Burn System	$2200	$1800	6000

Evaluation of Alternative Waste-Management Systems in Relation to Public-Policy Objectives.

In Chapter 5, a set of public-policy objectives for the City's waste-management system was identified. Some of these objectives relate directly to minimizing adverse environmental impacts or costs, or maximizing environmental or economic benefits. These quantitative assessments have been presented in the preceding sections. The comparative ranking of the alternate systems for these categories of impacts is summarized in Table 17.3.2-10.

Table 17.3.2-10: Ranking of Alternative MSW-Management Systems in Relation to Quantifiable Environmental and Cost Impacts

	System A	System B	No-Burn System	Maximum-Burn System	Projected Baseline
Least Overall System Cost	1	3	4	1	5
Lowest Facility Air Emissions*	4	3	2	5	1
Least Facility Acreage Required	4	3	5	2	1
Most Job Creation (not including jobs in recycling industries)**	1	2	4	3	5
Most Job Creation (including jobs in recycling industries)	2	2	1	4	5
Minimum Waste Transport Distances by Road #	3	2	1	4	5
Most Positive Energy Impacts	1	2	3	4	5

(1 = best, 5 = least; the same number indicates that two systems would be virtually indistinguishable.)

* Water pollutant emissions are negligible in all scenarios, and differ little between scenarios. Differences in vehicle air impacts between scenarios are less than differences in facility emissions.

** Not including jobs in recycling industries, which are considered unlikely to be created within NYC.

\# See "Mobile Air" analysis in Appendix Volume 7.2 for comparative tables.

Other public-policy objectives, which do not relate as directly to measurable environmental or economic impacts, cannot be quantitatively ranked from most-to-least, but can be compared in terms of their congruence with these objectives. A summary comparison of the degree to which the alternative MSW-management scenarios meet these objectives is presented in Table 17.3.2-11.

Table 17.3.2-11: Evaluation of Alternate Systems in Relation to Public-Policy Objectives

	System A	System B	No-Burn System	Maximum-Burn System	Projected Baseline
Most Use of Marine Transport	HC	HC	HC	HC	HC
Least Impact on Residential Neighborhoods	C	C	C	C	C
Implementation Speed	N	N	N	N	N
Most Decentralized	C	C	N	I	HI
Consistency with State Hierarchy	HC	HC	C	I	HI
Reliance on Established Technology	HC	C	I	HC	HC
Reliable for Capacity Needs	C	C	N	C	HI
Flexibility	HC	HC	I	I	HI
Redundancy	C	C	C	C	I
Minimum Dependence on Other Jurisdictions	HC	HC	C	HC	HI
Equitable Facility Distribution	C	C	C	C	HI
Ease of Recycling (for Waste Generators)	HC	HC	HC	NA	N
Degree to Which Consciousness of the Need for Waste Prevention Is Enhanced	HC	HC	HC	HI	I
Minimum Disruption of Existing Systems	N	N	N	C	HC

HC: Highly Consistent
C: Consistent
N: Neutral
I: Inconsistent
HI: Highly Inconsistent
NA: Not Applicable

Mitigation of Environmental Impacts.

Since this is a generic/programmatic environmental impact statement, it is not possible or desirable to identify specific mitigation measures, nor to assess their effectiveness, as would be done for a site-specific/project-specific impact analysis. Rather, the approach to assessing mitigation measures that has been taken in this planning process has been to begin with an analysis of the full range of feasible, reasonable alternatives (both in terms of specific system components, and in terms of the integration of overall systems), to compare their projected impacts on the basis of relative environmental and economic costs, and to use this analysis to identify and propose those system components and that system alternative that best meet the objectives of minimizing overall environmental and economic costs and maximizing environmental and economic benefits. The mitigation of impacts has thus been built into the evolving planning process itself.

When the facilities and programs proposed in this plan are developed, those that have the potential for significant environmental impacts will be subject to supplemental, site-specific environmental analyses. In the course of these analyses, proposals for project-specific mitigation measures will be developed.

17.3.3 General Cumulative Impacts From All Programs for All Waste Streams Combined.

Taken as a whole, the comprehensive integrated solid-waste-management systems proposed (Systems A and B) would produce an overall improvement in environmental quality in New York City relative to the "no-action" alternative represented by the "projected baseline" for the year 2000, while also reducing costs for the system as a whole by delivering waste-management services more effectively.

Direct air-pollutant emissions from waste-management facilities would increase (in relation to the projected baseline), but these emissions would be largely offset by reductions in air emissions from utility boilers that currently supply steam and electricity in the city. Vehicle miles travelled would not appreciably change. Facility acreage requirements would more than double.

$300 million fewer dollars per year would be spent on the system by tax payers and businesses, and these dollars would be put to more productive use, producing a net increase of about 8,000 jobs (not including jobs that would be associated with manufacturing industries that would use recycled materials, which would amount to an additional 22,000 jobs, most of them probably not within New York City) and increase annual sales in the city by $189 million over the projected baseline (again, not including sales by recycling industries). Instead of being a net energy consumer, the city's solid-waste-management system would produce enough energy to supply the electricity for over 400,000 households (while saving enough energy from the use of recycled materials to supply the electricity for over 10 million more).

The systems proposed in this plan would minimize the negligible public-health risks posed by the management of the city's wastes. (The specific environmental and public-health factors associated with each specific facility proposed for development, of course, must be addressed in the project-specific environmental assessments for those facilities.)

There would be no overall decrease in the "quality of life" of life in the city due to the implementation of the proposed systems; the new collection programs for recycling and composting, and the new facilities for recycling, composting, and incinerating wastes should, in a general way, improve rather than diminish New Yorkers' perceptions of how public services are delivered and of daily life in their neighborhoods.

From a public-policy perspective, the implementation of the proposed systems would somewhat reduce New Yorkers' reliance on out-of-city disposal of their wastes, thus partially reducing the City's vulnerability to potentially significant cost fluctuations due to a myriad of political, regulatory, and economic circumstances beyond its control.

There would be unavoidable short-term adverse impacts, compared to the projected no-action baseline, associated with the construction of the new facilities proposed. These short-term localized impacts would be examined in detail in the site-specific environmental reviews for each proposed facility.

Endnotes

1. Year 2000 costs, reflecting sequenced implementation schedule, in 2000 dollars.

2. Brown, B. and Felsvang, K.S., "Control of Mercury and Dioxin Emissions from United States and European Municipal Solid Waste Incinerators by Spray Dryer Adsorption Systems," Presented at the Second Annual International Municipal Waste Combustion Conference, Tampa, FL, April, 1991; Technical Services Group, American Norit, "Darco FGD Activated Carbon for Removal of Mercury and Dioxin from Flue Gas;" both quoted in Carolyn Konheim to Jim Coyle, 1-24-92, in Appendix Volume 7.2.

3. A.T. Kearney, Inc. and Franklin Associates, Inc., "Characterization of Products Containing Mercury in Municipal Solid Waste in the Unites States, 1970 to 2000," US EPA Municipal Solid Waste Program, Contract No. 68-W9-0040, January, 1991.

4. Chapter 304 of the Laws of 1991.

5. See materials-flow analyses in Appendix Volume 5.

6. Fax transmission from William B. Leo, HydroQual, Inc., to Benjamin Miller, 2-7-92.

7. For a full description of the methodology used to produce these energy impacts, and a description of each of the scenario subcomponents see "Energy Impacts of New York City Waste Management Alternatives," in Appendix Volume 7.2.

8. Energy savings from the use of compost (instead of alternative chemical fertilizers) were not considered in this analysis. If these effects were included, C might well be the most energy-efficient system overall.

9. Other reasons for not including commercial wastes in this analysis included the fact that adding their impacts to this calculation would diminish the distinctions between alternative systems (instead of highlighting their differential dynamics for decision-making purposes), and the considerable difficulties of estimating industry-specific impacts of commercial-waste-management costs.

CHAPTER 17.4. ENVIRONMENTAL AND ECONOMIC IMPACTS OF THE NEAR-TERM IMPLEMENTATION PLAN FOR MSW MANAGEMENT

The analysis in the preceding chapters (17.1, 17.2, 17.3) compares the environmental and economic impacts of proposed Systems A and B with the No-Burn, Maximum-Burn, and "no-action" (projected baseline) alternatives. Systems A and B (and the Projected Baseline) are the outer boundaries of the course of action that the City will follow over the next 20 years. It is likely that the City will develop only some -- not all -- of the facilities contemplated in either the full-scale A or B systems. Chapter 19 presents the near-term implementation plan, which consists of the programs and facilities that the City plans to implement over the next five fiscal years. The City is not now planning to move forward with any specific facilities other than those in the near-term plan. This chapter addresses the impacts of the near-term implementation plan. These impacts are analyzed over a ten-year period, since some of the facilities initiated within the next five years will not be in operation until nearly ten years from now.

The experience with the near-term plan will provide information that will be used to make further decisions that lie ahead on the "decision tree" toward full development of a long-term plan. This information will be supplemented by the monitoring and research-and-development efforts that are described in Chapter 20.

The near-term implementation plan represents a point on the trajectory between the no-action/projected baseline and a full-scale system; its environmental impacts, therefore, would fall within this range. To the extent that less waste-to-energy capacity would be in place than projected in Systems A and B, the environmental impacts due to waste-to-energy impacts (largely a result of air emissions), would be less. These impacts are also less since (as described in Chapter 19) the final plan amends the draft plan in deleting the proposed upgrades of two of the three existing municipal incinerators (the Betts Avenue and Greenpoint incinerators are now scheduled to be closed by the end of 1995 as provided for in Chapter 19). The smaller increase in waste-to-energy capacity, however, will result in greater reliance on the Fresh Kills landfill and a shorter life span for the landfill. The near-term implementation plan also pursues other methods of ash-disposal in place of the proposed Fresh Kills ashfill; there will be no ashfill in the city and none of its associated environmental impacts.

In addition, the Department of Environmental Protection has modified plans for the sewage-management facilities described in the draft GEIS, resulting in an overall "downsizing" of the proposed network of in-city sewage-management facilities.

Table 17.4-1: Percentage of Weight Handled by Each Waste-Management Option by Year.[1]*

Year	Prevented	Recycled	Composted	Waste-to-Energy	Landfilled (excluding ash)	Exported	Ash
1993	1.5	15.3	0.1	4.7	47.0	31.4	1.0
1994	2.9	20.0	0.2	4.7	42.7	29.8	0.9
1995	4.5	27.7	0.1	4.7	60.4	2.7	0.9
1996	6.6	29.7	4.7	2.9	55.5	0.6	0.6
1997	9.2	30.9	7.0	2.9	49.9	0.1	0.6
1998	9.2	31.0	9.8	2.8	47.2	0	0.6
1999	9.2	31.0	12.1	17.8	30.0	0	3.5
2000	9.1	31.0	10.8	17.7	31.4	0	3.5
2001	9.1	31.0	10.7	17.5	31.6	0	3.4
2002	9.1	31.1	10.6	17.4	31.8	0	3.4

* N.B.: FOR PURPOSES OF ALL OF THE TABLES IN THIS CHAPTER, IT IS ASSUMED THAT THE GREENPOINT INCINERATOR AND THE PROPOSED FRESH KILLS ASHFILL ARE IN OPERATION. THESE ASSUMPTIONS ARE MADE IN ORDER TO PROVIDE A CONSERVATIVE IMPACT ANALYSIS, EVEN THOUGH THE ASHFILL WILL NOT BE BUILT AND THE INCINERATOR MAY NOT BE UPGRADED. SEE CHAPTER 19 FOR A DISCUSSION OF THESE TWO FACILITIES.

Since waste-to-energy and sewage-management facilities contribute a disproportionate amount of the overall air emissions due to the proposed plan (while mobile air emissions, as the preceding analysis shows, would remain roughly comparable in all of the various systems considered), the air impacts of the near-term implementation plan, in comparison to the full-scale systems, are generally less. This is shown in the tables below. For this reason, public-health impacts would also be within the bounds described for the full-scale plan. Non-cumulative impacts (e.g., noise, traffic, and odor) would likewise be relatively unchanged between the partial and the full-scale plans, although a fewer number of facilities would reduce some of these impacts "overall." The other "cumulative" impacts (e.g., energy and secondary economic impacts) would be within the bounds established in the full-system analyses in the preceding chapters, and are not repeated below.

In the remainder of this chapter, specific quantitative environmental and economic factors that would differ significantly between the partial and the full-scale plans (costs, landfill requirements, air emissions, and water usage and discharge) are presented for disclosure purposes. All of these impacts are shown for the Year 2000.

The percentages of the entire MSW stream that are projected to be handled by each waste-management method each year for the 10-year duration of this plan are shown in Table 17.4-1. This table demonstrates that the program- and facility-development strategies contained in the plan are expected to achieve the State prevention and recycling/composting goals.

Table 17-4.1a shows the percentage of only the "processible" portion of the MSW stream (as defined in Commissioner Jorling's Broome County decisions and the June 26, 1991 NYSDEC memorandum on this subject) that is projected to be recycled/composted each year under this plan for the same 10-year period. For purposes of calculating these percentages, the projected quantities of "non-processible" wastes were subtracted from the total waste projected to be generated each year (see "Municipal Solid Waste Composition Yearly Projections" in Appendix Volume 1.1) and the amounts of bulk and yard waste (defined as "non-processible" in waste-to-energy facilities) previously included in the recycling and composting rates for Table 17.4-1 were similarly deducted. Thus, Table 17.4-1a also demonstrates that the plan is expected to result in compliance with the State recycling/composting goal. The Department of Environmental Conservation has used projections of diversion rates for processible waste streams in determinimg the appropriate size of new waste-to-energy facilities. These diversion rates are of less significance to the sizing of the proposed new Brooklyn Navy Yard facility because of the magnitude of the City's waste stream in comparison to the capacity of the proposed facility.

Table 17.4-1a: Projected Recycling/Composting Rates for Processible Waste Streams* By Year

Year	Percentage Recycled**	Percentage Composted***	Total Percentage Recycled/Composted****
1993	14.3%	0%	14.3%
1994	19.5%	0%	19.5%
1995	28.0%	0%	28.0%
1996	30.3%	4.5%	34.8%
1997	31.5%	6.8%	38.3%
1998	31.6%	9.4%	41.0%
1999	31.5%	11.7%	43.2%
2000	31.5%	10.4%	42.0%
2001	31.7%	10.3%	42.0%
2002	31.8%	10.2%	42.0%

* All waste streams that are processible in waste-to-energy facilities, excluding those that cannot be burned due to physical and technical limitations (i.e., bulk) as well as those waste streams that are excluded for environmental reasons (i.e., yard waste, batteries and household hazardous wastes), pursuant to Commissioner Jorling's September 19, 1990 Interim Decision and December 1991 Decision in the Broome County Resource Recovery Facility proceedings.

** Excluding bulk.

*** Excluding yard waste.

**** Does not include re-used materials.

The analysis in this chapter provides an overview of the cumulative impacts of the near-term implementation plan. Site-specific environmental analyses will be (or in some cases, have already been) completed pursuant to the State Environmental Quality Review Act for each major facility to be developed by the City under the near-term implementation plan. In the course of these analyses, proposals for project-specific mitigation measures will be developed.

Depending on the amount of commercial waste that must be disposed of in the city after 1995, the life expectancy of the Fresh Kills landfill as a result of the implementation of the near-term implementation plan would be between 14 and 21 years. That is, if 100 percent of commercial wastes were disposed of within the city, Fresh Kills would be filled to capacity by the year 2007. If 50 percent of the commercial waste is disposed of within the city, the landfill would be filled by 2010. If no commercial waste requires landfilling at Fresh Kills, capacity would remain until 2014. (See Appendix Volume 7.1 for further details on this calculation.)

Table 17.4-2: Summary of Capital and Operating Costs (Year 2000, $M)

Collection	COST
Operating Costs	728
Annualized Capital Costs	134
TOTAL COLLECTION COST	862
Facilities	
Operating Costs	644
Annualized Capital Costs	285
TOTAL FACILITIES COST	929
Total Costs	1,791
Operating Costs	1,372
Annualized Capital Costs	419
TOTAL COSTS	1,791

Figure 17.4-1: Percent of MSW Handled by Program (Year 2000)

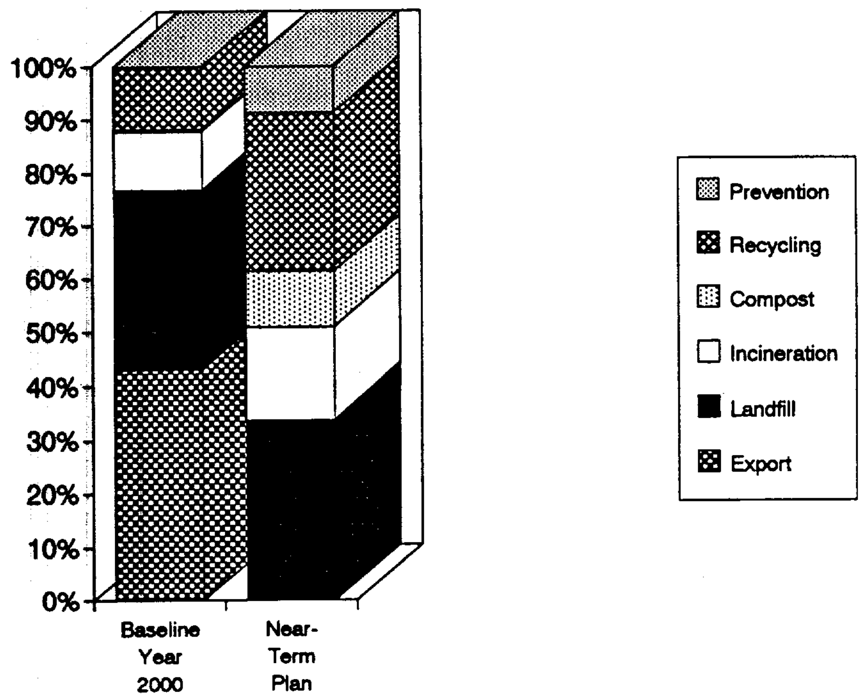


Figure 17.4-2: Program Costs of MSW Management Systems (Year 2000)

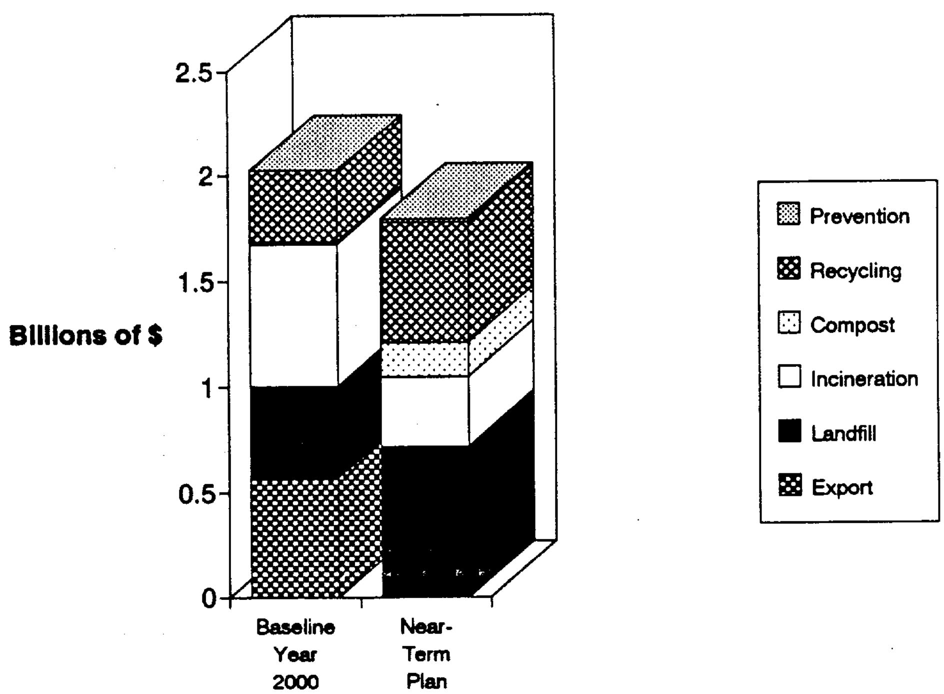


Table 17.4-3: MSW-System Acreage Requirements

	Near-Term Plan	Projected Baseline
Residential MRFs	30	6
Commercial Recycling Facilities	38	17
Leaf & Yd Waste Compost Facs	68	68
In-Vessel Compost Facility	45	0
Marine Transfer Station	28	28
Comb Waste Proc/Transfer Sta	27	0
Brooklyn Navy Yard WTE Facility	13	0
Southwest Brooklyn & Greenpoint Incinerators	15	23*
TOTAL	264	142

* This project-baseline calculation is based on the assumption that all three existing incinerators would be upgraded.

Table 17.4-4: Net Air Loadings, MSW Facilities (Tons Per Year)

(Tons/Yr)	Sulfur Dioxide	Nitrogen Oxides	TSP/PM10	Arsenic	Hydrogen Chloride	PCDD/PCDF
1990 Baseline*	4.9e+2	6.5e+2	3.7e+2	6.4e-2	1.6e+3	2.8E-5
2000 Projected Baseline	1.8e+2	1.5e+3	1.5e+2	2.0e-2	2.0e+2	8.8E-6
Near-Term Impltn Plan	4.1e+2	1.8e+3	2.2e+2	2.5e-2	2.7e+2	6.6E-6

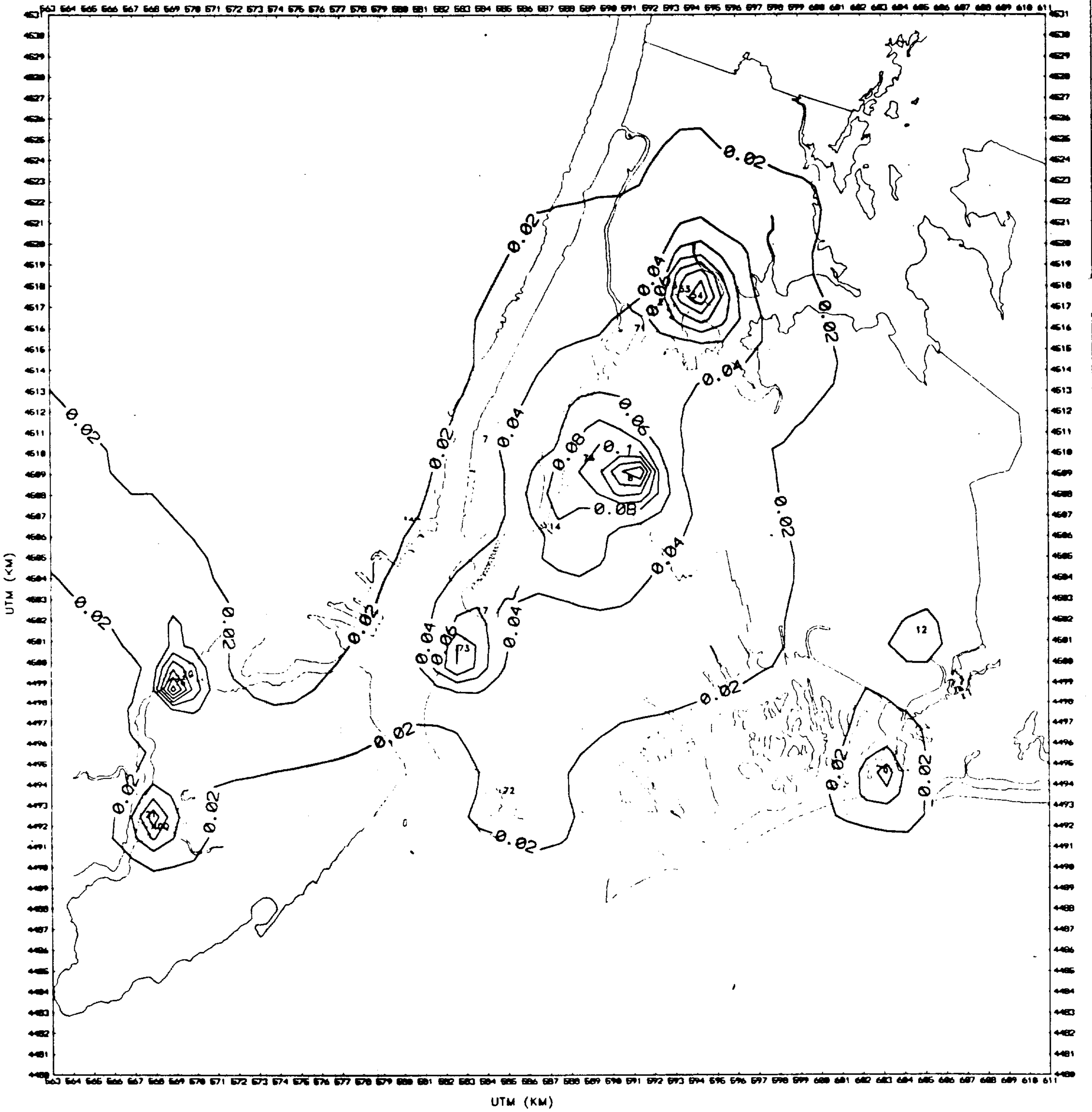
* The 1990 Baseline emissions are understated insofar as they do not include emissions from existing non-municipal facilities that are being phased out of operation.

Table 17.4-5: Ambient Air-Pollutant Concentrations from All Major Facilities in Integrated Management Systems

Ratio of Standard to Maximum	HCl	TSP/PM10	SO2	NOx	Dioxin	Arsenic
Ground-Level Concentrations*	(1-hr)	(24-hr)	(24-hr)	(Annual)	(Annual)	(Annual)
Standard/Guideline (ug/m3)	1.40e+2	2.80e+1	6.80e+1	6.00e+0	4.60e-8	2.30e-4
	1.60e+1	1.00e+1	2.60e+1	3.00e+0	5.01e+0	9.46e+0

* Assuming urban conditions, GEP stacks.

Figure 17.4-3: Isopleth Map of Ambient Air-Pollutant Concentrations Due to Facility Emissions Near-Term Implementation Plan (Annual PM10 Concentrations)



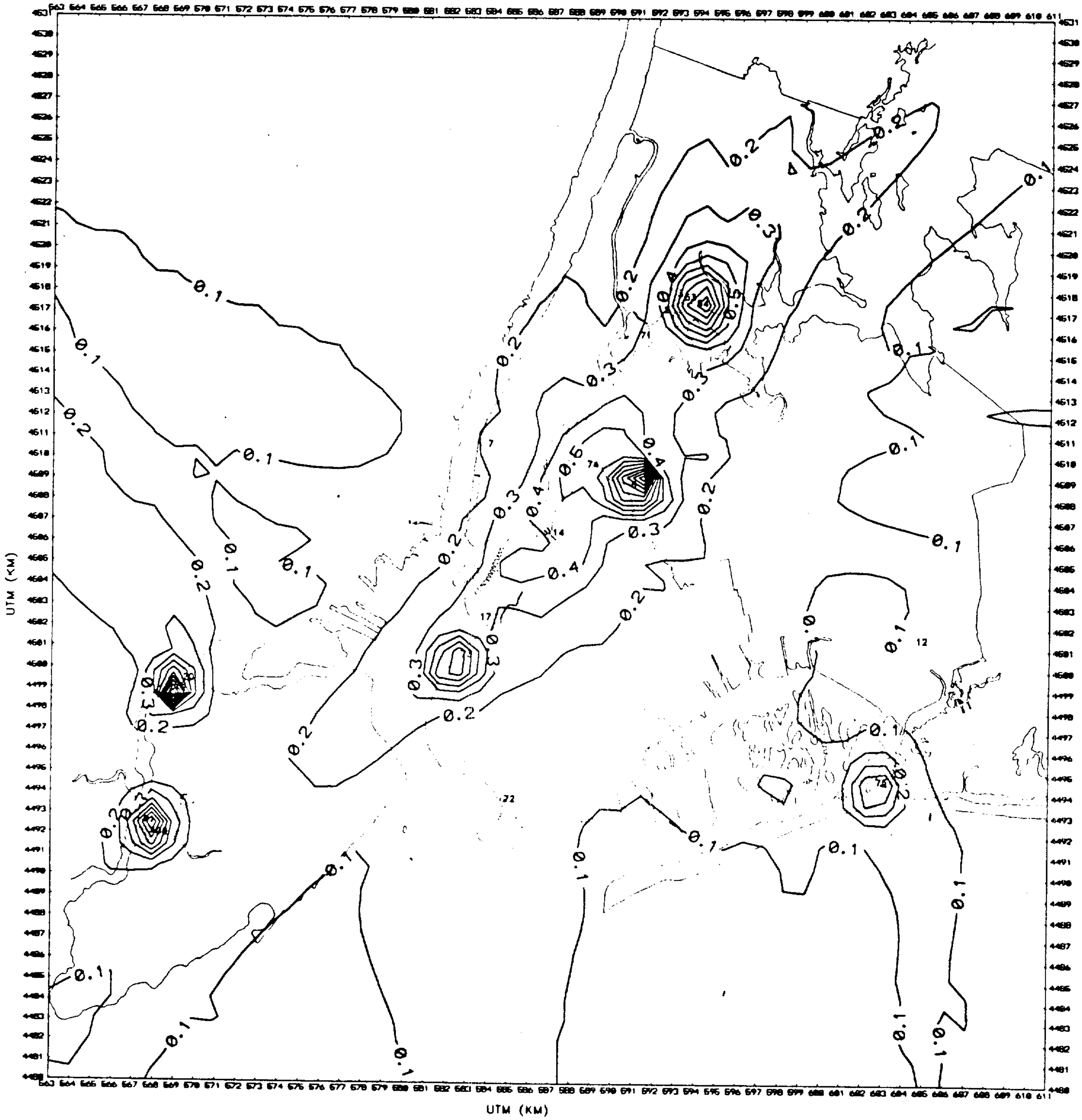
NYC SOLID WASTE MANAGEMENT PLAN

FINAL CUMULATIVE AIR QUALITY MODELING

ANNUAL PM10 CONCENTRATIONS (UG/M3)

TAMS CONSULTANTS, Inc.

Figure 17.4-4: Isopleth Map of Ambient Air-Pollutant Concentrations Due to Facility Emissions Near-Term Implementation Plan (24-Hour PM10 Concentrations)



NYC SOLID WASTE MANAGEMENT PLAN

FINAL CUMULATIVE AIR QUALITY MODELING

24-HOUR PM10 CONCENTRATIONS (UG/M3)

TAMS CONSULTANTS, Inc.

Table 17.4-6: Air Pollutants From All Major Facilities in Integrated Waste-Management Plan Deposited on Surface Waters

Total Loadings to NY Harbor Due to Deposition of Air Pollutants*	Existing Harbor Loading (kg/day)	Incremental Loading Due to Near-Term Plan (kg/day)	Near-Term Plan Loading as % of Total Loading
Arsenic	104.94	0.01	0.01%
Cadmium	634.37	0.02	0.00%
Lead	1,196.53	0.36	0.03%
Mercury	32.02	1.42	4.25%
Nickel	885.12	0.05	0.01%
Zinc	5,337.49	0.26	0.00%
PCB	3.62	1.2E-03	0.034%
(PCDD/F)**	NA	1.7E-06	NA

* Includes air emissions from all major non-MSW facilities.
** No data are available on background PCDD/PCDF (dioxin/furan) levels.

Table 17.4-7: Total Water Usage and Sewer Discharge from All Facilities in Integrated Waste-Management Plan

(Thousands of Gallons Per Day)	Avg Intake	Peak Intake	Avg Outflow	Peak Outflow
1990 Baseline	271	272	9	11
2000 Projected Baseline	665	668	15	17
Near-Term Implementn Plan	654	688	83	97
Non-MSW Waste-Stream Impacts Common to All Systems	304	316	287	298

Table 17.4-8: Near-Term Implementation Plan Facility Sewer-Discharge Impacts on WPCP Drainage Areas

Facilities	TPD	# EMP	Average Discharge gal/day	Drainage Areas (WPCP)	SPDES Permit (mgd)	YEAR 1991 Annual Average (mgd)	YEAR 1991 Maximum Monthly (mgd)	YEAR 1991 Excess Capacity (mgd)	YEAR 1991 Facility Discharge to WPCP (mgd)	YEAR 1991 % of WPCP Excess Capacity	YEAR 2010 - Projected Annual Average (mgd)	YEAR 2010 - Projected Maximum Monthly (mgd)	YEAR 2010 - Projected Excess Capacity (mgd)	YEAR 2010 - Projected % of WPCP Excess Capacity
Near-Term Plan			**63,472**		**710**	**621**	**704**	**89**	**0.06**	**0.07%**	**655**		**55**	**0.12%**
Manhattan MRF	500	142	10,650											
Brooklyn Navy Yard	3000	86	6,450	Newtown Creek	310	318	362	(8)	0.02	NA	331	375	(21)	NA
Bronx MRF	500	142	10,650											
Bronx In-Vessel	460	164	3,772	Hunt'sPoint	200	153	181	47	0.01	0.03%	155	183	45	0.03%
S Queens MRF	500	142	10,650	Jamaica	100	81	84	19	0.01	0.06%	82	85	18	0.06%
Brooklyn MRF	500	142	10,650	Red Hook	60	39	45	21	0.01	0.05%	41	47	19	0.06%
Staten Is MRF	500	142	10,650	Oakwood Beach	40	30	32	10	0.01	0.11%	46	48	(6)	NA

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PCB	3.62	1.2E-03	0.034%
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* Includes air emissions from all major non-MSW facilities.
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Near-Term Implementn Plan	654	688	83	97
Non-MSW Waste-Stream Impacts Common to All Systems	304	316	287	298

The proposed program may have a modest short-term adverse impact on existing private and/or non-profit recycling programs, because the increased supply of recyclable materials that will require absorption by end-users may temporarily overwhelm markets for certain materials. On a long-term basis, however, the program should contribute to the expansion of markets both for recyclables generated by City-operated programs and by private programs. This is because the creation of a larger, dependable, long-term supply of materials of predictable specifications should eventually increase end-user demand, as industries, technologies, and markets evolve to take advantage of new and less-expensive sources of raw materials. This is particularly true for those recyclable materials (e.g., glass) which demand no major changes in existing manufacturing facilities, and for those materials (e.g., newsprint) for which there are no major technological problems in using secondary feedstocks, because the use of secondary materials is cost-effective and environmentally preferable. As for the re-use of plastic resins, which have thus far been the exception to the general rule that secondary materials are relatively easy to integrate into manufacturing processes, there is reason to believe, based on the experience of technological innovation in other industries, that the availability of more-dependable secondary supplies (given the potential for environmental and cost benefits) will spur technology development and the creation of new end-user capacity.

Endnotes

1. The City's commercial waste stream is assumed to return to the City for disposal as of 1995.

CHAPTER 18. POLICY COMPLIANCE.

18.1 Compliance With State Waste-Prevention Goals.

The State solid-waste-management plan establishes a Statewide goal of reducing the waste stream by 8-10 percent from 1988 per-capita generation levels (taking into account, however, changes in overall generation rates due to changes in population and employment levels.) by 1997. If the City's proposed prevention measures are implemented on the schedule proposed for the near-term implementation plan, the waste composition and generation data suggest that reductions on the order of 10 could be achieved. Offsetting this reduction is a 15 percent projected increase in overall waste generation rates, but since the majority of this increase is expected to be due to employment and population increases,[1] this degree of reduction -- which is a prediction of what is likely to be due achievable, and which is a minimum rather than a maximum target -- should meet the State goals. Waste-prevention achievements, however, are difficult to predict, because so little has been accomplished anywhere thus far that there is little research or experience from which to draw meaningful data, and because, of all the waste-management techniques, waste-prevention measures are least within the purview of local/municipal control.

18.2 Compliance With State Recycling/Composting Goals.

The Statewide recycling goal is a recycling rate of 40 percent by September 1, 1997. Implementation of the near-term plan would result in an estimated recycling rate of 31 percent and a composting rate of seven percent, for a combined rate of 38 percent; by the year 2000, the recycling rate is projected to remain constant, and the composting rate to increase to 11 percent, for a combined recycling/composting rate of 42 percent.

18.3 Compliance With the State Solid Waste Management Priorities.

The proposed plan presents all waste-prevention measures considered practicable. These may have a higher- or lower-than-projected effect, and any additional measures which are in future found to be practicable will be added to this ensemble to achieve, if possible, higher prevention results.

The proposed recycling program encompasses a category of materials that is based on a definition of "recyclable" that is as aggressive and expansive as possible, and these materials would be collected in the way that is considered most likely to maximize public participation (and hence diversion) while at the same time producing processed recyclable materials of the highest public participation (and hence diversion) while at the same time producing processed recyclable materials of the highest specifications and grades practicable for maximum marketability (and hence diversion). This proposed recycling program is also designed to take maximal advantage of potential changes in technologies and recyclable markets over the 20-year period. The predicted recycling diversion rates, while moderately optimistic, are nonetheless "mid-range" projections, which, under the most favorable conditions, could be exceeded.

The near-term implementation plan would result in an increase of 2,550 tons per day in City's waste-to-energy/incinerator capacity by the year 2000, and there would be an accompanying decrease in the use of the Fresh Kills landfill. The near-term implementation plan will result in a reduction in the percentage of the waste stream that is disposed of at the Fresh Kills landfill or exported to other landfills, from 89 percent (of the residential and institutional waste stream) in 1990 to 31 percent (of the residential, institutional, and commercial waste streams disposed of in the city) in the year 2000.

18.4 Compliance With Section 120-aa of the General Municipal Law.

Despite the aggressive proposed recycling program, Section 120-aa of the General Municipal Law presents two outstanding recycling-policy compliance issues. GML 120-aa states that municipalities must adopt (by September 1, 1992) local laws or ordinances to require the source separation of recyclable components of the waste stream for which economic markets exist. An "economic market" is considered to exist when the costs of collecting materials for recycling, less revenue generated from the sale of the materials, are less than or equal to the costs of collecting the materials for disposal. GML 120-aa is discussed in detail in Chapter 19, section 19.3.1.3.

Endnotes

1. A study underway for the Regional Plan Association projects a 29 percent increase in overall waste-generation for the 31-county region between 1990 and 2015. Of this increase, 28 percent is due to population increase, 27 percent to employment increase, and 43 percent increase in per-capita generation rates. (Tellus Institute, "Existing and Future Solid Waste Management Systems in the RPA Region," March 5, 1992, p.11.)