CHAPTER 17.1 ENVIRONMENTAL AND ECONOMIC IMPACTS OF THE PLAN: The Environmental Impact Evaluation Process.[1]

Just as the scenario development process, using the NYC WastePlan computer model, was an iterative one which moved from relatively abstract preliminary screening phases to more detailed analyses, the environmental impact evaluation process passed from more abstract and general analyses to detailed and specific ones based on more realistic New York City conditions. The NYC WastePlan model developed comparative cost analyses of the alternative scenarios. It also provided some of the basic inputs required for the environmental analyses, such as waste tonnages and composition, number of facilities and numbers of acres required, numbers of trucks and miles travelled, and numbers of employees.

In this Chapter (17.1), "reference facility" emissions and costs are presented, analyzed on a facility-specific basis, and the first-phase scenario results are presented. In the next chapter (17.2), collection systems and facilities are combined and presented on a program-specific/waste-stream-specific basis (e.g., total MSW waste-to-energy impacts). In Chapter 17.3, the cumulative environmental impacts of comprehensive integrated waste-management systems (e.g., "System A," the High Quality/Refuse system relative to "System B," the High Quality/Organics/Refuse system) are presented. In Chapter 17.4, the most significant cumulative environmental impacts of the near-term implementation plan are presented. The near-term plan sets forth the programs and facilities scheduled for actual implementation by the City over the next five years that will become fully operational over the next ten years. Unlike the other "systems," the near-term implementation plan includes only those facilities that the City is now prepared to move forward with in the next five years, plus two additional composting facililities that are proposed to be developed by the end of the decade.

Chapters 1 through 17 and 21 are parts of the solid-waste-management plan and also constitute the environmental impact statement for the plan. Chapters 18 through 20, as distinct from the other chapters in the plan, represent the action to be taken by the City in adopting this plan and are not a part of the environmental analysis.

17.1.1 Reference Facility Costs and Impacts.

The universe of "reference facilities" and collection alternatives was developed with respect to technical and engineering feasibility, cost competitiveness, and environmental impacts relative to other potential alternatives. The universe of facilities was largely determined by those that were technologically and economically feasible. In general, the variance in environmental impacts for waste-management facilities has more to do with the type of waste processed, and the <u>type</u> of technology (i.e., materials recovery, composting, waste-to-energy, landfilling) than with variations within types; this is largely due to regulatory requirements that specify "Best Available Control Technology," or its equivalent, to require "state-of-the-art" environmental performance standards for a given type of technology.

Just as cost and operational data were assembled to characterize the reference facilities for comparative purposes and for scenario-modeling using New York City WastePlan, environmental emissions factors were assembled for each reference facility in the universe of feasible alternatives. These emission factors are arrayed in the summary tables and comparative graphs that follow.

17.1.2 Air Analyses.

Reference facility air emissions are displayed as a multiple of the emissions from a standard MRF facility in Table 17.1.2-1.[2]

The ambient air impacts produced by emissions from the eight facility types that were the most significant pollutant sources were modeled by computer. Maximum impacts from these facilities are compared to applicable standards, and to each other, in Table 17.1.2-2: the values in this this table show <u>how many times below the standard</u> the <u>maximum</u> ground-level concentrations would be. (A complete set of modeling results is presented in Appendix Volume 7.2.) Although these facilities differed in their relative impacts, none produced ambient impacts that were unacceptable from a regulatory or public-health perspective (see "Public-Health Analyses" in Section 17.1.10).

Using standard assumptions (about facility design, operating conditions, air-pollution-control devices, and stack parameters -- all of which are detailed in the "Reference Facility Design Sheets" in Appendix Volume 5), all of these prototypical facility types, at sizes in the range that would be likely for New York City, would produce ground-level pollutant concentrations that are well below any relevant regulatory standards or guidelines.

These modeling analyses were also used to develop more detailed siting criteria relative to air-quality impacts (e.g., desirable distance from high-rise buildings or natural elevations of a specified height, the desirability of avoiding areas with Federal Aviation Administration stack-height constraints, the desirability of locations in highly built-up as opposed to less-developed areas). The effects of different stack heights,

Table 17.1.2-1: Reference Facility Air Emissions -- As a Multiple of Standard MRF

Reference Facility	Sulfur Dioxide *(a)	Nitrogen Oxides	Particulates (TSP/PM10)	Carbon Monoxide	Lead	Vol Org Compounds
1 Truck Transfer Station	D	1	1	1	1	1
2 Marine Transfer Station	D	1	1	1	1	1
3 Rail Transfer Station	D	1	1	1	1	1
4 Materials Drop-Off	D	D	D	D	D	D
5 Materials Buy Back	D	D	D	D	D	D
6 Household Haz. Waste Drop-Off	D	D	D	D	D	NR
7 Waste Oil Facility	D	D	D	D	D	D
8 In-Vessel Compost	D	6	3	8	NR	27
9 Mixed Waste In-Vessel Compost	D	4	3	5	1	15
10 Leaf & Yard Waste Compost	D	126	60	164	D	NR
11 Sludge Compost	D	113	54	147	NR	62
12 Sludge Pelletizer	1	1017	115	147	407	148
13 Sludge Chemical Stabilization	D	10	114	13	D	5
14 Materials Recovery Facility	D	1	1	1	1	1
15 Mixed Waste Processing	D	1	1	1	1	1
16 Dry Bag Processing	D	1	1	1	1	1
17 Commercial Paper Processing	D	1	1	1	0.1	1
18 Commercial Waste Processing	D	1	1	1	1	1
19 Construction & Demolition Proc	D	3	10	4	0.1	D
20 Medical: On-Site Chop & Bleach	D	D	D	D	D	NR
21 Medical: On-Site Autoclave	D	D	D	D	6	8
22 Medical: Regional Autoclave	D	D	D	D	6	8
23 Harbor Debris Processing	D	1	1	1	D	D
24 Dredge Spoils Dewatering	D	D	D	D	D	NR
25 Waste Tire Processing	D	1	0.1	1	1	D
26 Mass-Burn Waste-to-Energy	1.3	1559	17	134	28	1.4
27 RDF Waste-to-Energy	1.1	1218	37	868	185	17
28 Modular Waste-to-Energy	1.8	624	18	144	149	D
29 Sludge Incinerator	0.1	355	23	8	741	2
30 Med:Reg. Pathological Incin	D	D	5	D	D	D
31 Med:On-Site Inc (dry injection)	0.5	2797	4	647	149	D
Med:On-Site Inc (wet scrubber)	0.2	2797	19	647	398	D
32 Med:Regional Incinerator	0.5	2797	4	647	354	D
33 Ash Landfill	D	3	0.2	0.8	0	D
34 MSW Landfill	D	15	4	7	0.5	3

D = No data reported, but process emissions of the pollutant are considered insignificant.
NR = No data reported, but emissions may exist.
*(a) Because a MRF emits no sulfur dioxide, this pollutant is expressed as a multiple of Sludge Pelletizer emissions.

terrain heights, building heights, and dispersion conditions ("urban" vs. "rural") at different distances and directions are detailed in a series of tables in Appendix Volume 6. Although under no circumstances was it projected that standards or guidelines would be exceeded, these analyses show the relative effects of site-related factors in relation to expected ambient concentrations.

After the initial-phase scenarios were developed, the emissions factors were multiplied on a spreadsheet to calculate "net air-pollutant loadings" for a specific combination of MSW facilities. The net loadings for the first-phase scenarios are presented in Table 17.1.2-3.

Table 17.1.2-2: Ratio of Standard to Maximum Ground Level Concentrations*

Reference Facility	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**
12 Sludge Pelletizer (500TPD)	1200	40	20000	70	140	50
14 Materials Recovery Facility (500 TPD)	NA	6100	NA	NA	NA	3400
11 Sludge Compost (100 TPD)**	NA	NA	NA	NA	NA	NA
26 Mass Burn Waste-to-Energy (2250 TPD)	33	45	25	6	27	14
27 RDF Waste-to-Energy (2250 TPD)	69	21	30	8	73	12
29 Sludge Incinerator (250TPD)	NA	130	1,100	90	15	50
32 Medical Regional Incinerator (330 TPD)	4	190	70	7	9	150
33 Ash Landfill	NA	3	NA	NA	NA	1100

* Assuming urban conditions, GEP stack
NA = Not Applicable

** None of these pollutants are relevant to sludge-composting facilities; instead, these pollutants were modeled for this facility: hydrogen sulfide, benzene, carbon disulfide, dimethyldisulfide, MEK, ammonia; see Appendix Volume 6 for details.

Table 17.1.2-3: Net Air Emissions, First-Phase Scenarios

	HCl tons/yr	TSP/PM10 tons/yr	SO2 tons/yr	NOx tons/yr	Dioxin tons/yr	Arsenic tons/yr
1990 Baseline	1,700	380	530	680	3e-5	7e-2
2000 Projected Baseline	240	140	210	1,800	1e-5	2e-2
1. HQ/R: 2 Trucks (WTE)	450	220	910	2,600	5e-5	4e-5
2. Wet/Dry: 1 Truck, 1 Compartment (WTE)	250	150	510	1,400	3e-6	2e-2
3. HQ/O/R: 3 Trucks (WTE)	360	180	720	2,000	4e-6	3e-2
4. Wet/Dry: 1 Truck, 1 Compartment	NR	100	D	16	NR	NR
5. HQ/R: 2 Trucks (MWP)	D	50	D	16	NR	NR
6. Wet/Dry: 1 Truck, 2 Compartments (WTE)	250	150	510	1,400	3e-6	2e-2
7. HQ/O/R: 3 Trucks	NR	50	D	22	NR	NR
8. HQ/Wet/Dry: 2 Trucks (WTE)	200	120	400	1,100	2e-6	2e-2
9. Wet/Dry: 2 Trucks (WTE)	250	150	510	1,400	3e-6	2e-2
10. Wet/Dry: 1 Truck, 2 Compartments	NR	60	D	20	NR	NR
11. HQ/Wet/Dry: 2 Trucks	NR	50	D	17	NR	NR
12. Wet/Dry: 2 Trucks	NR	60	D	20	NR	NR
13. Waste-to-Energy	810	380	1,600	4,600	8e-6	7e-2

D = No data reported, but emissions of the pollutant are considered insignificant.
NR = No data reported, but emissions may exist.

(The 1990 Baseline emissions in the table above deserve an important clarification: in order to make an apples-to-apples comparison with the alternative scenarios, only the same types of municipal facilities are included. Non-municipal facilities that are being phased-out of operation -- apartment-house incinerators, existing on-site hospital incinerators, and open-barge harbor-debris burning -- are not included. [One reason for not including these types of incinerators is that the emission data for them are much "softer" than emission data from the waste-to-energy facilities in the other scenarios.] This means that this historical baseline is considerably understated -- probably by two orders of magnitude. An analysis of emission factors for these types of "baseline" facilities is presented in Appendix Volume 6.)

The air impacts of the major facilities required for each of the various waste-streams included in the intermediate-stage scenarios (MSW, sludge, medical waste) were cumulatively modeled to assess the impact of any "overlapping plumes," both as a guide to developing more detailed siting criteria that take into account the interactions between facilities, and to determine whether the combined effects of facilities' emissions produced ambient pollutant levels of regulatory or public-health significance. The maximum impacts for particulate emissions thus produced (particulates were the only pollutants modeled in this phase of analysis), due to the most likely spacing pattern between facilities (which reduces the potential for plume overlap) and to the differential ways that pollutants are dispersed from facilities of different types (e.g., from a relatively tall stack in the case of waste-to-energy facilities, and from a relatively low stack in the case of compost facilities), are virtually identical. A detailed presentation of these results is presented in Appendix Volume 7.2 ("Scenario Results"). The air impacts of the major facilities included in the final-stage scenarios were modeled in somewhat more detail, to include the dispersion of more pollutants, including the deposition of air-borne particulate matter as well as the dispersion of gaseous pollutants. A summary of these results is presented in Section 17.3; see Appendix Volume 6 for more details.

Net-loading calculations were also performed for the facilities of all types (for all waste streams) which were included in the final-phase scenarios. These are presented in section 17.3 (Cumulative Impacts of Alternative Integrated Waste-Management Systems).

Air impacts due to traffic -- exhaust from trucks on collection routes as well as from trucks delivering waste to and picking up products and residue from processing facilities, and from the cars driven to and from work by truck operators and facility employees -- were also calculated on a "net loadings" basis for each scenario by modeling miles traveled by vehicle type, using standardized assumptions for the percentage of miles traveled in each borough, at varying speeds, with varying engine conditions. These analyses are presented in detail in Appendix Volume 7.2 ("Scenario Results"), and in summary form in Table 17.1.2-4. Because the City is committed to using "alternative fuels" to the extent feasible to reduce air pollution, the values in this table, which are based on the use of traditional fuels (in the absence of data on emissions from alternative fuels), should be seen as a conservative projection of future conditions. From a planning perspective, however, the most important issue are the relative impacts of alternative waste-management systems, since the effects of fuel type would presumably be equivalent in any system.

Table 17.1.2-4: Vehicular Air Emissions (Tons per Year, Year 2000)

	Carbon Monoxide	Hydro-carbons	Oxides of Nitrogen	Diesel Particulates	Carbon Dioxide
1990 Baseline	360	40	140	20	89,000
2000 Projected Baseline	430	50	170	30	132,000
1. HQ/R: 2 Trucks (WTE)	420	50	170	30	119,000
2. Wet/Dry:1 Truck, 1 Compartment (WTE)	380	40	150	20	124,000
3. HQ/O/R: 3 Trucks (WTE)	470	50	190	30	118,000
4. Wet/Dry: 1 Truck, 1 Compartment	380	40	150	20	124,000
5. HQ/R: 2 Trucks (MWP)	450	50	170	30	120,000
6. Wet/Dry:1 Truck, 2 Compartments (WTE)	420	50	150	20	138,000
7. HQ/O/R: 3 Trucks	470	50	190	30	130,000
8. HQ/Wet/Dry: 2 Trucks (WTE)	490	50	190	30	146,000
9. Wet/Dry: 2 Trucks (WTE)	500	60	190	30	200,000
10. Wet/Dry: 1 Truck, 2 Compartments	420	50	150	20	134,000
11. HQ/Wet/Dry: 2 Trucks	500	60	190	30	150,000
12. Wet/Dry: 2 Trucks	340	30	100	20	104,000
13. Waste-to-Energy	270	30	90	10	78,000

17.1.3 Water Analyses.

With one exception -- the dredge spoils dewatering facility -- no type of facility would discharge pollutants directly into ground or surface waters. Two types of facilities, however -- landfills and ash monofills -- would produce leachate that must be carefully contained and monitored in order to prevent its escape into the environment. The remaining facilities, due to regulatory requirements as well as to standard design and operating practices for each type of technology, would discharge effluents only into the City's sewer system. Of these latter facilities, only eight would discharge any liquid effluents that were contaminated by any direct contact with refuse or its processing (see tables below); the remaining facilities would discharge only "sanitary" waste water produced by their employees and by normal "housekeeping" procedures.

Table 17.1.3-1: Process Water Discharge

	Cadmium		Chromium		Copper		Lead		Mercury		Zinc	
DEP Standard	2mg/L		5 mg/L		5 mg/L		2 mg/L		.05 mg/L		5 mg/L	
Reference Facility	mg/l	mg/ton	mg/l	mg/ton	mg/l	mg/ton	mg/l	mg/ton	mg/l	mg/ton	mg/l	mg/ton
Sludge Compost	0	0	0	0	0.03	23	0	0	0	0	0	0
Sludge Pelletizer	0.1	70	2	1,200	20	11,500	4	2,100	0.03	20	20	8,500
Chemical Stabilization	0	0	0	0	0.6	1,600	0	0	0	0	0.5	1,200
Medical: On-Site Chop & Bleach	0	0	0	0	0	0	0	0	0	0	0	0
Medical: On-Site Autoclave	0	0	0	0	0	0	0	0.03	0	0	0	0
Medical: Regional Autoclave	0	0	0	0	0	0	0	0.02	0	0	0	0
Medical: On-Site Incinerator	NA	NA	NA	NA	0	0	14	14,100	NA	NA	NA	NA
Medical: Regional Incinerator	0	0	0	0	0	0	0	0	0	0	0	0

Table 17.1.3-2: Landfill Leachate

	Ammonia	Phenol	Arsenic	Cadmium	Copper	Lead
Reference Facility	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
Ash Landfill	25	.02	.3	.003	.008	.04
MSW Landfill	866	.026	.011	<.005	.56	<.005
FRESH KILLS LANDFILL[3]	512	.041	.170	.030	.163	.310

Since none of the eight types of facilities that produce "process water" discharge to the sewer system were included in the first-phase scenarios, there were no "net water-pollutant loadings" to be calculated at this stage of the analysis. Net loadings were calculated for proposed Systems A and B and the "benchmark" No-Burn and Maximum-Burn Systems in the final stage of scenario analysis, and are presented in section 17.3.

In order to assess the differential effects on pollutants in surface waters in the New York Harbor/estuary system -- as these pollutants would be dispersed by tides and currents, and as pollutant "plumes" from various facilities overlapped -- a water-modeling analysis was performed, as described in Chapter 6. Since direct discharges to surface waters are not at issue for most types of facilities, the ranking of the various reaches in the harbor according to their dispersion capacity produced by this analysis provides relatively little guidance for the development of more detailed siting criteria.

The amount of airborne pollutants that would be deposited directly on surface waters or washed into surface waters by runoff from land was calculated and compared to existing loadings from all sources to the Harbor. This analysis is presented in Section 17.3 below.

17.1.4 Transportation Analyses.

To assess the impact that the vehicle trips generated by any particular type and size of facility would have in particular regions of the City -- and to determine whether or not it would be feasible to consider siting such facilities at these locations -- intersections that serve as "portals" to the major areas of the City that might be suitable locations for waste-management facilities (see the description of the siting analyses in section 17.1.9), or which are typical of traffic conditions within these areas, were analyzed. One-day peak-hour(s) traffic counts were conducted for intersections for which there were no existing data from studies completed within the past three years. These counts and the projected vehicle trips for specific facility types were then used as inputs to a computer model to predict the incremental effects of these waste-management-facility-generated trips on projected traffic volumes at particular intersections. The results of this analysis are presented in Appendix Volume 7.

This analysis of the pairing of specific intersections with the peak-hour traffic generated by specific types of facilities shows that traffic conditions are a relatively significant constraint in siting facilities in New York City. Figure 17.1.1-3 presents the total daily vehicular trips generated by the reference facilities. The facility types that generate the greatest amount of traffic are landfills (because of their size) and large-scale composting facilities (because of their size, because they are labor-intensive, and because of the amount of material that must also be removed from the facility). Of the 33 potentially feasible regions of the City in terms of land-use, the analysis of key intersections shows that only seven could handle these most-traffic-intensive types of facilities. Truck-fed waste-to-energy facilities on a 2,250 ton-per-day scale would generate enough traffic to suggest that 18 of the 33 regions would be problematic.[4] For certain types of facilities in certain locations, these constraints could be overcome by the use of barge transport. Another factor that could reduce the effect of traffic due to waste deliveries in certain locations is that waste-management facilities of comparable sizes already exist in those locations, so that, since waste deliveries would simply be displaced from one location to another, there would be no net increase over current levels in certain regions.

The heuristic waste sheds and facility locations proposed for the alternative scenarios were used to assess the potential for cumulative effects from a network of facilities on a particular intersection. The wastesheds were sectioned into quadrants (or fifths, in some cases where geography dictated), and a quarter (or a fifth) of the traffic generated by a facility was assumed to come from each direction to a potential site. When wastesheds for different facilities overlapped, the overlapping portions of their traffic flows were assumed to go through the same sample critical intersection. In the few instances when such wasteshed overlap occurred, the impacts of the proposed systems over "no-build" conditions indicated very few potentially significant impacts, and even these were solvable through the use of easy-to-implement improvements such as traffic-signal timing modifications. (See Appendix Volume 6 for specific details.)

The 40 general areas of the City that were assessed in this analysis are shown in the maps on the following pages.

17.1.5 Noise Analyses.

The analysis of facility-generated noise in the figure below shows minimal potential impacts from all but a small number of facilities, and no facility that would generate incremental noise over existing background levels in any appropriate land-use area. Collection-noise impacts for the various alternative scenarios, as analyzed by the methodology described in Chapter 6, were equally inconsequential in terms of their incremental impacts over average citywide background levels, nor did this analysis reveal any significant differences between the various alternative scenarios. As in the case of the vehicular air emissions, which did not reflect the anticipated beneficial impacts of increased use of alternative fuels, the collection-noise analysis is conservative in that it does not reflect the City's intent to purchase compactor trucks that meet the most stringent noise-abatement specifications. The results of this analysis of differential collection noise between the alternative scenarios are presented in Appendix Volume 7.2.

Figure 17.1.4-1: Vehicular Trips Generated by Reference Facilities

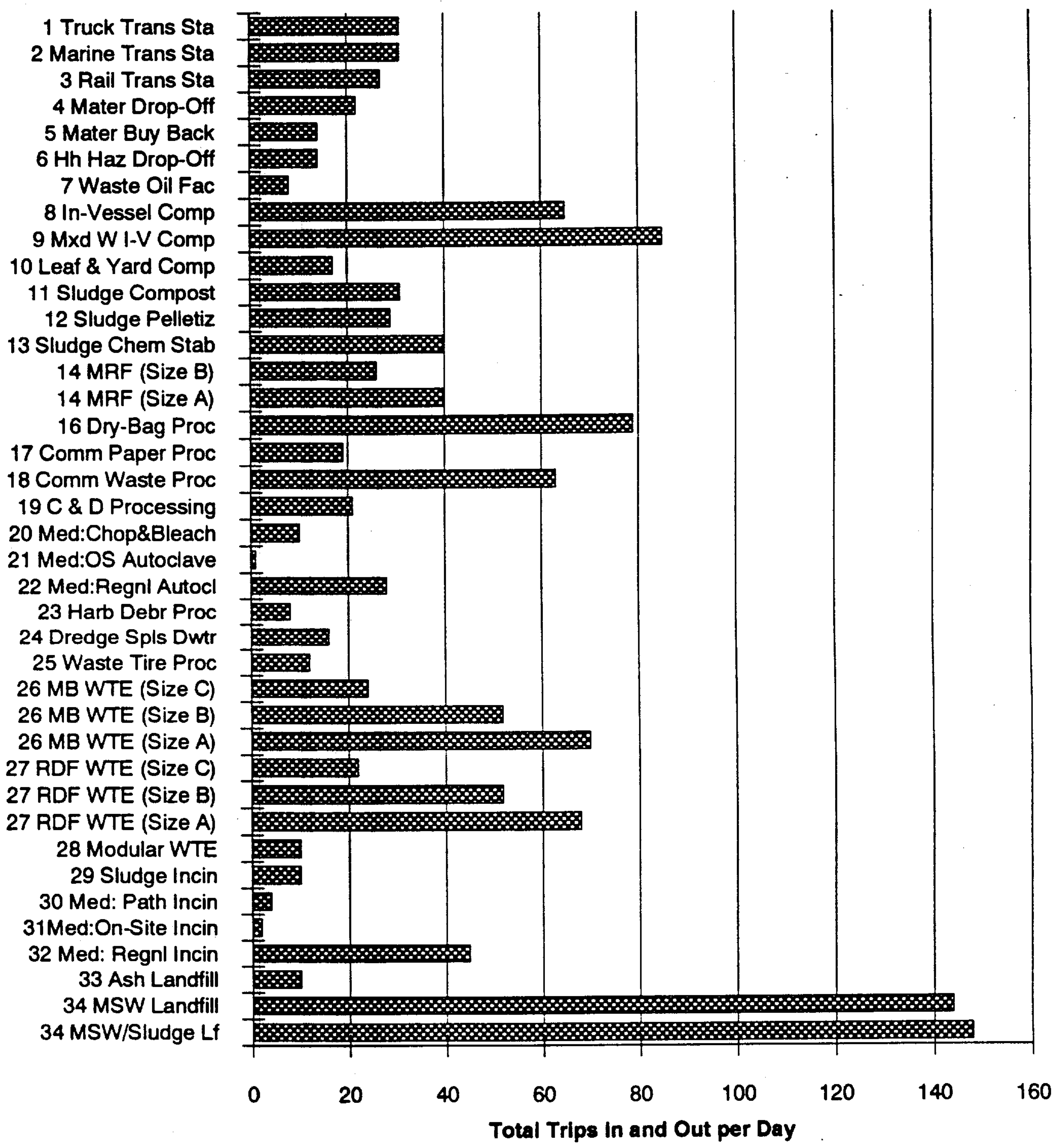


Figure 17.1.4-2: Key Access Intersections for Potential Bronx Facility Locations

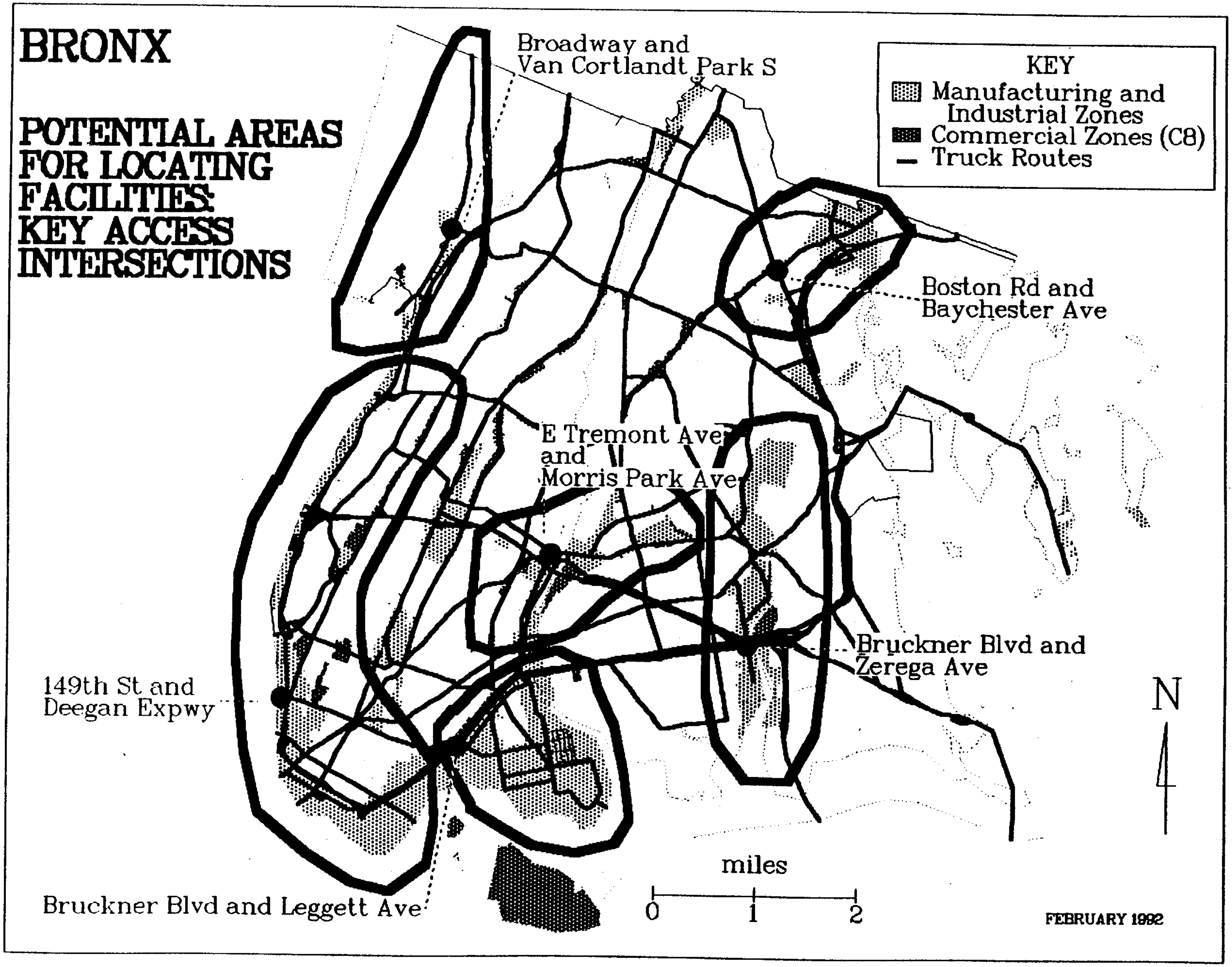


Figure 17.1.4-3: Key Access Intersections for Potential Brooklyn Facility Locations

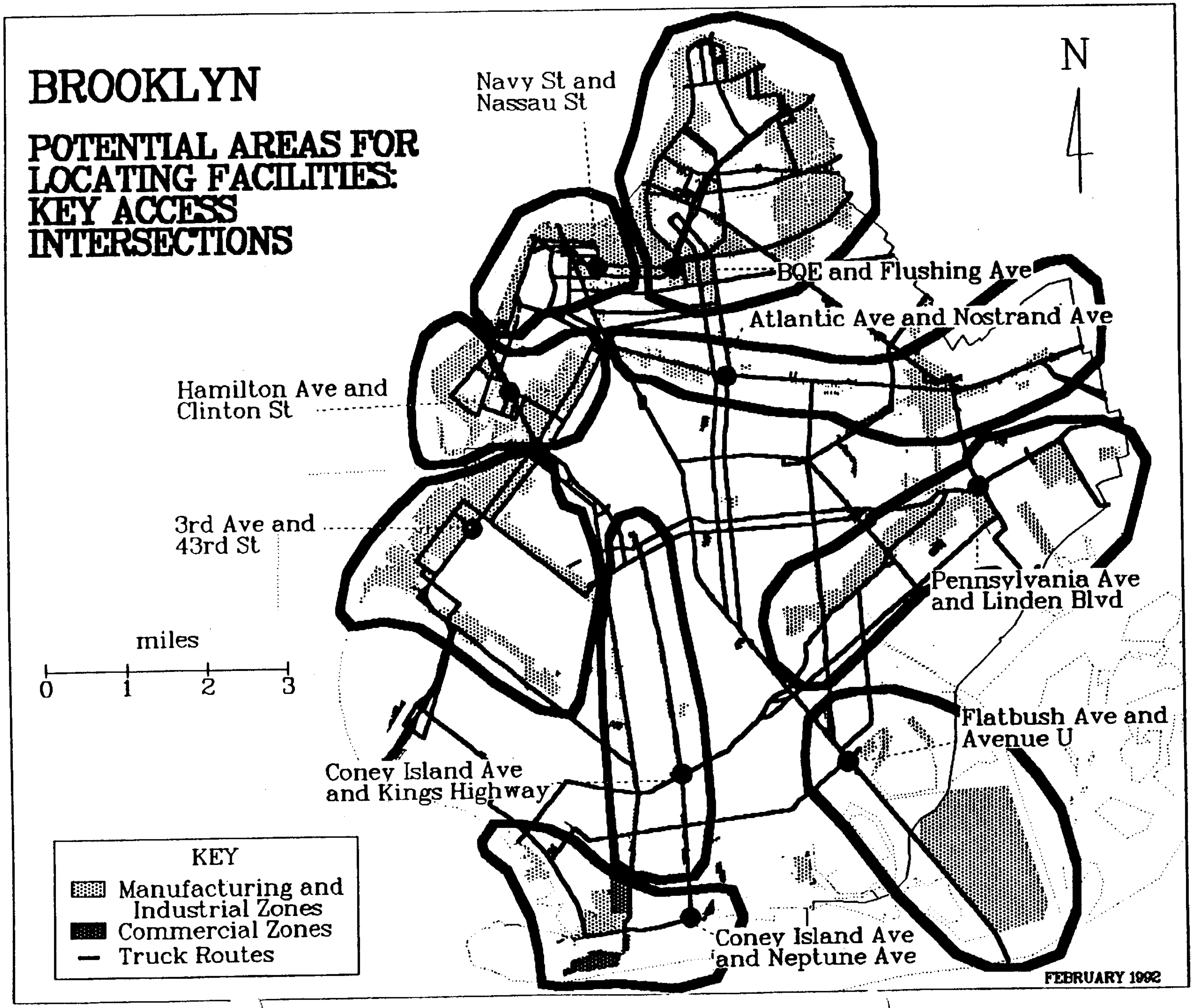


Figure 17.1.4-4: Key Access Intersections for Potential Manhattan Facility Locations

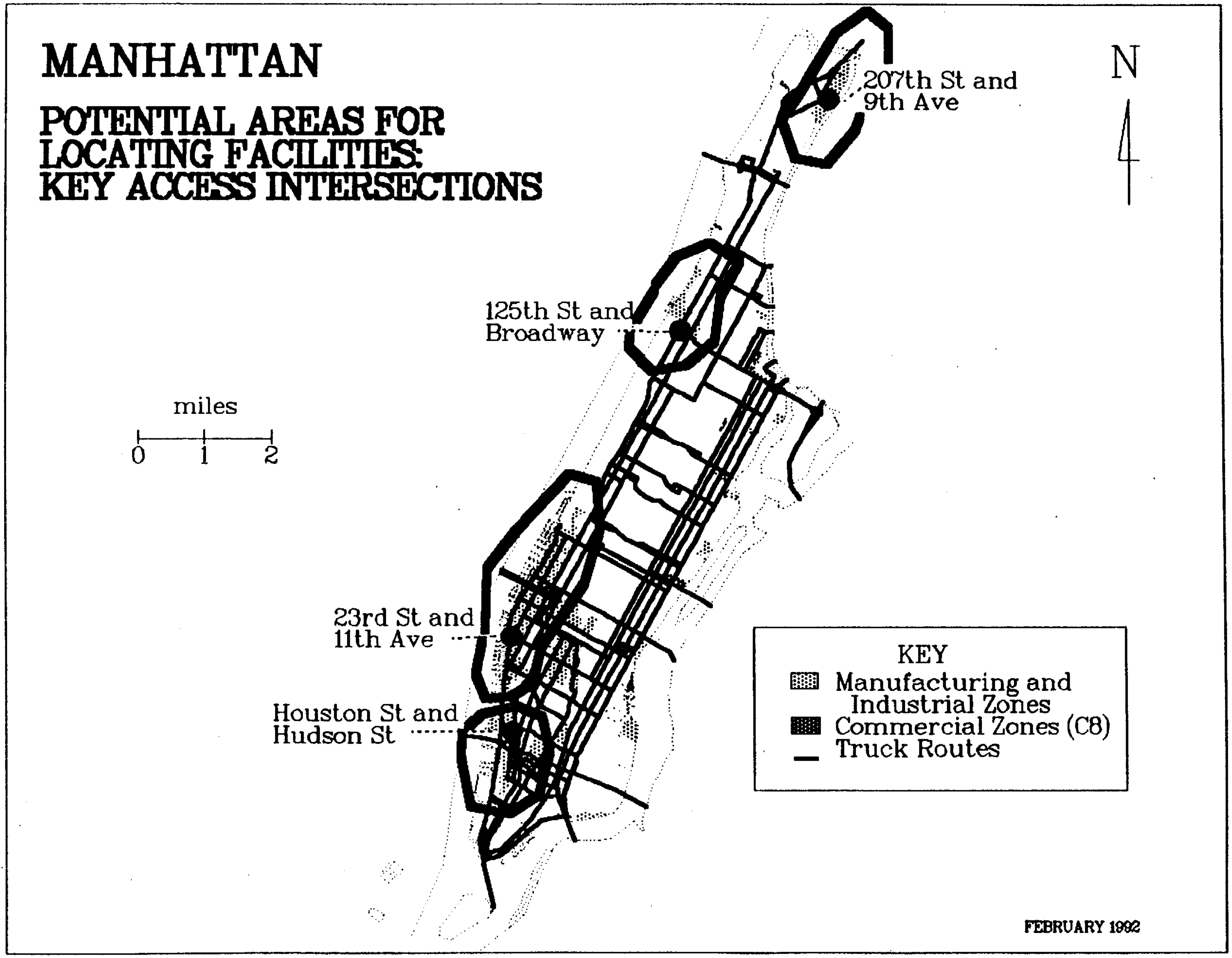


Figure 17.1.4-5: Key Access Intersections for Potential Queens Facility Locations

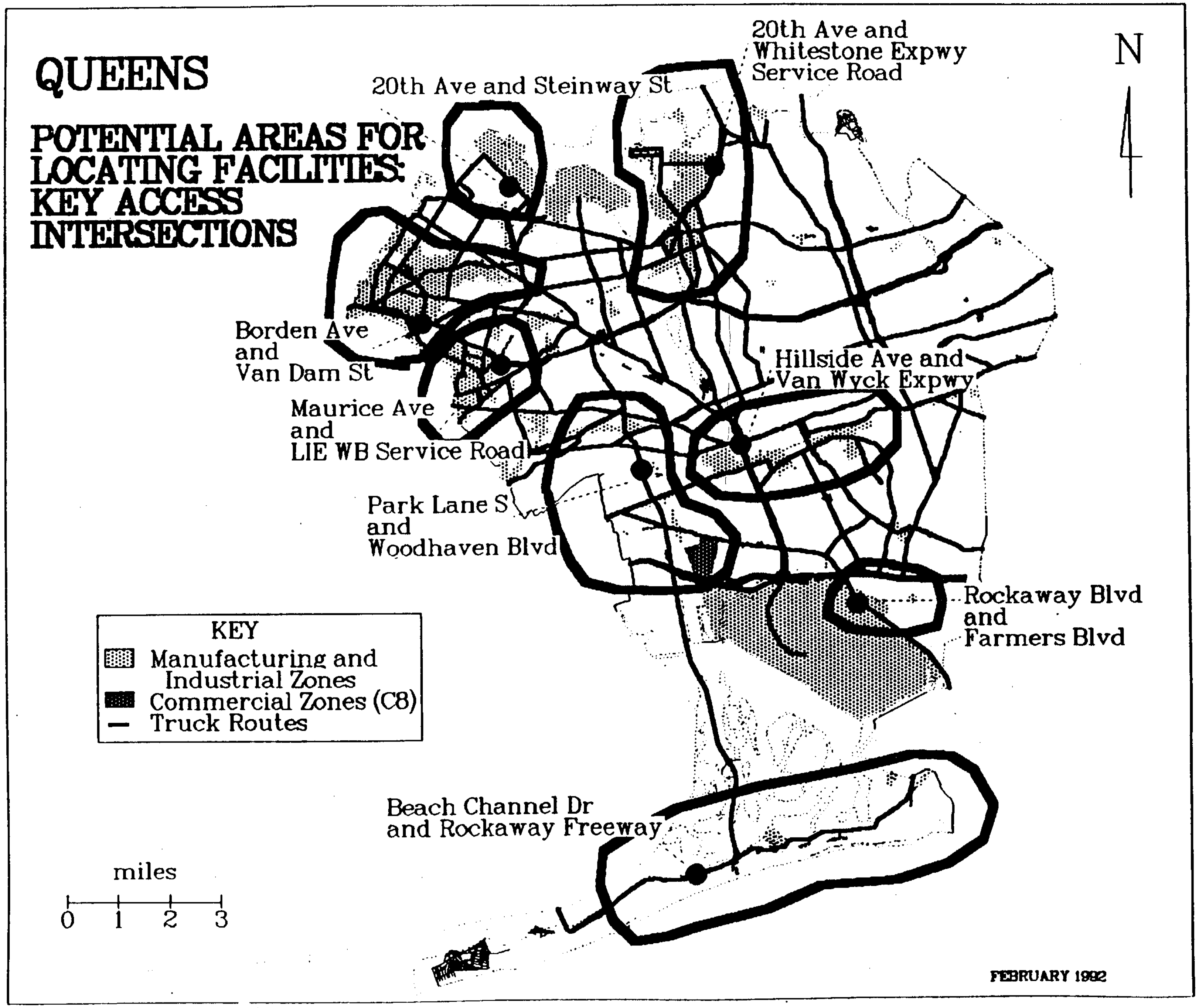
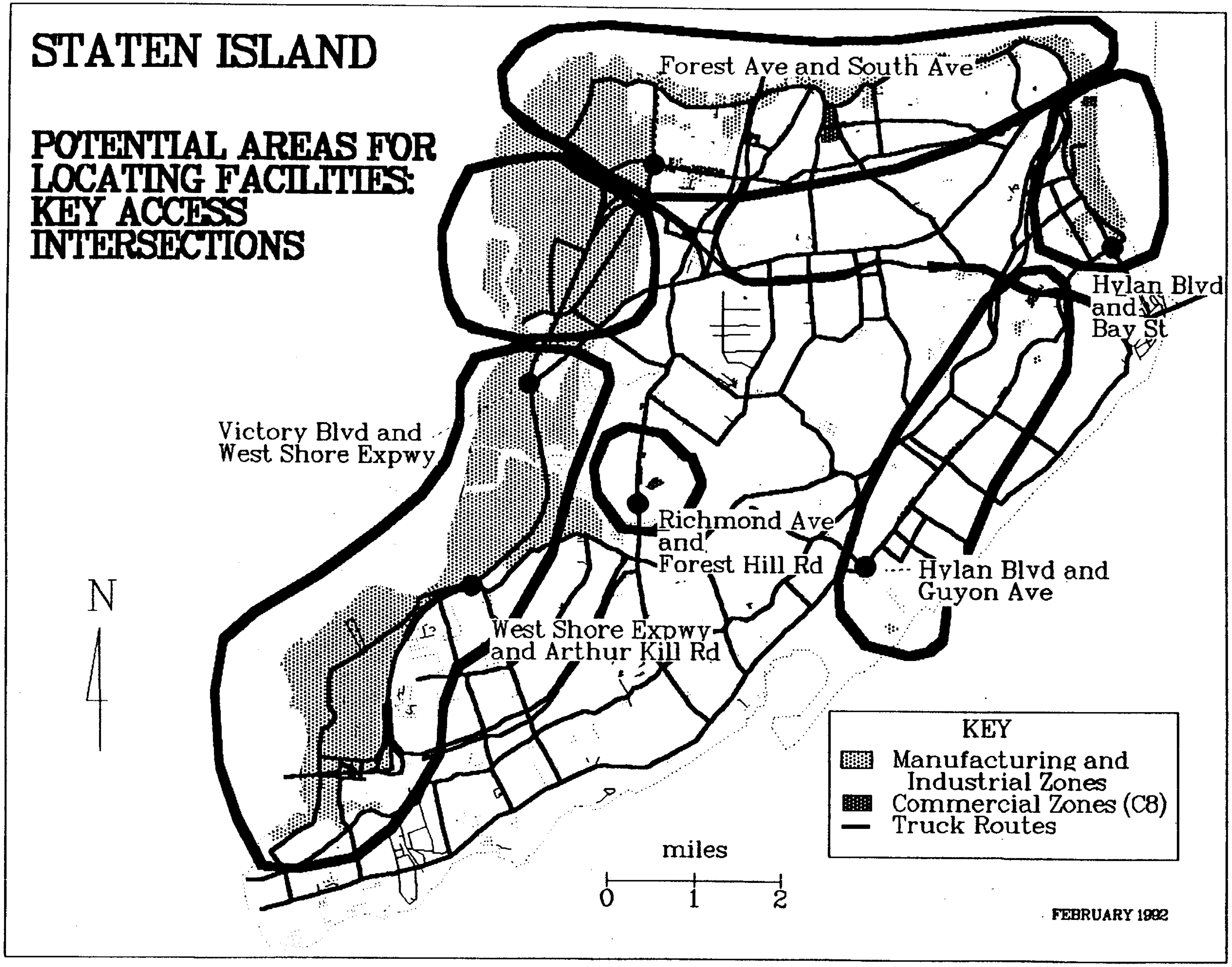


Figure 17:1.4-6: Key Access Intersections for Potential Staten Island Facility Locations



17.1.6 Odor Analyses.

Each of the reference facilities was evaluated for its odor-producing potential under three sets of conditions. The first, "optimum condition," assumes state-of-the-art facility design and high-quality operation and maintenance levels throughout the life of the facility. The second, "normal conditions," assumes typical cost-effective facility design and/or operations-and-maintenance levels that have been typical in New York City facilities. The third, "poor condition," assumes marginal design and/or overloaded operation, deferred maintenance, and poor housekeeping in general. The results of this analysis are shown in Figure 17.1.6-1.

This analysis shows that almost all facilities will have little or no adverse odor impact if they are adequately designed, operated, and maintained. However, if any of these three criteria (design, operation, maintenance) are neglected, most facilities can rapidly degrade to a condition in which offensive and/or hazardous odors will occur, creating either continuous or intermittent nuisance to local populations and/or violations of local, state, and federal regulations.

The impacts of odor, for most type of odorous pollutants, cannot be modeled as successfully as other air pollutants can be.[5] Therefore, in order to impose a margin of safety in mitigating odor impacts, attention must be given to locating potentially odorous operations in areas where sensitive receptors are absent.

17.1.7 Infrastructure/Utility-System Analyses.

The most significant infrastructural/utility system constraint in the City (excluding the City's overloaded transportation systems, and, of course, the capacity limitations of the current solid-waste-management system) is sewage-treatment plant capacity. Table 17.1.7-1 and Figure 17.1.7-1 present the reference facilities' average amount of water intake and sewer outflow. Only one type of waste-management facility, a sewage-sludge chemical-stabilization facility, would discharge more than a hundred thousand gallons of waste water a day; waste-water discharges from other types of facilities would be insignificant in terms of their discharge requirements for any drainage area. Total water usage and discharge requirements for the 13 first-phase scenarios are presented in Table 17.1.1-3.

While the City needs to restrict water usage as much as feasible on a citywide basis, there are no parallel

Figure 17.1.5-1: Reference Facility Noise Impacts

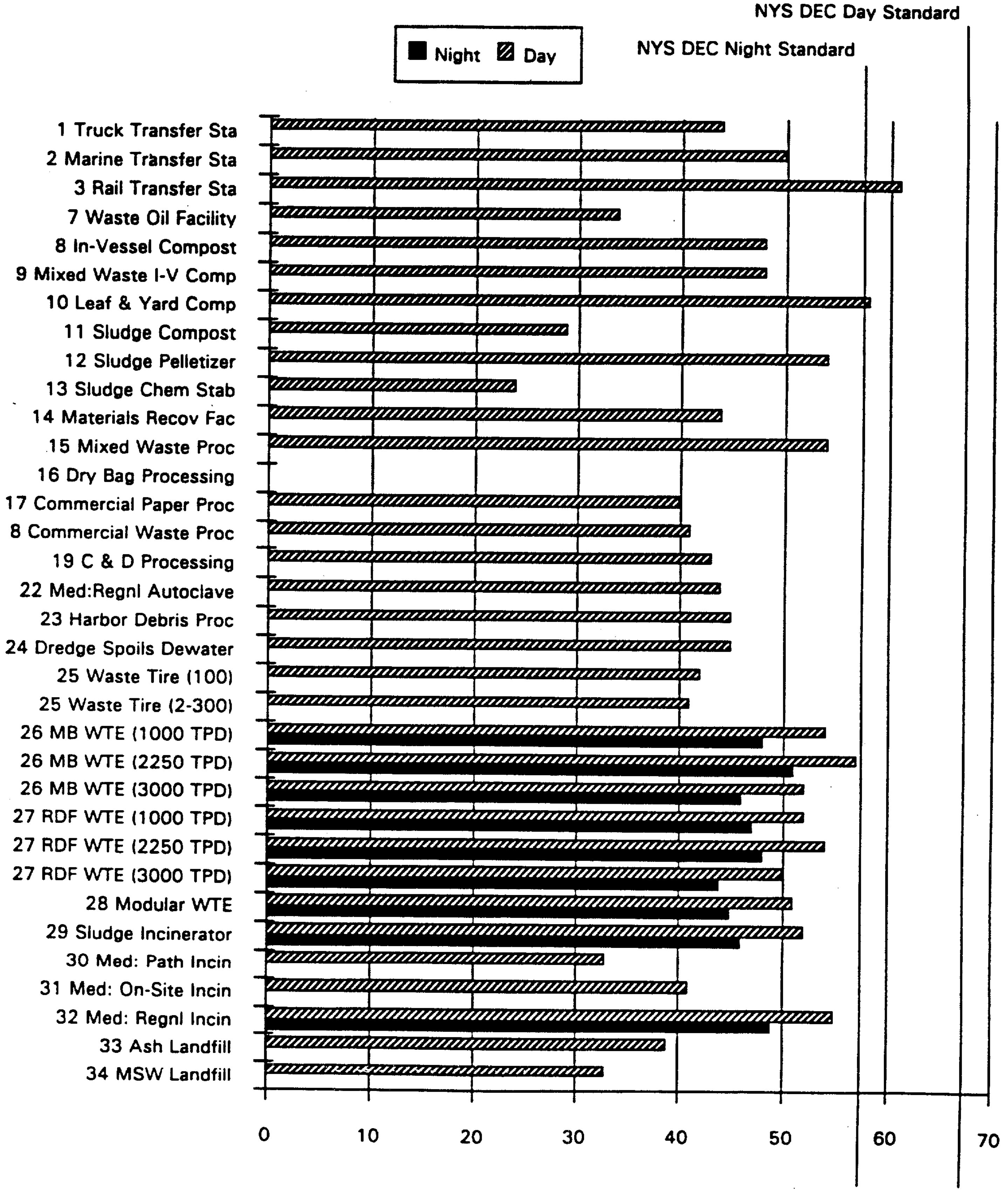


Figure 17.1.6-1: Reference Facility Odor Impacts

	Reference Facility Odor Impacts	Optimum Condition	Normal Condition	Poor Condition
1	Truck Transfer Station	□	░	▓
2	Marine Transfer Station	░	░	▓
3	Rail Transfer Station	□	░	▓
4	Materials Drop-Off	□	□	░
5	Materials Buy Back	□	□	░
6	Household Hazardous Waste Drop-Off	□	□	░
7	Waste Oil Facility	░	░	░
8	In-Vessel Compost	░	░	■
9	Mixed Waste In-Vessel Compost	░	░	■
10	Leaf & Yard Waste Compost	░	░	■
11	Sludge Compost	░	▓	■
12	Sludge Pelletizer	░	░	■
13	Sludge Chemical Stabilization	░	░	■
14	Materials Recovery Facility	░	░	▓
15	Mixed Waste Processing	░	░	▓
16	Dry-Bag Processing	□	░	▓
17	Commercial Paper Processing	░	░	▓
18	Commercial Waste Processing	░	▓	■
19	Construction & Demolition Processing	░	▓	■
20	Medical: On-Site Chop & Bleach	□	□	▓
21	Medical: On-Site Autoclave	□	□	░
22	Medical: Regional Autoclave	□	░	▓
23	Harbor Debris Processing	░	▓	■
24	Dredge Spoils Dewatering	▓	▓	■
25	Waste Tire Processing	□	░	■
26	Mass-Burn Waste-to-Energy	□	░	▓
27	RDF Waste-to-Energy	□	░	▓
28	Modular Waste-to-Energy	□	░	▓
29	Sludge Incinerator	□	░	■
30	Medical: Regional Pathological Incin.	□	░	▓
31	Med: On-Site Incin. (dry injection)	□	░	▓
	Med: On-Site Incin. (wet scrubber)	□	░	▓
32	Medical: Regional Incinerator	□	□	▓
33	Ash Landfill	□	░	▓
34	MSW Landfill	▓	▓	■

□	No adverse impact under any conditions; an odor specifically related to the facility cannot be detected beyond the property line.
░	Slight chance of an odor, mild, short duration, probably evoking little citizen awareness.
▓	Good chance of offensive odors occurring and lasting for a few days; likely to be perceived as offensive by some citizens.
■	Offensive odors almost always permeate the surrounding area; facility creates odors of which most area residents are continuously aware.

geographically specific constraints on the City's water-supply system. None of the waste-management <u>facilities</u> in the universe of feasible options is a particularly intensive water consumer. The possibilities for using alternate water sources for some types of facilities would mitigate water-usage requirements (e.g., the use of surface or ground water for certain types of in-plant uses, or using effluent from sewage-treatment plants for water-cooled condensers or other purposes in a waste-to-energy facility). Water usage by waste <u>generators</u> -- for example, in rinsing out recyclable containers for the "high-quality" recycling program -- can only be estimated qualitatively. In its analysis of water-use requirements for rinsing bottles and cans in an institutional-kitchen setting (in the absence of a glass crusher),[6] WasteTech estimated that rinsing requirements would approximate five gallons per pound of material. If rinsing recyclable in residences and other types of institutional and commercial settings requires water usage on this scale, this would equate to a water demand of nearly eight million gallons a day citywide.[7]

Apart from the general desirability of conserving electricity on a citywide basis, the overall electric-supply system in the city is not constrained, nor are there any particular constraints in specific geographic areas. Steam supply is not required by any potential waste-management facility, although certain types of facilities might be able to produce steam for sale in the city's steam-distribution system as a primary or secondary energy product.[8] There are no particular constraints on the city's natural-gas distribution system, nor are any of these facilities major gas users; again, some types of facilities are capable of producing pipeline-grade methane for sale in the city's distribution system.

Total water and sewer requirements for the final-stage alternative waste-management scenarios are presented in section 17.3.

17.1.8 Energy Analyses.

Net energy usage/production in the first-phase alternative scenarios was calculated. The detailed results are presented in Appendix Volume 7.2. In brief, this analysis establishes that the most significant energy impacts are due to the energy requirements of primary materials production; energy produced by waste-to-energy facilities is of secondary importance, and energy consumed by the alternative collection systems,[9] though a factor, is least important.

Total energy requirements for the final-stage alternatives are compared in section 17.3.

Table 17.1.7-1: Reference Facility Water Supply/Sewer Discharge

Reference Facility	TPD	# EMPL	Avg Intake gal/ton	Avg Outflow gal/ton
1 Truck Transfer Station	1500	42	2	2
2 Marine Transfer Station	2000	26	1	1
3 Rail Transfer Station	1500	30	1	1
4 Materials Drop-Off	10	5	30	30
5 Materials Buy Back	50	19	9	9
6 Household Haz. Waste Drop-Off	2	7	190	190
7 Waste Oil Facility (gal/day)	1500	4	0.2	0.2
	5000	4	0.06	0.06
	7500	4	0.04	0.04
8 In-Vessel Compost	1500	84	120	8
9 Mixed Waste In-Vessel Compost	1500	124	120	30
10 Leaf & Yard Waste Compost	60	12	0	0
11 Sludge Compost	250	105	70	150
12 Sludge Pelletizer	500	86	30	30
13 Sludge Chemical Stabilization	500	30	490	490
14 Materials Recovery Facility	250	53	10	10
	500	142	10	10
	1000	183	9	9
15 Mixed Waste Processing	1500	120	8	8
16 Dry Bag Processing	1500	250	10	10
17 Commercial Paper Processing	250	55	9	9
18 Commercial Waste Processing	1500	117	6	6
19 Construction & Demolition Proc	500	52	8	8
20 Medical: On-Site Chop & Bleach	2	1	3400	3400
21 Medical: On-Site Autoclave	3	4	250	240
22 Medical: Regional Autoclave	110	9	150	140
23 Harbor Debris Processing	150	12	6	6
24 Dredge Spoils Dewatering	150	25	0	0
25 Waste Tire Processing	100	26	10	10
	200	28	6	6
	300	34	5	5
26 Mass-Burn Waste-to-Energy	1000	66	700	10
	2250	72	620	5
	3000	86	100	6
27 RDF Waste-to-Energy	1000	87	880	10
	2250	87	800	5
	3000	102	80	6
28 Modular Waste-to-Energy	360	38	90	20
29 Sludge Incinerator	250	52	5000	30
30 Med:Reg. Pathological Incin	7	7	80	80
31 Med:On-Site Inc(dry injection)	5	2	60	60
Med:On-Site Inc(wet scrubber)	5	2	630	630
32 Med:Regional Incinerator	330	58	200	20
33 Ash Landfill	1000	15	1	1
34 MSW Landfill	5000	63	1	1

Figure 17.1.7-1: Reference Facility Water Usage/Outflow

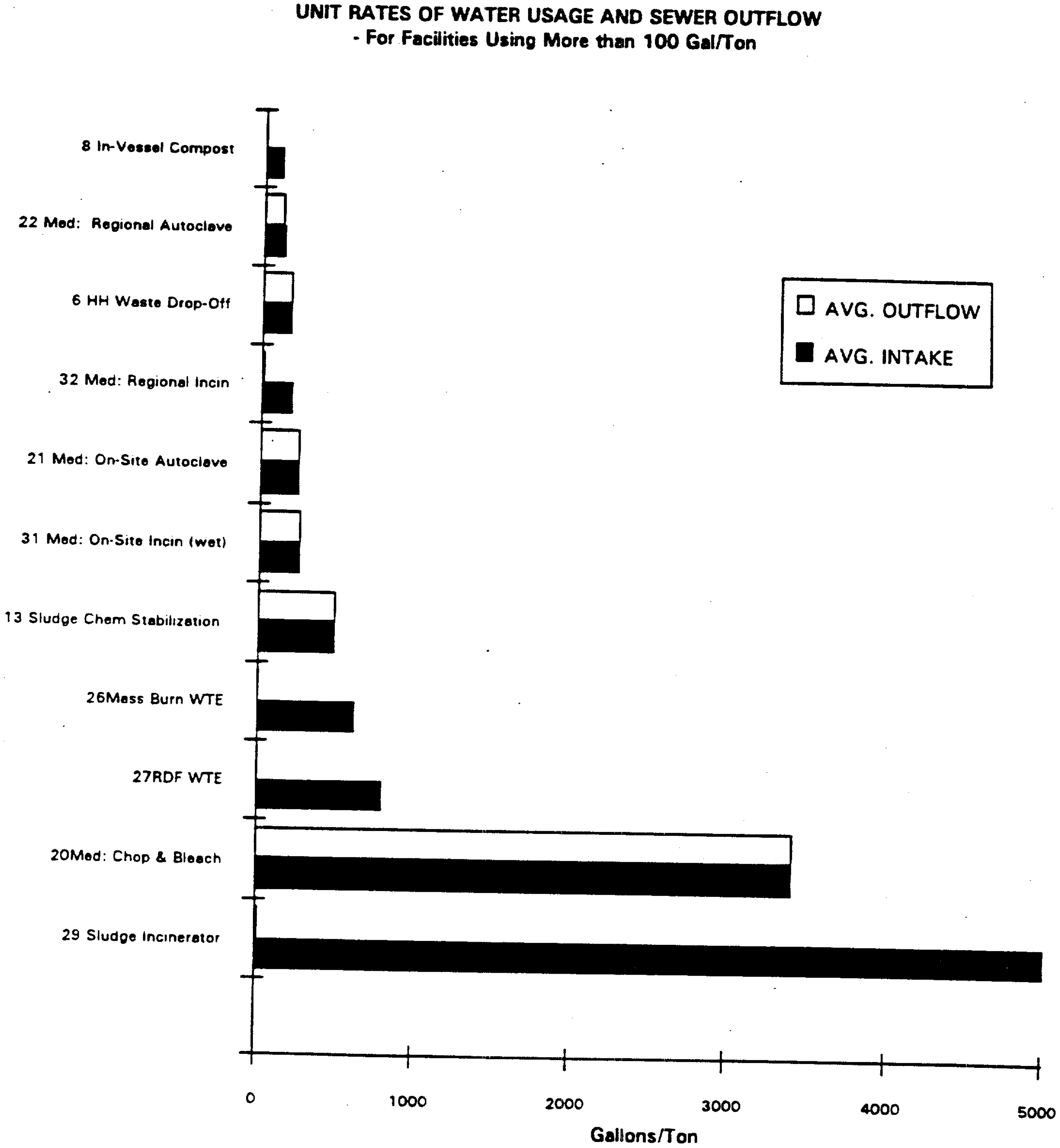


Table 17.1.7-2: Water Usage and Discharge

First-Phase Scenarios	Water Supply Total Intake 000's Gal/Day	Sewer Discharge Total Outflow 000's Gal/Day
1990 Baseline	4,200	70
2000 Projected Baseline	4,200	70
1 High Qual/Refuse: 2 Trks (WTE)	4,800	80
2 Wet/Dry: 1 Trk, 1 Compart (WTE)	3,200	110
3 HQ/Organics/Ref: 3 Trks (WTE)	4,000	90
4 Wet/Dry: 1 Trk, 1 Compart	500	90
5 HQ/Ref: 2 Trks (MWP)	900	100
6 Wet/Dry:1 Trk, 2 Comparts (WTE)	3,100	110
7 HQ/Organics/Ref: 3 Trks	200	60
8 HQ/Wet/Dry: 2 Trks (WTE)	2,500	120
9 Wet/Dry: 2 Trks (WTE)	3,100	110
10 Wet/Dry: 1 Trk, 2 Comparts	400	90
11 HQ/Wet/Dry: 2 Trks	400	100
12 Wet/Dry: 2 Trucks	400	90
13 Maximum Waste-to-Energy	8,600	80

17.1.9 Land-Use Impacts: Acreage Requirements; Landfill Volume Requirements; Siting Requirements; Visual Impacts; Impacts on Waterfront Usage (and Consistency with Coastal-Zone-Management Objectives); "Quality of Life" Impacts[10]

Figures 17.1.9-1 and 17.1.9-2 summarize the most salient siting criteria (some of which, as noted above, were developed through the environmental-impact-analysis process, while others are determined by basic technology and operational parameters, and others by regulatory requirements) for these facilities. Many of the most significant negative land-use or "quality-of-life" impacts for adjacent populations would be mitigated most effectively by following such siting criteria as closely as possible.

Among other things, this matrix shows acreage requirements for each type of facility. The cumulative facility acreage requirements (not including landfill requirements) were calculated for each of the alternative first-phase, intermediate-phase, and final-phase scenarios (see scenario "scorecard" tables in Appendix Volume 7.1). Scenarios involving a high degree of composting are most land-intensive. The facility acreage requirements for fully implemented final-stage Systems A, B, No-Burn, and Maximum-Burn are compared in section 17.3.

Landfill volume requirements (both for "raw"/"by-pass" MSW

Insert 17.1.9 Table 1: REFERENCE FACILITY SITING MATRIX 8/6/91

Facility Groups		REFERENCE FACILITY SITING REQUIREMENTS MATRIX	TPD	Acre-age	Marine Access	Rail Access	Most Appropriate Land Use	SPECIAL SITE RESTRICTIONS								
								Dist to Airport (feet)	Stack Height (feet)	AIR		ODOR	NOISE	WATER		CZM
										Elevated Receptors	Elevated Terrain			Loading Treatment	Discharge Surface	Consis-tency
TRANSFER	1	Truck Transfer Station	1500	4			▥	▦								
	2	Marine Transfer Station	2000	4	■		▥	▦								
	3	Rail Transfer Station	1500	8		■	▥	▦								
	4	Materials Drop-Off	10	0.75			Commercial Areas and Commercial Areas within Residential Areas									
			50	2.2												
		and	100	4.4												
	5	Materials Buy Back	10	0.75												
			50	2.2												
			100	4.4												
	6	Household Haz Waste Drop-Off	2	0.28			▥									
	7	Waste Oil Facility	1500	0.5	▒	▒	▥					▧				
			5000	0.5												
			7500	0.5												
COMPOST	8	In-Vessel Compost	600	9.3	▒	▒	▥									
			900	14												
			1500	23												
	9	Mixed Waste In-Vessel Compost	1500	25.3	▒	▒	▥									
	10	Leaf & Yard Waste Compost	60**	24			▥									
	11	Sludge Compost	25	5	▒	▒	▥					▧				
			50	9												
			100	19.4												
	12	Sludge Pelletizer	500	2.8	▒	▒	▥									
	13	Sludge Chem Stabilization	500	8.5	▒	▒	▥							Caution: 5 overloaded drainage		
PROCESSING	14	Materials Recovery Facility	250	2	▒	▒	▥		39.4			▧				
			500	5												
			1000	13												
	15	Mixed Waste Processing	500	2.2	▒	▒	▥									
			1500	11												
			3000	13												
	16	Dry Bag Processing	1500	11	▒	▒	▥									
	17	Commercial Paper Proc	250	1.4	▒	▒	▥					▧				

▒ Desirable

■ Required

▥ Industrial Areas

▦ 10000/5000

▧ Caution: Do not locate near sensitive odor receptors

▨ Caution: Abutting estuary reaches with worst mixing

* 6 NYCRR states: facility must demonstrate no hazards from birds within 10,000 feet of runway of turbojet aircraft or 5,000 feet of runway of piston type aircraft

** Leaf & Yard Waste Composting facility handles 18,000 cy/yr during an active season of 6 weeks. *** Dredge Spoils Dewatering facility handles 159,000 cy/yr.

These facilities have been converted to [illegible]

Insert 17.1.9 Table 1: REFERENCE FACILITY SITING MATRIX 8/6/91

Facility Groups		REFERENCE FACILITY SITING REQUIREMENTS MATRIX	TPD	Acreage	Marine Access	Rail Access	Most Appropriate Land Use	SPECIAL SITE RESTRICTIONS								
								Dist to Airport (feet)	Stack Height (feet)	AIR		ODOR	NOISE	WATER		CZM Consistency
										Elevated Receptors	Elevated Terrain			Loading Treatment	Discharge Surface	
PROCESSING	18	Commercial Waste Proc	1500	5.5	░	░	▥					▧				
	19	Const & Demolition Proc	500	3			▥					▧				
	20	Med: On-Site Chop & Bleach	2.1	<0.1			▥									
	21	Med: On-Site Autoclave	2.5	<0.1			▥									
	22	Med: Regional Autoclave	110	2			▥									
	23	Harbor Debris Processing	150	3	■		▥					▧				
	24	Dredge Spoils Dewatering	3***	98	Max 1 Mi from NJ/NY Waterway	░	▥					Caution: Powerful odor producing potential			▨	
	25	Waste Tire Processing	100 200 300	1.5 2.1 2.5	░	░	▥					▧				
INCINERATION	26	Mass Burn Waste-to-Energy	1000 2250 3000	12 16 26	░	░	▥		328.1	Exceeds threshold mercury at 2000m distance, 120' elevation	Exceeds threshold for TSP at 1500m for terrain at 60'		Caution: low density residential areas for nighttime operation		▨	
	27	RDF Waste-to-Energy	1000 2250 3000	13 20 30	░	░	▥		328.1							
	28	Modular Waste-to-Energy	3360	8	░	░	▥									
	29	Sludge Incinerator	250	7	░	░	▥									
	30	Med: Pathological Incin	7.4	0.5			▥									
	31	Med: On-Site Incinerator	5.4	0.1			▥									
	32	Med: Regional Incinerator	330	3			▥		150.9							
LANDFILL	33	Ash Landfill	1000	100	░	░	▥	▦							▨	
	34	MSW Landfill	5000	400	░	░	▥	▦				▧			▨	

░ Desirable
■ Required
▥ Industrial Areas
▦ 10000/5000
▧ Caution: Siting should be confined to industrial area
▨ Caution: Abutting estuary reaches with worst mixing

* 6 NYCRR states: facility must demonstrate no hazards from birds within 10,000 feet of runway of turbojet aircraft or 5,000 feet of runway of piston type aircraft

** Leaf & Yard Waste Composting facility handles 18,000 cy/yr during an active season of 6 weeks. *** Dredge Spoils Dewatering facility handles 159,000 cy/yr.
These facilities have been converted to average tons per day for consistency purposes only.

and for ash residue) for the various alternative scenarios are also presented in the scenario "scorecards" in Appendix Volume 7.1. Scenarios without waste-to-energy processing of non-recyclable/non-compostible wastes require the greatest amount of landfill space; scenarios that delay development of waste-to-energy facilities require proportionately more landfill space than do scenarios with more aggressive sequencing schedules. Comparisons of volume requirements for the final-stage alternative systems are shown in section 17.3 below.

The visual impacts of waste-management facilities may be thought of in three general categories: vertical interruption of aesthetically significant viewsheds (including the blocking of sunlight), horizontal degradation of aesthetically significant visual resources (e.g., meadows, lakes/streams/waterways), and the general visual appearance of the facility itself in terms of its "architectural quality" and design and operating characteristics (e.g., enclosed vs. unenclosed storage of incoming and outgoing materials). The latter sort of visual impacts can be mitigated to varying degrees for any type of waste-management facility through high-quality architectural and operational design, landscaping, and lighting. Mitigation of the second type of visual impacts, "horizontal degradation," is primarily achieved by siting "big-footprint" facilities to avoid scenic and historical resources. The first type of visual impact, which is due to a facility's height and mass, is a function of the value of the viewshed that is blocked, and of the accessibility of that viewshed from the direction(s) that are blocked. These latter effects can be mitigated both by appropriate siting and by architectural and operational designs that minimize the effects of a facility's height and mass.

Waste-management facilities may be roughly grouped into two categories in terms of their impacts on visual resources. Small-scale facilities, in general, would have an insignificant impact on visual resources almost anywhere within New York City. The large-scale sorts of facilities, including MSW or sludge composting facilities, waste-to-energy facilities, and landfills, would have a significant negative visual impact if located in areas that blocked views from a residential area or views to which a significant number of people had access (e.g., from an expressway); if such a facility were developed at such a location, appropriate architectural treatment of height and mass would be particularly appropriate. The facility silhouettes in Appendix Volume 5 provide a comparative sense of the relative impacts of this sort that different types of large-scale waste-management facilities could create.

The impacts on waterfront usage are generally consistent with the Department of City Planning's current waterfront planning goals, as well as with the Coastal Zone Management objectives.[11] These goals include maximizing use of marine transport, and limiting the use of waterfront land to land uses that benefit from such access. MSW facilities can profit from barge access, because barge transport takes advantage of the existing network of marine-transfer facilities, minimizes truck transport distances (which in turn minimize traffic impacts, air and noise emissions, fuel use, and cost), and allows the flexible management of waste shipments between a network of facilities in a utility-type system. The City's one remaining landfill, Fresh Kills, is barge-accessible, and continued reliance on the barge system opens future possibilities for economical long-distance export of MSW, ash, or recyclable materials. The fact that historical zoning and land-use patterns along New York City's waterfront have favored industrial-type uses means that adjacent waterfront land-uses are likely to be compatible with waste-management facilities. Similarly, sludge-management facilities benefit from being on the waterfront since sewage-treatment facilities, where sludge "orginates," must discharge into surface waters. Harbor debris and dredge spoils are likewise water-bound waste streams.

"Quality-of-life" impacts, or effects "on neighborhood character," are in a way the "bottom-line" effect of the congeries of particular impacts -- noise, traffic, visual impacts, odors, air pollutants, vermin -- that have already been discussed. These bottom-line impacts, which may be positive as well as negative, may be felt in such phenomena as property values or the types of businesses that are encouraged or discouraged by the development and operation of a waste-management facility. Negative impacts of this sort are best mitigated by selection of appropriate sites; appropriate design and operating controls are also important. These concerns are most significant in the case of the handful of large-scale facility types -- compost facilities, waste-to-energy facilities, and landfills -- that occupy the most acreage. Most other types of facilities would not be out of place or particularly noticeable in most light-industrial or heavy-commercial areas of the city, many of which closely abut residential neighborhoods.

The New York City Zoning Resolution currently does not distinguish most waste management facilities as separate use categories. Instead, waste management facilities are distributed in industrial land-use categories (Use Group 18) such as storage and manufacturing. To address this problem, and to ensure that the Zoning Resolution appropriately regulates the siting of waste-management facilities, the Department of City Planning has drafted amendments to the Resolution (as described in Chapter 13). A "ULURP" application for these amendments was filed on March 31, 1992, and their adoption is anticipated by the summer of 1993. The proposed amendments, among other things, distinguish between types of transfer stations and other handlers of discarded materials, such as drop-off, buyback and redemption centers, which have less of an impact on the character of the surrounding community.

The proposed zoning framework would establish a new "Waste-Management Facilities" category that would include transfer stations and salvage facilities, including junk yards and vehicle-dismantling yards. These facilities could be built as-of-right (provided, of course, that all other applicable regulations are met) in zones designated for the heaviest use (M3); these facilities would be permitted in other industrial zones (M1 and M2) if stricter operational standards could be met. Buy-back, redemption and drop-off centers would be permitted in certain commercial zones, where they would be in closer proximity to residential and business areas that they service.

17.1.10 Public Health Analyses.[12]

17.1.10.1 General Background Information.

Humans are exposed to environmental contaminants in air, water, soil, and food, and may encounter them at home, at work, or in the community. The contaminants may enter the body by eating or drinking (ingestion), breathing (inhalation), or by passing through the skin (dermal absorption). Once in the body, the contaminants may be eliminated. If they are not eliminated, they may be changed into other substances (by metabolism), and may be distributed throughout the body by the blood stream. After reaching various tissues (for example, liver, kidney, nervous system, bone) they may exert a toxic effect, may be metabolized, or may be simply stored.

For any given chemical, the amount of harm it may produce depends on how much of it enters the body and reaches a sensitive organ or tissue. Because it is generally difficult to determine this for individuals, public-health and environmental agencies set guidelines, criteria or standards which indicate how much of a pollutant may be present without causing adverse health effects to individuals or to the public at large. These numbers are based on a variety of toxicologic and epidemiologic data, and include safety factors that are intended to protect almost everyone from almost every health effect.

With improved analytic techniques, it is now possible to measure minute quantities of many different substances. The entry of pollutants into the environment, and their various movements, are quite complicated. Chemical pollutants may derive from many sources (households, workplaces, traffic, as well as from waste-management facilities). They may be emitted into the air or discharged to water. Airborne contaminants may fall onto soil or water surfaces, and onto food and animals and people. Water discharges may move through soil, and may reach lakes or rivers or may be taken up by plants.

To simplify the decision-making process, it is necessary to visualize a particular pollutant source in terms of its relationship to public-health guidelines or to the background level of contamination from all sources. Two related measures or indices can be derived for this purpose. The Hazard Index is the ratio of the pollutant to the guideline or standard established by a public-health agency. The Protection Index is the reciprocal of the Hazard Index, and is the guideline or standard divided by the pollutant level.

The data used for this public health assessment are the estimated maximum air concentrations of pollutants from the different combinations of collection/management options. These were grouped into 13 scenarios (Phase I), later modified to four final systems (A, B, No-Burn, and Maximum-Burn). The air concentrations were modelled for Systems A and B. The estimates for emissions of significant health pollutants were based on some measurements obtained on Reference Facilities that are already in operation. The mean value of the emissions from these Reference Facilities was then incorporated into air dispersion models to predict what the air concentration would be at various heights, distances, and directions from the source. The very complex models require many assumptions about average wind directions and velocities, heights of stacks and receptors, the velocity of air movement from the stack, and other variables. Their outcome is a three-dimensional spatial distribution of concentrations for each pollutant.

The maximum value for each pollutant was then compared to the published guideline or standard (see Appendix 1 to "Public Health Evaluation" in Appendix Volume 7.2) to obtain a Hazard Index.

Although the models used can produce very precise estimates of concentrations, their accuracy depends on assumptions that are specific to actual facilities and sites. Accordingly, one cannot put too much weight on minor differences in model outcomes. Thus differences of less than 10% among models are not considered significant in this section.

This analysis does not cover the ecological effects (impacts on fisheries, wildlife, habitats, and ecosystems) of the New York metropolitan area). Impacts on ecological systems can be divided into near-field effects (construction, direct disturbance during operations, noise, and fenceline contamination), and remote effects (air emissions and water discharges). Siting of new facilities should take into account potential alterations to or impacts on ecologically sensitive areas, as well as additional loadings to the estuary as a whole.

Considering all other sources of heavy metal and dioxin, the incremental contributions of arsenic, cadmium, lead, nickel, zinc and dioxin estimated for System A and B would add less than 0.1 percent to background levels. Using extremely conservative assumptions for mercury emissions and deposition, the projected loadings for mercury of airborne deposition and runoff from System A amount to about seven percent of the loadings from all sources. Mercury levels in several areas of the New York harbor estuary already exceed the EPA water quality criterion of 0.025 ug/l, and the modeling indicates that mercury concentrations would be raised throughout the harbor. (See section 17.3 below for a more detailed discussion of the conservatism of this impact, and for steps that will be taken to reduce levels of mercury in the waste stream prior to the development of any new waste-to-energy facilities.)

From a health perspective, only mercury is identified as a potential water-pollution problem. Direct exposure (i.e., swimming) is not likely to pose a health hazard. However, biomethylation to organomercurials, and biological amplification in fish and shellfish is a potential problem that would require monitoring of these animals by the appropriate City agency (DOH or DEP). Currently, there are public-health advisories or bans regarding fish and shellfish in the New York harbor, but these are generally ignored. Although relatively few New Yorkers consume locally-caught fish and shellfish, some do so regularly, and for them, environmental contaminants from all sources, including added loadings of mercury from the proposed waste-management systems, is a potential health concern that needs to be monitored. No other pollutants modeled in this study reach levels of public health concern through food-chain exposure.

17.1.10.2 Health Evaluation of 12 First-Phase Scenarios.

Air-impact comparisons for the first-phase scenarios (as described in Chapter 15) are summarized in Table 17.1.2-2 for hydrogen chloride, particulates, sulfur dioxide, oxides of nitrogen, dioxin and arsenic. (Estimates for cadmium, chromium, lead, mercury, and 26 other pollutants are presented in the longer version of this table, which is in Appendix Volume 7.2.)

There is substantial variability among the scenarios with respect to release of certain pollutants, particularly sulfur dioxide, which in some scenarios would be released at a rate in excess of 1000 tons per year. For the other substances, the variation among scenarios is generally much lower. For example, oxides of nitrogen releases were estimated to range from less than one ton per year up to a maximum of seven tons (scenario 1). Dioxin releases could vary over at least three orders of magnitude.

None of the first-phase scenarios included any of the facilities that produce process water discharge, so this was not considered at this stage.

The magnitude of the contribution to the overall burden of pollutants in the city from emissions estimated for these scenarios was variable. Air quality in New York City occasionally reaches unsatisfactory levels, particularly due to elevated ozone levels, which in turn depend on emissions of oxides of nitrogen and hydrocarbons. The various scenarios therefore would contribute to the NOx and ozone levels in New York City, but only to a slight degree on a citywide basis, particularly in comparison with vehicular air-pollutant sources. These sources would be largely offset by the reduction in emissions from ending most on-site medical-waste and apartment-house incineration and from reducing nitrogen-oxide (NOx) emissions from existing municipal incinerators by 60 percent. If the NOx emissions from oil-burning generators which would be displaced by waste-to-energy facilities were accounted for, the facilities proposed by the plan would lead to a substantial net reduction of NOx in the region; this benefit would not occur with the No Burn scenarios.

17.1.10.3 Health Evaluation of the Final-Phase Systems.

Airborne contamination from Systems A (the High Quality/Refuse system) and B (the High Quality/Organics/Refuse system) is very similar for most pollutants. The Protection Indices are greater than 10 for hydrogen chloride, particulates, and sulfur dioxide. They are less than 10 (but still greater than one) for oxides of nitrogen, dioxin, and arsenic. Adding composting to either System A or B would produce a 12-15 percent reduction in sulfur dioxide release. The No-Burn System would produce the lowest net loadings of air pollutants, while the Maximum-Burn System would produce the highest.

The vehicular air-pollutant analysis shows much less variation among the four systems. All involve truck traffic from the same source neighborhoods to various facilities. They differ in the number of trucks and to some extent in the distribution of facilities. In this case, the maximum-burn approach requires the least amount of collection, and therefore produces the lowest emissions. Otherwise, except for carbon dioxide, there are negligible differences (for carbon monoxide, hyrdrogen chloride, nitrous oxides, and particulates) among the four systems.

Table 17.1.10-1 provides a comparison of the maximum air impacts modeled for the final-phase scenarios, and presents an analytical context in which their health effects can be considered. The "Hazard Index" (HI) represents the ratio of the maximum pollutant level, divided by the stanard or guideline. This calculation can then be "graded" in terms of its significance by a "yardstick" called "Category of Concern" (CAT). If the HI is less than .01, its CAT rating is -1, which represents a negligible level of concern. A HI which shows that the pollutant concentration is at least half as high as the standard (i.e., greater than .49) would have a CAT rating of 5.

For all of the air pollutants listed in the table, the estimated maximal concentration is below the relevant standard or guideline. There is virtually no difference between Systems A and B in this regard. For 10 of the pollutants (carbon monoxide, particulate matter [for the annual averaging period], sulfur dioxide [for the three-hour and annual averaging periods], antimony, copper, lead [which is of particular public health significance], manganese, selenium, vanadium, zinc, hydrogen fluorides, polychlorinated biphenyls [PCBs], and polyaromatic hydrocarbons [PAHs]), the Hazard Index (HI) lies well below 0.01 (as indicated by a -1 in the CAT column), which shows that these are of negligible concern.

For mercury, the Hazard Index is greater than 0.4, which indicates that mercury levels approach the standard. This requires careful attention to assure that standards are not exceeded, and efforts should be made to improve the margin of safety for mercury. This is also important because mercury figures prominently as a water contaminant as well. The mercury contribution is potentially important because of the propensity for biomethylation and bioamplification of methyl mercury in the aquatic food chain. Since this has implications for both ecologic risk and human health risk, steps will be taken to reduce mercury releases by at least a factor of ten. These include reduction of mercury in manufacturing batteries and the proposed additional air pollution control methods, the effect of which was not accounted for in the estimation of emissions. Source separation of batteries also can reduce the amount of mercury significantly (and incidentally of several other heavy metals) in the waste stream. In the next few years, changes in manufacturing will further reduce mercury waste.

For dioxin, since there is no guideline or standard, the reference value is the maximum concentration predicted from the proposed Brooklyn Navy Yard waste-to-energy facility. This value was examined extensively in a publicly scrutinized health-risk assessment, and found to result in an acceptable risk; the resulting Hazard Index is (HI>0.3).

Table: 17.1.10-1 COMPARISON OF AIR MODELLING RESULTS FOR SYSTEMS A AND B

			Values for Proposed System A					Values for Proposed System B					
		Standard/ Guideline (ug/m3)	High	2nd	Hazard Index	CAT	HSHR	High	2nd	Hazard Index	CAT	HSHR	RATIO HI(a)/HI(b)
HCl	1hr	140	9.83	9.32	0.070		95%	9.83	9.13	0.070		93%	1.00
CO	1hr	40,000	49.5	41.1	0.001	-1	85%	41.5	37.9	0.001	-1	91%	1.17
CO	8hr	10,000	18.5	17.8	0.002	-1	96%	18.8	15.7	0.002	-1	84%	0.98
PM-10	24hr	150	2.77	2.38	0.018		86%	8	2.4	0.053	2	30%	0.35
PM-10	ann	45	0.41	0.32	0.009	-1	78%	0.4	0.31	0.009	-1	78%	1.03
SO2	3hr	1,300	9.98	8.68	0.008	-1	87%	9.98	8.66	0.008	-1	87%	1.00
SO2	24hr	365	3.93	3.9	0.011		99%	3.93	3.9	0.011		99%	1.00
SO2	ann	80	0.55	0.55	0.011	-1	100%	0.54	0.52	0.007	-1	96%	1.02
NO2	ann	100	2.75	1.99	0.028		72%	2.73	1.97	0.027		72%	1.01
Antimony	ann	1.2	4.7E-04	4.3E-04	0.000	-1	91%	3.9E-04	3.8E-04	0.000	-1	97%	1.21
ARSENIC	ann	3.5E-04	4.0E-05	2.7E-05	0.114	1	68%	3.7E-05	2.7E-05	0.106	1	73%	1.08
BERYLLIUM	ann	4.0E-04	1.2E-05	1.1E-05	0.030		92%	1.0E-05	9.8E-06	0.025		97%	1.19
CADMIUM	ann	5.0E-04	1.2E-04	1.0E-04	0.240	2	84%	1.3E-04	9.0E-05	0.250	2	72%	0.96
CHROMIUM VI	ann	2.0E-05	5.0E-07	2.0E-07	0.025		40%	4.5E-07	2.1E-07	0.023		46%	1.11
Copper	ann	2.4	1.0E-05	1.0E-05	0.000	-1	100%	1.0E-05	1.0E-05	0.000	-1	100%	1.00
LEAD	3 mos	1.5	0.003	2.5E-03	0.002	-1	71%	3.5E-03	2.4E-03	0.002	-1	70%	1.00
Manganese	ann	0.3	1.6E-04	1.5E-04	0.001	-1	92%	1.4E-04	1.3E-04	0.000	-1	94%	1.17
MERCURY	ann	0.024	0.011	8.0E-03	0.475	4	70%	1.1E-02	8.0E-03	0.475	4	70%	1.00
NICKEL	ann	0.02	8.7E-04	8.0E-04	0.044		92%	7.2E-04	6.9E-04	0.036		97%	1.21
Selenium	ann	0.48	1.8E-04	1.3E-04	0.000	-1	72%	1.3E-04	1.3E-04	0.000	-1	99%	1.34
Vanadium	ann	0.2	1.2E-04	1.2E-04	0.001	-1	97%	1.0E-04	9.7E-05	0.001	-1	96%	1.19
Zinc	ann	50	0.008	0.006	0.000	-1	70%	8.3E-03	5.7E-03	0.000	-1	69%	1.01
	ann												
HF	ann	6	0.040	0.028	0.007	-1	70%	4.0E-02	2.8E-02	0.007	-1	69%	1.00
H2SO4	ann	2.4	0.175	0.129	0.073		74%	1.7E-01	1.3E-01	0.072		74%	1.02
PCB	ann	4.5E-04	5.0E-07	3.8E-07	0.001	-1	76%	5.0E-07	3.8E-07	0.001	-1	76%	1.01
BaP (PAH)	ann	0.002	6.0E-06	4.6E-06	0.003	-1	77%	6.0E-06	4.6E-06	0.003	-1	76%	1.00
Dioxin	ann	4.6E-08	1.5E-08	1.1E-08	0.326	3	71%	1.5E-08	1.1E-08	0.333	3	69%	0.98

CAT = Category of Concern -1 negligible concern HI < .01
1=HI between .1 and .2 5=HI >.49

HSHR is the ratio of the Second Highest value to the highest value.
A low HSHR indicates that the values are relatively far out on a right-skewed distribution and use of the high value is quite conservative.
A high HSHR indicates that many other values are probably close to the high value.
Ratio Hi(a)/Hi(b) is the ratio of the maximum concentration for System A relative to System B.

CAPITALIZED pollutants are those of particular public health concern.

The Hazard Index is the ratio of the maximum pollutant level divided by the standard or guideline.
It is the reciprocal of the Protection Index.

For carbon monoxide and cadmium, the Hazard Indices exceed 0.1; although these levels do not pose an immediate health concern, they have a small margin of safety and should be monitored carefully when the proposed systems are implemented.

Water contamination can arise from direct discharge of process water, from runoff or leachate, and from airborne deposition. Only a few of the facility types discharge process water; the main release would be associated with a sludge-pelletizer system which releases significant quantities of chromium, copper, lead, mercury and zinc. The only other significant process-water discharge identified is lead from the incineration of medical wastes.

The overall loadings to the New York harbor for the second-phase systems is shown in Table 17.1.10-1 for metals, PCBs, and dioxins. System A and B are virtually identical in this regard. For arsenic, cadmium, lead, nickel, zinc, and PCB's, the incremental contribution from the proposed solid-waste-management systems would amount to less than 0.1 percent of the total input. However, for mercury, the added contribution would be almost seven percent, under the highly conservative assumptions explained in Section 17.3.2. (For dioxin, there are no available background data with which to compare incremental loadings to existing conditions.)

17.1.10.4 Public Health Conclusions and Recommendations.

Although certain facilities would emit significant quantities of pollutants, the resulting concentrations at any point where the public may be exposed are generally substantially lower than the public health guidelines established by State and federal agencies. Where the predicted concentration approaches the guideline (i.e., the Hazard Index is greater than 0.1), special attention should be paid to assuring that the facilities are sited in such a way as to reduce this impact. A basic assumption underlying this analysis is that the new and upgraded facilities will perform at least as well as (or better than) the average for the Reference Facilities, and that they will be maintained or operated to assure that they are within specifications. The overall plan has built-in contingencies to allow for down-time and maintenance of facilities.

17.1.11 Cost Analyses.

Cost impacts (capital and operating, annualized and on a net-present-value basis over the 20-year plan period) were calculated through the NYC WastePlan model for each first-phase scenario and final-phase system. The results for the four final-phase systems are presented in section 17.3. Detailed cost analyses for every scenario modeled are presented in Appendix Volume 7.1. The capital and annualized operating costs of the reference facilities are presented in Table 17.1.11-1 and

17.1.11-2.

17.1.12 Secondary Economic Impacts.

The lowest-cost system does not necessarily produce the most favorable economic impacts for New York City overall, because certain types of waste-management spending are less productive in terms of local jobs, sales, and tax revenues. The differential effects of alternative waste-management systems were assessed through the use of regional input-output multipliers developed by the U.S. Department of Commerce, which provide a way of projecting the local effects of spending for various types of facilities and systems. Differences in impacts are based on the types of businesses that are locally based as opposed to products that must be imported from other regions, on capital-intensity vs. labor-intensity, and on the potential for development of industries that use recycled materials. The results of this analysis for the four final-stage systems are presented in section 17.3; a detailed analysis of all scenarios modeled is presented in Appendix Volume 7.2.

Table 17.1.11-1: Reference Facility Capital Costs

Reference Facility	TPD	Availability	Capital Costs*# (000,000s)	Capital $ /TPD**## (000s)	Size (ft2) (000s)	Bldg $/ft2	No. Acres	Const (Yrs)
1 Truck Transfer Station	1,500	100%	5.8	6.8	15	$75	4	1
2 Marine Transfer Station	2,000	100%	42.5	25.0	----	----	4	2
3 Rail Transfer Station	1,500	100%	9.3	11.4	19	$75	8	1
4 Materials Drop-Off	10	100%	0.9	168.2	6	$50	0.8	1
	50	100%	3.1	109.6	35	$50	2	1
5 Materials Buy Back	10	100%	0.9	168.5	6	$50	0.8	1
	50	100%	3.1	110.9	35	$50	2	1
6 Household Haz Waste Drop-Off	2	100%	1.4	862.0	6	$75	0.3	1
7 Waste Oil Facility	1,500 gpd	100%	1.2	1.2	1	$75	0.5	1
	5,000 gpd	100%	1.2	0.3	1	$75	0.5	1
	7,500 gpd	100%	1.2	0.2	1	$75	0.5	1
8 In-Vessel Compost	600	90%	36.7	80.2	218	$75	9	2
	900	90%	53.3	78.4	327	$75	14	2
	1,500	90%	86.7	77.0	546	$75	23	2
9 Mixed Waste In-Vessel Compost	1,500	85%	112.8	95.2	576	$75	24	2
10 Leaf & Yard Waste Compost***	556	100%	5.3	53.2	4	$75	24	1
11 Sludge Compost	25	100%	26.8	1324.4	138	$75	5	2
	50	100%	47.0	1168.6	260	$75	9	2
	100	100%	80.1	1021.1	400	$75	18	2
	250	100%	195.5	898.4	1,059	$75	20	2
12 Sludge Pelletizer	150	100%	38.8	275.9	37	$75	2	2
	500	100%	143.1	293.2	79	$75	3	2
13 Sludge Chemical Stabilization	35	100%	14.7	468.3	40	$75	1	2
	115	100%	24.1	233.5	68	$75	2	2
	500	100%	112.1	246.3	277	$75	9	2
14 MRF: High-Level Sorting	250	95%	8.0	45.7	33	$75	3	1
	500	95%	17.1	46.3	100	$75	5	1
MRF: Low-Level Sorting	500	95%	14.0	39.6	70	$75	5	1
MRF: Restricted Materials	500	95%	18.0	48.2	110	$75	5	1
	1,000	95%	20.5	28.5	90	$75	7	1
	1,500	95%	28.7	26.8	120	$75	10	1
15 Mixed Waste Process: Organics In	1,000	85%	11.5	13.6	55	$75	1.6	3
	2,250	85%	25.8	13.6	124	$75	4	3
	3,000	85%	34.4	13.6	165	$75	5	3
Mixed Waste Process: Organics Out	1,000	85%	11.7	13.8	55	$75	2	3
	2,250	85%	26.3	13.8	124	$75	4	3
	3,000	85%	35.0	13.8	165	$75	5	3
16 Dry Bag Processing	1,500	88%	47.3	39.8	220	$75	10	2
17 Commercial Paper Processing	250	100%	4.7	25.3	22	$75	1	1
	500	100%	7.5	19.9	42	$75	2	1
	1,000	100%	11.1	14.3	61	$75	3	1
18 Commercial Waste Processing	1,500	100%	33.4	27.2	150	$75	6	2

Reference Facility	TPD	Avail-ability	Capital Costs*# (000,000s)	Capital $ /TPD**## (000s)	Size (ft2) (000s)	Bldg $/ft2	No. Acres	Const (Yrs)
19 Construction & Demolition Proc	500	100%	12.8	32.7	50	$75	3	2
20 Medical: On-Site Chop & Bleach	18	92%	0.6	35.2	0	$0	0	2
21 Medical: On-Site Autoclave	3	92%	0.5	189.7	0	$0	0	2
22 Medical: Regional Autoclave	165	92%	11.3	82.7	35	$75	2	2
23 Harbor Debris Processing	150	100%	8.3	77.3	20	$75	3	2
24 Dredge Spoils Dewatering	147	100%	0.3	396.6	--	--	58	1
25 Waste Tire Processing	100	100%	3.7	54.0	15	$75	1	1
	200	100%	5.4	38.6	26	$75	2	1
	300	100%	6.1	29.7	26	$75	3	1
26 Mass-Burn Waste-to-Energy	1,000	85%	162.5	178.2	174	$128	12	3
	2,250	85%	255.9	123.3	218	$142	16	3
	3,000	85%	366.0	133.0	283	$136	26	3
MB WTE w/MWP: Organics In	1,000	85%	142.2	158.6	166		13	3
	2,250	85%	238.4	117.1	312		19	3
	3,000	85%	339.1	125.6	410		30	3
MB WTE w/MWP: Organics Out	1,000	85%	136.3	152.4	161		13	3
	2,250	85%	229.1	112.8	305		19	3
	3,000	85%	325.9	121.1	401		30	3
27 RDF Waste-to-Energy	1,000	85%	139.5	156.3	218	$101	13	3
	2,250	85%	247.8	121.8	348	$108	20	3
	3,000	85%	352.4	130.2	588	$76	30	3
28 Modular Waste-to-Energy	360	85%	57.1	186.2	87	$103	8	3
29 Sludge Incinerator	250	100%	70.4	314.5	44	$92	7	3
30 Medical: Regional Pathological Inc	8	92%	6.4	879.2	5	$125	0.5	3
31 Medical: On-Site Incinerator	5	92%	2.9	543.4	0	$0	0	2
32 Medical: Regional Incinerator	330	92%	66	213.8	37	$94	4	3
33 Ash Landfill	1,000	100%	25	13	--	--	100	1
34 MSW Landfill	5,000	100%	116	10	--	--	400	1

* Capital costs in this column are direct costs for buildings and equipment only. (See Appendix Volume 5-H for a much more complete presentation of cost categories.

** Capital costs per ton of daily capacity in this column includes the cost of land and contingencies (neither of which is included in the prior direct-cost column. Contingency costs are applies to buildings/infrastructure and site-preparation costs, and are assumed to be 10%. Land costs, based on the average cost of industrial land in the city (excluding Manhattan, which is not representative of citywide costs), are assumed to be $1m per acre. See Appendix Volume 5-H for further details.

*** The leaf-and-yard-waste composting facility handles 20,000 tons per year, received 6 days a week over a 6-week period.

\# Does not include land and contingency.

\## Includes land and contingency.

Table 17.1.11-2: Reference Facility Operating Costs

Reference Facility	TPD	Annual Op Costs (000,000s)*	Op $/ton daily capac (000s)**	Days/Yr	Shifts/day	# Empl
1 Truck Transfer Station	1,500	2.5	1.8	302	3	42
2 Marine Transfer Station	2,000	3.6	2.0	302	3	26
3 Rail Transfer Station	1,500	2.9	2.1	302	3	30
4 Materials Drop-Off	10	0.3	28.6	302	1	5
	50	0.8	17.1	302	1	15
5 Materials Buy Back	10	0.4	44.1	302	1	8
	50	1.0	22.0	302	1	19
6 Household Haz Waste Drop-Off	2	0.4	204.0	302	1	7
7 Waste Oil Facility	1,500 gpd	0.3	0.2	302	1	4
	5,000 gpd	0.3	0.07	302	1	4
	7,500 gpd	0.3	0.05	302	1	4
8 In-Vessel Compost	600	2.2	4.0	365	2	34
	900	3.3	4.0	365	2	50
	1,500	5.5	4.0	365	2	84
9 Mixed Waste In-Vessel Compost	1,500	7.7	5.6	365	2	124
10 Leaf & Yard Waste Compost (a)	60	0.8	1.5	302	1	12
11 Sludge Compost	25	0.9	37.9	365	1	10
	50	1.7	36.7	365	3	21
	100	3.3	36.4	365	3	42
	250	11.7	51.6	365	2	105
12 Sludge Pelletizer	150	8.6	63.0	365	3	25
	500	29.5	65.0	365	3	86
13 Sludge Chemical Stabilization	35	1.7	54.1	365	1	7
	115	4.5	42.9	365	1	11
	500	18.4	40.6	365	3	30
14 MRF: High-Level Sorting	250	3.5	15.3	302	2	53
	500	7.7	16.9	302	2	142
MRF: Low-Level Sorting	500	5.8	12.8	302	2	102
MRF: Restricted Materials	500	7.8	17.1	302	2	144
	1,000	11.1	12.2	302	2	183
	1,500	16.6	12.1	302	2	270
15 Mixed Waste Process: Organics In	1,000	6.2	7.4	365	3	82
	2,250	13.3	7.1	365	3	175
	3,000	17.6	7.0	365	3	230
Mixed Waste Process: Organics Out	1,000	7.0	8.3	365	3	100
	2,250	15.0	8.0	365	3	215
	3,000	19.9	8.0	365	3	284
16 Dry Bag Processing	1,500	13.9	10.2	302	2	250
17 Commercial Paper Processing	250	3.0	13.1	302	2	55
	500	5.3	11.7	302	2	101
	1,000	7.8	8.6	302	2	149
18 Commercial Waste Processing	1,500	6.9	5.1	302	2	117
19 Construction & Demolition Proc	500	3.2	7.0	302	3	52
20 Medical: On-Site Chop & Bleach	18	0.1	6.9	365	0.5	1
21 Medical: On-Site Autoclave	3	0.2	87.5	302	3	4

	TPD	Annual Op Costs (000,000s)*	Op $/ton daily capac (000s)**	Days/Yr	Shifts/day	# Empl
(con't)						
22 Medical: Regional Autoclave	165	0.7	4.9	365	0.5	9
23 Harbor Debris Processing	150	1.0	7.0	302	2	12
24 Dredge Spoils Dewatering	147	1.1	8.5	365	2	25
25 Waste Tire Processing	100	1.9	21.0	302	2	26
	200	2.4	12.9	302	2	28
	300	2.8	10.4	302	2	34
26 Mass-Burn Waste-to-Energy	1,000	12.3	13.5	365	3	66
	2,250	20.9	10.2	365	3	72
	3,000	29.7	10.9	365	3	86
MB WTE w/MWP: Organics In	1,000	17.0	19.3	365	3	148
	2,250	31.2	15.9	365	3	247
	3,000	39.4	15.0	365	3	316
MB WTE w/MWP: Organics Out	1,000	17.4	19.8	365	3	166
	2,250	32.2	16.4	365	3	287
	3,000	40.8	15.6	365	3	370
27 RDF Waste-to-Energy	1,000	16.8	18.5	365	3	87
	2,250	22.6	1.11	365	3	87
	3,000	32.5	11.9	365	3	102
28 Modular Waste-to-Energy	360	3.7	11.2	365	3	38
29 Sludge Incinerator	250	6.5	28.8	302	2	52
30 Medical: Regional Pathological Incin	8	0.9	119.9	365	2	7
31 Medical: On-Site Incinerator	5	0.3	60.1	365	1	2
32 Medical: Regional Incinerator	330	11.6	38.6	365	3	58
33 Ash Landfill* **	1,000	6.0	6.6	302	2	15
34 MSW Landfill* **	5,000	9.1	2.0	302	2	63

* Does not include land and contingency.

** Includes contingency.

*** In addition, annual post-closure costs for the ashfill would be $90,762, and for the MSW landfill would be $398,416.

Endnotes

1. The data and analyses summarized in this chapter are presented in Appendix Volumes 5 (Reference Facilities), 6 (Environmental Impacts), and 7 (Cumulative Scenario/System Results).

2. The purpose of this table is to provide a simple comparison of the magnitude of emissions from different types of facilities. It deserves an important caveat, however: some of the emissions data represented here (particularly those from waste-to-energy facilities), are of relatively high quality, being based on multiple samples from multiple facilities; the MRF data, however (which are used by extrapolation for certain other types of facilities for which data are lacking), are based on only one test at one facility, and are therefore significantly less reliable. For a detailed presentation of these emission data for all facilities, see Appendix Volume 6.

3. Fresh Kills data, refuse only, sections 1/9 & 6/7, from sampling quarters January 1991, July 1991, January 1992.

4. These numbers of regions are determined in the following way: The trip-generation table in Appendix 5E breaks facilities into four ranges. Landfills and in-vessel composting facilities fall into the two highest ranges; 2,250 truck-fed WTE facilities fall into the third-highest range. The analysis of critical intersections in the 33 potential regions in the five boroughs is in Appendix 6C. It presents 10 tables (one for each borough for the a.m. and p.m. peak hours) that show the highest-facility-group level that each intersection could absorb, assuming a reasonable range of mitigation measures, if needed. Three intersections (Steinway Street/20th Avenue and Beach Channel Drive/Rockaway Freeway in Queens; and Richmond Avenue/Forest Hill Road in Staten Island) could absorb facilities in the highest category during both a.m. and p.m. peak hours. Another group of four intersections (East Trement Avenue/Morris Park Avenue in the Bronx; Hamilton Avenue/Clinton Street in Brooklyn; West Houston Street/Hudson Street in Manhattan; and Glen Street/Victory Boulevard in Staten Island) could absorb facilities in the second-highest category during both daily peak periods with no traffic mitigation. In addition, eight other intersections (Bruckner Boulevard/Zerega Avenue and Baychester Avenue/Boston Post Road in the Bronx; Flushing Avenue/BQE NB Service Road, Flushing Avenue & Nassau

in Brooklyn; LIE WB Service Road/Maurice Avenue and Rockaway Boulevard/Farmers Boulevard in Queens; and South Avenue/Forest Avenue in Staten Island) could accept facilities in the third-highest range, with only minor traffic mitigation, if mitigation is needed at all. All of these intersections could also, of course, accept smaller facilities in the lowest range.

5. In the case of the air modeling performed for this plan, only one type of facility, a sludge-composting facility, produces significant levels of modelled pollutants -- ammonia and hydrogen sulfide. When the modeled concentrations of these pollutants at the maximum-impact areas are converted to ppm and compared to the threshold values presented in the odor analyses in Appendix Volume 6, the worse case is about half of the threshold detection value. Therefore, it can be concluded that this facility would have no odor impacts.

6. See Appendix 5, Task 3, p.105.

7. Using mid-range projections for the high-quality recycling program. This calculation is presented in Appendix Volume 6.

8. Electricity would be the primary energy product for waste-to-energy facilities in most locations.

9. Energy usage for alternative collection systems does not vary as radically as the one-to-three-truck range may seem to suggest, due to the fact that the trucks nonetheless collect the same overall amount of material with as few truck trips as possible.

10. Manhattan Community Board 3, October, 1991.

11. The City's coastal-zone-management objectives and waterfront goals (as stated in City of New York, Department of City Planning, "NYC Waterfront Revitalization Program," 9-82, pp. 70ff) and the relationship of the proposed waste-management plan to them are as follows:

    1) Restore, revitalize, and redevelop deteriorated and underutilized waterfront areas for commercial, industrial, cultural, recreational and other compatible uses.

        A) Improve urban shorelines by maintaining, removing, or recycling waterfront structures (piers, docks, wharves, etc.) in accordance with waterfront-development policies and plans. Identify alternative uses for underutilized waterfront structures.

The plan is consistent with this policy.

2) Facilitate the siting of waterfront-dependent uses and facilities on or adjacent to coastal waters.

B) Improve channels as necessary to maintain and stimulate economic development.

The plan is consistent with this policy.

3) Promote the development and use of the State's major ports as centers of commerce and industry, emphasizing the siting, within port areas, of land use and development which is necessary to, or in support of, the waterborne transportation of cargo and people.

The plan is consistent with this policy.

4) Strengthen the economic base of smaller harbor areas by encouraging the development and enhancement of those activities which have provided such areas with a unique identity.

The plan is neutral with regard to this policy: this objective will be considered with regard to the siting of specific projects.

5) Encourage the location of development in areas where public services and facilities essential to such development are adequate.

The plan is neutral with regard to this policy: this objective will be considered with regard to the siting of specific projects.

6) Expedite existing permit procedures in order to facilitate the siting of development activities at suitable locations.

This policy is not applicable to the plan.

7) Significant coastal fish and wildlife habitats will be protected and preserved so as to maintain their viability as habitats.

Such potential site-specific impacts must be considered in the course of project-specific reviews.

8) Protect fish and wildlife resources in the coastal area

from the introduction of hazardous wastes and other pollutants which bioaccumulate in the foodchain or which cause significant sublethal or lethal effect on those resources.

A goal of the plan is to minimize overall environmental impacts, including these. The effects of specific proposed facilities on marine life will be examined in the course of supplemental site-specific environmental reviews.

9) Expand recreational use of fish and wildlife resources in coastal areas by increasing access to existing resources, supplementing existing stocks and developing new resources.

The plan is largely neutral with respect to this goal, except to the extent that additional waterfront waste-management facilities (consistent with policies listed above) are developed.

10) Further develop commercial finfish, shellfish, and crustacean resources in the coastal areas by encouraging the construction or improvement of existing on-shore commercial fishing facilities, increasing of the State's seafood products, maintaining adequate stocks and expanding agricultural facilities.

This policy is not applicable to the plan.

11) Buildings and structures will be sited in the coastal area so as to minimize damage to property and the endangering of human lives caused by flooding and erosion.

C) Provide shorefront protection against coastal erosion hazards where there is public benefit and public use along non-public shores.

D) Provide technical assistance for the identification and evaluation of erosion problems, as well as the development of erosion-control plans along privately-owned eroding shores.

E) Implement public and private structural flood- and erosion-control projects only when:

- public economic and environmental benefits exceed public economic and environmental costs;

- non-structural solutions are proven to be ineffective or cost-prohibitive;

- projects are compatible with other coastal-management goals and objectives, including aesthetics, access, and recreation;

- adverse environmental impacts are minimized;

- natural protective features are not impaired; and

- adjacent (downdrift) shorelines are not adversely affected.

Siting and development of proposed facilities will be conducted in conformance with this policy.

12) Activities or development in the coastal area will be undertaken so as to minimize their adverse effects upon natural features which protect against flooding and erosion.

Siting and development of proposed facilities will be conducted in conformance with this policy.

13) The construction or reconstruction of erosion-protection structures shall be undertaken only if they have a reasonable probability of controlling erosion for at least thirty years as demonstrated in design and construction standards, and/or assured maintenance or replacement programs.

The development of proposed facilities will be conducted in conformance with this policy.

14) Activities and development including the construction or reconstruction of erosion-protection structures shall be undertaken so that there will be no measureable increase in erosion nor flooding at the site of such activities nor development at other locations.
The development of proposed facilities will be conducted in conformance with this policy.

15) Mining, excavation, or dredging in coastal waters shall not significantly interfere with the natural coastal processes which supply beach materials to land adjacent to such waters and shall be undertaken in a manner which will not cause an increase in erosion of such lands.

The development of proposed facilities will be conducted in conformance with this policy.

16) Public funds shall be expended for activities and development, including the construction or reconstruction of

erosion-control structures, only where the public benefits clearly outweigh their long-term monetary and other costs, including their potential for increasing erosion and their adverse effects on natural protective features.

The development of proposed facilities will be conducted in conformance with this policy.

17) Non-structural measures to minimize damage to natural resources and property from flooding and erosion shall be used whenever possible.

The siting and development of proposed facilities will be conducted in conformance with this policy.

18) To safeguard the vital interest of the State of New York and of its citizens in the waters and other valuable resources of the State's coastal area, all practicable steps shall be taken to ensure that such interests are accorded full consideration in the deliberations, decisions, and actions of State and federal bodies with authority over those waters and resources.

This policy is not applicable to the proposed plan.

19) Protect, maintain, and increase the level and types of access to public water-related recreation resources.

The plan is neutral with regard to this policy, except to the extent that current and proposed waterfront facilities, consistent with previously listed policies, maintain or increase the extent to which waterfront areas are used industrial or commercial purposes. Given the nature of these waste-management activities, they are likely to be incompatible with public access.

20) Access to the publicly owned foreshore or water's edge, and to the publicly owned lands immediately adjacent to these areas shall be provided, and it shall be provided in a manner compatible with adjoining uses. To ensure that such lands remain available for public use, they will be retained in public ownership.

Facilities operated and/or developed in conformance with this plan will conform to this policy, except insofar as the demands of marine transportation pose safety hazards inconsistent with public access.

21) Water-dependent and water-enhanced recreation will be encouraged and facilitated, and will be given priority over

non-water-related uses along the coast.

> F) Priority shall be given to the development of mapped parklands and appropriate open space where the opportunity exists to meet the recreational needs of immobile user groups and communities without adequate waterfront park space and/or facilities.
>
> G) Maintain and protect NYC beaches to the fullest extent possible.

The plan is neutral with regard to this policy.

22) Development when located adjacent to the shore will provide for water-related recreation activities whenever such recreational use is appropriate in light of reasonably anticipated demand for such activities, and the primary purpose of the development.

The plan is neutral with regard to this policy.

23) Protect, enhance, and restore structures, districts, areas, or sites that are of significance in the history, architecture, archeology, or culture of the State, its communities, or the nation.

> H) Ensure ongoing maintenance of all waterfront parks and beaches to promote full use of secure, clean areas with fully operable facilities.

The siting and development of facilities built pursuant to this plan will be conducted in conformance with this policy.

24) Prevent impairment of scenic resources of Statewide significance.

This is a siting criteria that will be considered in the development of proposed facilities, and proposed facilities will be built in a way that minimizes the interruption of significant viewsheds.

25) Protect, restore, and enhance the natural and man-made resources which are not identified as being of statewide significance, but which contribute to the overall scenic quality of the coastal area.

The siting and development of facilities built pursuant to this plan will be conducted in conformance with this policy.

26) Conserve and protect agricultural lands in the State's

coastal area.

This policy is not applicable to NYC.

27) Decisions on the siting and construction of major energy facilities in the coastal area will be based on public energy needs, compatibility of such facilities with the environment and the facility's need for a shorefront location.

> I) Siting of liquified and substitute-natural-gas facilities, including those associated with the tankering of such gas, shall take into consideration State and national energy needs, public safety concerns and the necessity for a shorefront location.

The siting and development of facilities built pursuant to this plan will be conducted in conformance with this policy.

28) Ice-management practices shall not damage significant fish and wildlife resources and their habitats, increase shoreline erosion or flooding or interfere with the production of hydroelectric power.

This policy is not applicable to NYC.

29) Encourage the development of energy resources on the outer continental shelf and in other water bodies and ensure the environmental safety of such activities.

This policy is not applicable to the plan.

30) Municipal, industrial, and commercial discharge of pollutants, including, but not limited to, toxic and hazardous substances, into coastal waters will conform to State water-quality standards.
Discharges from facilities developed pursuant to the plan will conform to State standards.

31) State coastal-area policies and management objectives of approved local waterfront revitalization programs will be considered while reviewing coastal water classifications and while modifying water-quality standards; however, those waters already over-burdened with contaminants will be recognized as being a development constraint.

This policy is not applicable to the plan.

32) Encourage the use of alternative or innovative sanitary waste systems in smaller communities where the cost of

conventional facilities are unreasonably high, given the size of the existing tax base of these communities.

This policy is not relevant to the plan.

33) Best management practices will be used to ensure the control of stormwater runoff and combined sewer overflows draining into coastal waters.

Facilities developed pursuant to this plan will conform to this policy.

34) Discharge of waste material into coastal waters from vessels under the State's jurisdiction will be limited so as to protect significant fish and wildlife habitats, recreational areas, and water-supply areas.

Activities pursuant to the plan will conform to this policy.

35) Dredging and dredge-spoil disposal in coastal waters will be undertaken in a manner that meets existing State dredging permit requirements and protects significant fish and wildlife habitats, aesthetic resources, natural protective features, important agricultural lands, and wetlands.

Activities pursuant to the plan will conform to this policy.

36) Activities related to the shipment and storage of petroleum and other hazardous materials will be conducted in a manner that will prevent or at least minimize spills into coastal waters; all practicable efforts will be undertaken to expedite the cleanup of such discharges; and restitution for damages will be required when these spills occur.

Activities pursuant to the plan will conform to this policy.
37) Best management practices will be used to minimize the non-point discharge of excess nutrients, organics, and eroded soils into coastal waters.

Facilities developed pursuant to the plan will conform to this policy.

38) The quality and quantity of surface water and groundwater supplies will be conserved and protected, particularly where such waters constitute the primary or sole source of water supply.

The plan is consistent with this policy.

39) The transport, storage, treatment, and disposal of solid wastes, particularly hazardous wastes, within coastal areas will be conducted in such a manner so as to protect groundwater and surface water supplies, significant fish and wildlife habitats, recreation areas, important agricultural lands, and scenic resources.

J) Adopt end-use plans for landfill areas which specify the following: final capacity; final contours; leachate, erosion, and gas-control systems; re-vegetation strategies; and interim review schedules.

K) Curtail illegal dumping throughout the coastal zone and restore areas scarred by this practice.

L) Encourage energy development from waste and waste landfills.

The plan is consistent with this policy, and facilities and activities developed or conducted pursuant to it will conform with it. Presently closed landfills are being managed in conformance with the policy; sections of Fresh Kills which are planned for closure will also conform with it. Final capacity and contour plans for sections of Fresh Kills that are planned for ongoing operations will be developed.

40) Effluent discharged from major steam electric generating and industrial facilities into coastal waters will not be unduly injurious to fish and wildlife and will conform to State water quality standards.

Effluent will not be discharged from major steam electric-generating or industrial facilities into coastal waters in consequence of this plan.

41) Land use or development in the coastal area will not cause national or State air-quality standards to be violated.

The plan is consistent with this policy.

42) Coastal-management policies will be considered if the State reclassifies land areas pursuant to the Prevention of Significant Deterioriation of the federal Clean Air Act.

This policy is not applicable to the plan.

43) Land use or development in the coastal area must not cause the generation of significant amounts of the acid-rain precursors: nitrates and sulfates.

Airborne emissions of nitrogen oxides and sulfur dioxide will be minimized to the greatest extent practicable.

44) Preserve and protect tidal and freshwater wetlands and preserve the benefits derived from these areas.

Facilities developed or activities conducted pursuant to the plan will not impinge upon wetlands.

12. This section was written by Michael Gochfeld, M.D., Ph.D., Director of Occupational Medicine and Clinical Professor of ENvironmental and Community Medicine, University of Medicine and Dentistry of New Jersey -- Robert Wood Johnson Medical Center, and Environmental and Occupational Health Sciences Institute, Piscataway, NJ.