2. PARTIAL CURBSIDE TRANSFER OUT - WITH LANDFILL

The Town could maintain a landfill for such items as construction debris, sludge and as a depository for recyclables and then either pick up and haul trash itself or contract it out. Such towns as Northborough contract their curbside pickup service, which is transferred out. Waltham operates a town pickup service and transfers out direct. The estimated cost for Wayland for direct transfer by a contract hauler would be $50 per household unit, including the cost of the tipping fee at the ultimate disposal site. A direct transfer operation run by the Town of Wayland for Wayland residents would involve the purchase of the necessary collection trucks, their fuel and maintenance and the hiring of additional labor and such associated costs. In addition to these costs would be the tipping fee at either a landfill or resource recovery facility.

3. TRANSFER STATION - WITH LANDFILL

Another alternative would be to maintain the present Town system - private car and commercial truck hauling to a landfill site where the solid waste would be placed into one large vehicle and hauled to a final disposal site outside the town. A landfill would be operated for limited use - recyclables, sludge, etc. This alternative requires an extra materials handling step and in most cases the construction of a transfer facility. This facility can be as simple or as extensive as the Town is willing to construct. Essentially, the facility would allow for the dumping of solid waste from vehicles into closed container receptacles where it is compacted and prepared for transferring to a disposal site. The facility could be a town-owned and operated station with the town either doing its own hauling or contracting out the hauling.

Wellesley owns and operates its transfer station and hauls its solid waste, including recyclables. Southborough owns and operates its own station but contracts out the hauling of its solid waste.

It is assumed that hauling either direct from curbside or from the landfill or transfer facility to the disposal site will be entirely by truck. There does exist the future possibility of hauling by rail, should a receiving facility ever be situated on the rail line. Wayland is fortunate to have railroad access at its present landfill site and this fact should be kept in mind before disposing of the present landfill site.

Some form of transfer is an option which the Town of Wayland should not overlook. A transfer station operation would be visually more desirable than the present landfill since everything would be contained and more orderly, and the area would be cleaner. There would be better control of recycling, allowing more versatility for maximum recovery. A strong recycling program would reduce the tonnage which would be transferred out thus reducing hauling and tipping fees. Furthermore, a transfer station operation would allow the town flexibility in the disposal of its solid waste in order to take advantage of changing costs and improving technology. The Town is fortunate to have suitable land available for use as a disposal site. However, in planning for its use and operation every possible consideration should be given to those items such as power, siting of facilities, location of paved area which could be easily adjusted to a transfer operation.

7. SMALL-SCALE RESOURCE RECOVERY

Introduction

A barrel of oil (42 gallons) will heat a typical Wayland home for a week during the heating season; so will the energy in a ton of typical municipal solid waste (MSW). There are estimates from the power industry and the Environmental Protection Agency (EPA) that the total MSW of the nation--approximately 200 million tons--could provide 4-7% of the nation's energy needs. Less than 0.2 per cent is utilized at present, and it is easy to understand why. Fossil fuels are less bulky, have more uniform burning characteristics, can be stored, and are more aesthetic. Equipment for the manufacture and burning of oil and coal has had the benefits of at least fifty years of development. In the past, it was more economically efficient to increase the amount of foreign oil purchased to meet a deficit in domestic oil production. With the shortages in world production due to OPEC and other international events, it has become a matter of national interest to explore alternative methods of obtaining energy. MSW, as an alternate fuel source for some of the nation's energy needs, is receiving more attention.

The Wayland Committee to Study Options for Solid Waste Disposal accepted a suggestion from one of its members to examine small-scale energy recovery possibilities, and authorized a limited review of this option.

Wayland has a unique set of conditions in regard to an energy recovery facility from MSW. The new Sudbury-Wayland Septage Facility is adjacent to both landfills. The landfills are proximal to industrial and town buildings, all of which are potential markets for energy, either as electricity or as steam. Savings by producing electricity for local use are greater than revenues obtained by selling electrical energy to the utility power grid.

There are several possibilities for exchanges in resources between the cluster of four disposal-energy conservation methods (landfill, septage treatment, combustion, steam-turbine electrical generation), as follows:

- MSW is combusted to heat
- Heat is used to create medium and low pressure steam
- Medium pressure steam develops electricity
- Back pressure (low) steam from the turbine can be used as steam for heating buildings
- Sludge from the Septage Facility can be burned as fuel along with MSW
- Water from the Septage Facility can be used for cooling turbines
- Water from the Septage Facility can be used in certain air pollution control devices
- Ashes and residues from the combustion unit may become useful in road construction

none of the possibilities mentioned for Septage facility are in the design plans for Septage facility — m[ay] be too late to incorporate changes now

- Back pressume steam can be used as process steam for local industry and the Septage Facility

Technical Aspects: Definitions

Resource Recovery is the term generally applied to waste disposal methods which recover materials for re-use or energy. The main disposal methods are usually land filling, combustion, transfer, or the manufacture of Refuse Derived Fuel (RDF).* Each disposal method has recovery possibilities at the "front-end" or the "back-end" of the central disposal process. In some methods the "front-end" procedures include recycling and separation procedures; "back-end" procedures might include secondary fuels, glass aggregates, metals, and ash-mineral residues. If energy is recovered, it is usually in the central process. The scheme discussed in this report is suited primarily to front-end and energy recovery.

A Small-Scale Resource Recovery device is arbitrarily defined as a unit which has a capacity of 100 tons per day, or less. European systems are in the mid-scale range, between 500 - 1,000 tons per day. Systems under consideration as regional facilities in the Northeast are being sized over 1,000 tons per day, and would be considered "large scale."

*RDF can be stored and burns more efficiently at higher temperatures, but the equipment for its manufacture is sophisticated and costly.

A small-scale unit is appropriate, since Wayland develops about 60 tons per day of household and commercial MSW* at 1979 levels.

Technical Aspects: Equipment

There are four major developments, experimental or in operational stages, for obtaining energy from MSW. Waterwall incineration is used extensively in Europe to generate steam, and is currently used by the RESCO facility in Saugus. The Brayton Cycle is a device which uses organic gases to drive turbines directly; however, it has not yet been proven to be completely successful. Pyrolytic decomposition is utilized in some developmental plants to produce burnable gases, which are then used to develop steam. Some methods produce an RDF which is then used as a storable fuel to ultimately fire boilers and produce steam. Recently, smaller modularized, starved-air combustion units have come into use, with the addition of boilers to generate steam.

Other technologies to produce electricity directly from heat or for large-scale storage of energy would improve the recovery picture substantially, but are not as yet available for general use.

Technical Aspects: Breakthroughs

In recent years, manufacturers and research centers have improved equipment and techniques for the use of MSW as a fuel. Some of these developments are as follows:

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*Based on a five-day week.

- Better refractory linings of combustion chambers to resist corrosion

- Upgraded air pollution control devices for retention of solid particulates and gases

- New techniques to obtain metals which are more resistant to corrosion and abrasion from MSW fuels

- Special boilers to resist breakdown from MSW fuels

- Special boilers to maximize energy recovery from MSW processes

- Better controls for monitoring, charging, and firing the MSW fuel

- Better electronic controls for automatically switching to alternate power sources at shutdown

- Better techniques for the classifying and the pre-processing of MSW

- New techniques for cooling of mechanical equipment used in some systems to transport and/or jostle the MSW to optimize the burning of the MSW

- Increased efficiencies of small turbo-generators to obtain more electricity per pound of fuel

Findings: Available Equipment

For a combustion unit, the starved-air, modified incinerator devices were identified as the only equipment currently in the size range with the operating record to be feasible. Three companies were found with such equipment. Only one had progressed sufficiently with energy recovery devices on an operational level - the Consumat Corporation.

The Consumat process is a two-stage combustion. The MSW is pushed into a receiving pit which is then sealed by an automatic cover when full. A hydraulic device pushes the waste into the first combustion chamber, where it is burned around 900°F to produce residues and hot organic gases in a starved-air, "quasi-pyrolytic" process.* The residue is moved by grates to a disposal area. The organic gases rise and move to the second chamber, where they are burned at a temperature near 1600°F. In the second chamber, boiler tubes caputre the heat for energy recovery. The final gases from the combustion are vented into an air pollution control chamber, and then into the atmosphere.

Findings: Production

In order to generate sufficient energy, on a scale that will produce energies likely to meet market needs of the town, the following specifications were projected with the available equipment:

- A 50-ton-per-day Consumat unit, operating 24 hours a day (Model Dual 1200)
- A non-condensing, water-cooled, Turbo-Dyne Steam Turbine requiring 13,000 pounds of saturated steam per hour at 250 pounds per square inch, at approximately 400°F.
- An electrical production of 350 Kilowatts per hour
- Back pressure steam (steam available for heating after electrical generation) at 13,000 pounds per hour (at 100% recovery), at 15 psi

*This term has been chosen by the writer as a suitable descriptor of the process - it is not used by the manufacturer.

- The overall efficiency of energy production per ton (in this process) of MSW is approximately 70% (65% steam production, 5% electrical production). Modern industrial boilers using fossil fuels or RFD can obtain efficiencies close to 90% to obtain steam; however, when using MSW fuel, the efficiencies are in the 65-75% range. Larger turbines, using very high pressure steam, have electrical efficiencies close to 40%. Equipment chosen for some proposed nearby large-scale Resource Recovery Facilities is estimated to have efficiencies around 17-19% for electrical generation, using medium pressure steam.

The Consumat Corporation has several installations in New England, but none in Massachusetts at present. The Town of Wellesley had explored the use of these units in 1975-76, and had an unsatisfactory experience. The official investigation by the Town of Wellesley revealed that the failure was due to mismanagement rather than the technology. A unit in Wolfeboro, New Hampshire, was visited and found to be operating successfully one year after installation. There are many other units in operation throughout the United States. Additional units have been selected by an EPA-funded evaluation study for Auburn, Maine.

The survey revealed that small-scale electrical turbo-generators of the type needed (under 1 Megawatt) have been available for institutions, factories, and ships for some time. Three suppliers of this equipment were identified. Only one responded with sufficient information for consideration in this report - the Turbo-Dyne Company.

Therefore, for the purposes of this review, to operate the small-scale Resource Recovery Unit, a configuration of a Consumat unit with a Turbo-Dyne steam turbine electrical generator was considered. An energy recovery unit of this type could be in operation one year after funding approval, since many of the components are "in-stock" items.

Findings: Capitalization

"Ballpark" cost information was obtained by telephone and correspondence. No detailed specifications or bid requests were developed. The following is the best estimate available of capital costs for the identified configuration:

Combustion unit with energy recovery boiler	$ 575,000
Electrical turbines and switching gear	60,000
Installation and shipping	90,000
Steam line to town buildings	300,000
Total	$1,025,000*

Economics

It is not possible with the data presently available to consider the economics in detail. The markets will vary with the operational requirements. For instance, the Septage Facility may operate only ten hours a day, but on a 7-day-per-week cycle; heating steam may be in demand during the day but not at night; and the landfill may function only during an eight-hour shift, five days a week. Costs for maintenance and operation will vary according to the market demands and the

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*This is based on the assumption that there are no Land Acquisition costs if sited on the new Sand Hill landfill.

operating conditions of the facilities. The following figures are offered for speculation of revenues:[1]

- Savings can be obtained from the Septage Facility, which will consume electricity costing about $35,000 per year (at present estimates - 1978 rates)

- The new town building, in 1978 dollars, utilizes about $19,000 in fuel oil, which equates to 1000 barrels per year.[2] This could be substituted with the steam produced by burning 1,700 tons of MSW per year - assuming a 65% efficiency

- The public safety building is estimated to use another $4,300 in oil, which would require another 400 tons of MSW per year as an equivalent fuel

- A revenue, at 1978 dollars, of $58,300 can be obtained from the above users

- Other revenues are possible in selling surplus steam

<u>Advantages</u>

1. The energy recovery facility can produce revenue, or cost savings which could recover all or part of the investment. The revenues become more attractive as inflation and energy costs rise.

2. Local control over participation in a 40-town regional facility with complex organization and stringent legal liabilities may be more desirable.

3. The electrical producing capacity can serve as an emergency supply in a power failure for public safety purposes.

4. The burning of MSW can substantially lengthen the life of the landfill.

5. The small-scale Resource Recovery Facility can accept waste if an alternate MSW disposal method of the town is interrupted.

[1] See Table 3 for conversion factors.

[2] At a cost of $0.36 per gallon of #4 fuel oil.

Disadvantages

1. The risk of failure in the innovative blending of the varied technologies.

2. The necessary capitalization plan may be too heavy a burden for a small town.

3. The complexity of the new technologies requiring a necessary "break-in/learning period" will be an additional overhead.

4. The complexity of project organization involving two towns.

5. The complexity of community acceptance.

6. The absence of a town energy policy to advance such a project.

7. The possibility of technological obsolescence before earnings are obtained.

8. The costs of delays in planning the opening of new landfill to incorporate this possibility in the design.

9. Air pollution control devices to meet air quality standards for this type of unit are relatively new and may require costly adjustments and maintenance.

TABLE 3

Energy Conversion Estimates - Small Scale Resource Recovery

One pound of Wayland MSW*	equals about 4700 BTUs
One bbl. of #4 Fuel Oil	equals about 1 ton MSW in BTUs
One ton of Wayland's MSW	equals about 10^6 BTUs
One Kilowatt Hour of Electricity	equals about 3413 BTUs
One gal. #4 Fuel Oil	equals about 1.5×10^5 BTUs
One lb. of Saturated Steam at 250 psi	equals about 1200 BTUs

*National averages put MSW at 4300 BTUs. Wayland, by eliminating wet garbage, has a drier MSW and therefore it is a slightly better fuel source.

Space of Buildings

Town Office Building....about 48,000 sq. ft.

Public Safety Building...about 14,000 sq. ft.

LARGE-SCALE RESOURCE RECOVERY

Large-scale resource recovery refers to those facilities capable of processing 1000 tons or more per day of solid waste. Materials of value are recovered from the waste, with the energy content of the combustibles being by far the most significant. Such large size leads to significant improvements in economy of operation and efficiency of electrical generation.

The committee has investigated three large-scale resource recovery plants: RESCO in Saugus, since it is the only existing large-scale resource recovery plant available to Wayland, 128 West Resource Recovery Council, because Wayland will have to make a decision within the coming year as to whether to join this groups of towns, and NESWC (North East Solid Waste Committee) because it is about one year ahead of 128 West and for which much more information is available. No other large-scale resource recovery plants are known to be even contemplated within hauling distance from Wayland.

The following block diagram shows the general principle of all three resource recovery plants. Raw refuse from the contract towns and from private contractors is dumped into a collection and storage pit. From the pit it is fed by clamshell crane into the automatic stokers of the boilers. Stumps and mineral construction wastes are not accepted. Large metal objects, such as appliances, are usually hand-picked before arrival at the plant for their scrap value. All other material is fed directly into the boiler. Experience has shown a thermal content of more than 4200 Btu/pound of mixed trash and no supplemental fuel is required in the boilers. Ferrous metal is removed from the residue and the balance found to contain less than 1 percent combustibles. The residue is about 20 percent of the weight of the original refuse but only about 5 percent of its volume and is disposed to a landfill. High pressure steam from the boiler is used to drive turbines for electrical generation. The electricity so generated represents most of the revenue available to offset operating costs. A few percent is available from the sale of the ferrous materials with experience showing no value to other residues. The balance of the costs must be borne by the users as a tipping fee per ton of waste.

RESCO is a privately owned facility in operation since April 1976 having 1500 tons/day total capacity, expandable to 3000 tons/day. The capital plant was financed with $30 million of tax-exempt revenue bonds and $15 million of private capital from Wheelabrator-Frye and deMateo, on whose land the plant is sited. In the case of RESCO the steam turbine and electrical generator is located about one-half mile away across the river at the General Electric Lynn gas turbine facility. The plant is fortunate in its location in that it did not have to supply the capital for the turbine and electrical generators and that General Electric had a demand for the low pressure process steam as well. As of 4/7/79 RESCO had only 600 tons/day from contract communities, but was processing another 400 tons/day from private contractors. It was operating close to break-even, with a contract tipping fee of $14.82 and a fee to private contractors somewhat less than this. They would like to have 1200 tons/day from contract communities in order to utilize the full capacity of the present plant as well as to become profitable. Their experience shows that they can only contract for 80 percent of the full capacity because of fluctuations at various times of the year in the waste stream from the communities. RESCO would welcome a long-term contract from Wayland or would accept our waste on a short-term basis at a lower fee.

128 West is a consortium of towns in the southwest metropolitian area that is trying to arrange construction of a large-scale resource recovery plant, probably in Stoughton. Wayland will be solicited to join this consortium sometime in the coming year. Bids have been received from from five contractors for the construction of plants sized at 1500, 2500, and 4000 tons/day. Very little information is available at the present time concerning contractual terms or projected costs to the towns. Except for capacity, this project is expected to be very similar to NESWC and the information available from NESWC should serve as a model for what to expect from 128 West. The design and construction

of a large-scale resource recovery plant typically takes about five years so that this plant would be available by 1985 at the earliest. There is considerable doubt as to the ability to get signed contracts from the towns in the area for a large enough volume of waste to make the plant economically viable. There is also considerable doubt about its location in Stoughton because of the unavailability of a source of water.

NESWC is to be a 3000 ton/day capacity plant located in North Andover. As of early April, no town has signed a contract with NESWC. They must have firm commitments of 1800 tons/day before proceeding with financing and construction. This requires towns having a combined population of 750,000 to sign 20-year contracts on an open-ended cost-plus basis. There is severe doubt that this will occur. NESWC could be in operation by 1984 at the earliest, but with the difficulties they are having getting towns to sign contracts, that date is very doubtful.

Costs

The present long-term contract tipping fee at RESCO is $14.82 per ton. To this must be added the cost of hauling to Saugus from Wayland which is estimated at $6/ton, and the cost of operating a transfer station, estimated at $1/ton, for a total cost of $22/ton. RESCO's experience would indicate that Wayland might have about 12000 tons per year acceptable to RESCO for a total cost of about $260,000 per year. Since they will not accept yard waste such as stumps, mineral construction, materials, or sludge from the septage treatment facility, the town would still have to operate the sanitary landfill, however at a reduced cost and longer life than presently anticipated.[1]

The gross operating costs of NESWC can only be estimated at this time based on actual experience at already constructed facilities. The annual costs are dominated by depreciation and interest on the capital plant. Assuming 20-year depreciation and 7-1/2 percent tax-exempt revenue bonds, one might expect gross costs approaching $33 at 1800 tons/day and $25 at 2400 tons/day.

[1] The total cost including landfilling is estimated at about $350,000 annually.

To this would be credited the price of electricity sold, although the guaranteed credit is only $7.50 because of low (17 percent) electrical generation efficiency. From this one might project tipping fees anywhere from $17 to $25, but if the estimates of construction costs are wrong, they could rise significantly above this. Since RESCO was fortunate in being able to sell steam to General Electric, it dod not have to bear the capital cost of turbines and electrical generators. NESWC at best will be built seven years after RESCO and should incur inflation in capital costs over that period as well as the additional costs for steam turbines, electrical generators, and condens ers. To offset this somewhat should be the economy of scale at 3000 tons per day instead of 1500 tons/day. All things considered, one might expect tipping fees to be close to $20 rather than the $15 of RESCO. NESWC, located in North Andover, might incur higher hauling charges. Altogether total costs of about$29 per ton might be expected, or about$350,000 per year.[2]

All long-term contracts are for twenty years. The major benefit to entering into such a contract is to have a guaranteed disposal of solid waste until after the turn of the century, but it would appear that Wayland almost enjoys that option with its new sanitary landfill. The labor costs involved in large-scale resource recovery are significantly less per ton than for operating the Wayland landfill. If inflation continues at its present pace, the tipping fees at the large-scale resource recovery plants can be expected to become less than for a sanitary landfill, and with continued escalation of energy costs, the credit for electricity could well make these plants very attractive toward the end of the contractual period. There certainly is some risk involved in projecting continued cost escalation at the present rate.

There is a major risk to the town in the projected construction costs. The gross operating costs including interest and depreciation are passed through directly to the towns. Furthermore, NESWC assesses penalties on those towns whose delivered refuse departs by more than 20 percent from the weekly contracted amount or by more than 10 percent from the yearly contracted amount. A long-term contract of twenty years would prevent Wayland from exploring other possible lower-cost options during that period. A

[2] The total cost including landfilling is estimated at $410,000 annually.

great deal of pressure will be brought to bear on Wayland to join 128 West primarily on the argument that if we do not join initially, we will be unable to join at a later date. Experience at RESCO would indicate that this will not happen until long-term contracts reach 80 percent of the maximum plant capacity. More realistically, it is doubtful that 128 West will ever get started if most communities make the decision to sit back and wait to see how the project develops. However, it will take fifty communities the size of Wayland to initiate the project.

The consensus of the committee is to not enter into a long-term contract at the present time in order to preserve options for the town. In the meantime, the town should remain informed as to the progress and projected costs of 128 West and NESWC. It should also remain informed as to the remaining capacity at RESCO as a possible alternative.

APPENDIX I

LANDFILL INPUT ESTIMATES

SOURCE OF INPUT	ANNUAL AMOUNT			
	C.Y.	%	TONS	%
1. 25 packers/week 1) (18 cy @ 8 tons)	20800	66	10400	66
2. 4 trailers/week 1) (40cy @ 10 tons)	4160	13	2080	13
3. 2000 self-haul households/week 2) (@ 0.45 tons/person/year)	6320	20	3160	20
TOTAL	31280	100	15640	100
OTHER RECENT ESTIMATES				
3179 LEA Report 3)	38244		19122	
1 - week landfill volume increase 4) survey (May 1979)	33800			

ASSUMED DENSITIES:

Packer: 888 lb/cy
Oper-top trailer and household self-haul: 500 lb/cy
Landfill: 1000 lb/cy

NOTES:

1) From 1978 one-month vehicle count survey; 1979 W. Miller estimate. Includes residential and commercial solid waste.

2) Miller, BP and others collect from about 1700 households; 2000 (remainder of 3727 Wayland households) self-haul (54%). RESCO communities generate about 0.45 tons/person/year. Wayland's population is approximately 13,000. Includes residential construction waste hauled by building contractors for homeowners.

3) Includes newspapers, glass and metal now being recycled.

4) Excludes newspaper, glass and metal now being recycled.

5) No precise town records exist on landfill input.

APPENDIX II

10 TOWN SOLID WASTE DISPOSAL SURVEY

rounded [illegible]

APPENDIX III

ESTIMATED COST OF ALTERNATIVES

ALTERNATIVE 1 - OLD LANDFILL

Labor (1-2/3 est.)	16,800
Daily oover (contract trucking)	20,000
Intermediate cover (purchased 200 mesh clay)	6,000
Hyster parts and maintenance	12,500
Replacement dozer and intermediate cover	8,400
DEQE monitoring (CV&P)	3,500
Diesel Fuel	2,100
Utilities	1,550
Miscellaneous	1,700
Depreciation-Hyster (6year/life)	17,500
Depreciation-Front end loader (60% landfill use,10 year/life)	1,860
Interest on capital equipment (7.5% on 124,000)	9,300
	101,210
Garbage collection contract	36,000
	137,210
rounded	140,000

ALTERNATIVE 2 - NEW LANDFILL - CURRENT OPERATION

Old landfill operating costs (assumed)	100,000
Garbage collection contract	36,000
interest on landfill land (7.5% on 417,000)	31,300
Additional employee (formerly CETA worker)	10,000
	177,300
rounded	180,000

ALTERNATIVE 3 - NEW LANDFILL WITH IMPROVED OPERATIONS

Old landfill operating costs	100,000
Additional employee	10,000
Depreciation on mini-facilities and transfer equipment (6 year/life; paved area ($30,000)	
5 on-site transfer containers, roll-off transporter ($10,000)	10,000
Operation and maintenance on mini-transfer/recycling area	15,000
Interest on mini-transfer equipment (7.5% of 60,000)	4,500
Interest on landfill land	31,300
Garbage collection contract	36,000
	206,800
rounded	210,000

ALTERNATIVE 4 - CURBSIDE COLLECTION TAKEN TO NEW LANDFILL

Residential curbside collection (30/year X 3727 households)	111,800
Commercial curbside collection (75% of residential cost)	83,900
Landfill operating cost (100,000 less 2/3 employee)	93,200
Interest on landfill land	31,300
	320,200
rounded	320,000

ALTERNATIVE 5 - CURBSIDE COLLECTION TAKEN TO OUT-OF-TOWN LANDFILL

Residential curbside collection/ transfer/tipping ($50 X 3727 households)	186,400
Commercial curbside collection/ transfer/tipping (At 100% of residential cost)	186,400
	372,800
rounded	370,000

ALTERNATIVE 6 - DOOR-TO-DOOR COLLECTION TAKEN TO NEW LANDFILL

Residential collection ($84/year X 3727 households)	313,100
Commercial collection (same as for alternative 4)	83,900
Landfill operating cost (same as Alternative 4)	93,200
Interest on landfill land	34,300
	521,500
rounded	520,000

ALTERNATIVE 7 - TRANSFER STATION TO OUT OF TOWN LANDFILL

Depreciation - transfer station (10 years; $200,000)	20,000
Landfill and transfer station operating cost (50% of Alt.2)	55,000
Interest on Transfer station	15,000
Interest on landfill land	31,300
Hauling cost (7000 tons at 6/ton)	42,000
Tipping fee (7000 tons at $10/ton)	70,000
Garbage collection cost	36,000
	269,300
rounded	270,000

ALTERNATIVE 8 - SMALL SCALE RESOURCE RECOVERY

Operating cost data incomplete

ALTERNATIVE 9 - TRANSFER TO RESCO

Depreciation-transfer station	20,000
Interest -Transfer station	15,000
Landfill and transfer station (25% of Alt.2)	28,000
Hauling cost (75% of total 16,000 tons X $6/ton)	72,000
Tipping fee ($14.50/ton X1200 ton)	174,000
Interest on landfill land	31,300
Garbage collection	36,000
	376,300
rounded	380,000

ALTERNATIVE 10/11 TRANSFER TO NESWC OR 128 WEST

All costs as above less tipping	202,300
Tipping fee ($20/ton X12000tons)	240,000
	442,300
rounded	440,000