

CRS No. 1272

Final Draft

**SOURCE REDUCTION AND RECYCLING ELEMENT
HOUSEHOLD HAZARDOUS WASTE ELEMENT**

Submitted to:

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HOUSEHOLD HAZARDOUS WASTE ELEMENT

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FOREWARD

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This document was prepared by Senior Analyst Steven Sherman. Field work was supervised by Project Analyst Robert Eckwall. Senior Vice-President George Savage provided overall project guidance.

Executive Summary



SECTION 1

EXECUTIVE SUMMARY

The California Integrated Waste Management Act, found in Assembly Bill 939 and Senate Bill 1322 (Chapters 1095 and 1096, Statutes of 1989), requires local governments to reduce, reuse, recycle, or compost a portion of the materials that are typically disposed. Specifically, by January 1, 1995, the City of Sunnyvale must divert at least 25% of its solid waste from landfills through source reduction, recycling, and composting. By January 1, 2000, a 50% diversion is mandated. The City expects to meet or exceed the State goals.

The Source Reduction and Recycling Element (SRRE) for the City of Sunnyvale is a comprehensive ten-year plan describing how the City will respond to the critical need to reduce the quantity of solid wastes that are landfilled. The SRRE addresses the following components:

- waste characterization
- source reduction
- recycling
- composting
- solid waste facility capacity
- education and public information
- funding
- special waste
- household hazardous waste
- integration

The City, facing a remaining landfill disposal capacity of approximately 3.4 years as of January 1, 1991 (Section 6), has been implementing recycling programs for several years. Existing City source reduction and recycling efforts have resulted in a diversion of approximately 19% of the solid waste generated in the City (Section 2). These programs, when expanded and accompanied by new programs, will reduce the City's dependence on dwindling available landfill space, will raise awareness of the need to conserve valuable resources, and will result in the achievement of the City's diversion goals.

Source reduction will be fostered to prevent materials from entering the solid waste stream (Section 3). Source reduction for households and the commercial/industrial sector is expected to be achieved through: public education (e.g., selection of more durable or recyclable items; donating items for reuse, reusing items, adopting procurement policies that promote source



reduction and recycling); home and on-site composting; volume-based user fees for refuse collection; ordinances restricting what can be disposed at local solid waste facilities; and other measures.

One major aspect of the SRRE is the source-separation and diversion of household recyclables from the City's solid waste stream (Section 4). The residential recycling program would be expanded to include: multi-family dwellings; more types of recyclable materials in collection programs; volume-based user fees for refuse collection for single-family households; and extensive public information and education. The program would include a combination of curbside collection, drop-off centers, buy-back centers, and the construction and operation of a materials recovery facility (MRF) to process recyclables.

The City will place particular emphasis on commercial recycling, because commercial solid waste (including the commercial, industrial, and self-haul sectors) constitutes nearly 70% of the solid waste generated in the City (Sections 2, 4). The commercial recycling program is based primarily on: providing information and technical support to businesses and institutions regarding how to recycle; structuring refuse collection rates to encourage source reduction and recycling; and requiring businesses and institutions which employ more than 250 employees at a single site in the City to respond to City requests for detailed source reduction and recycling information, and to pro-actively plan to achieve goals set by the City on a site-specific or business category basis.

A comprehensive composting program for all sectors is needed to meet the State's mandated diversion goals (Section 5). The compost program calls for curbside collection of source-separated yard waste from single-family households, and encouragement of the use of a drop-off site or sites by commercial haulers and generators; using a centralized processing facility, preferably an existing private one, as described in the City's franchise agreement with its waste hauler; eventually expanding the program to include food wastes; providing public education and publicity; providing program incentives through fee structures; and using or marketing the end products as soil amendments or, in some circumstances, as fuel.

Special wastes, including tires, construction and demolition debris, white goods and appliances, and other materials, will be targeted for diversion as well, through a combination of recycling and salvaging (Section 9).

A comprehensive education and public information program will be a crucial part of the overall plan (Section 7). The goals will be to: create widespread awareness of environmental and



solid waste issues; create broad visibility for the source reduction and recycling program; motivate increased participation in all available source reduction and recycling programs by all sectors; and promote market development by stressing the importance to all sectors of buying recycled and composted materials.

The City will utilize County public education materials and participate in County-sponsored technical assistance and other projects which help the City to meet its solid waste diversion goals and program objectives, whenever it is clearly advantageous to the City in terms of cost and time savings.

The City will urge the State to become more active in market development. While the City will work to stimulate market demand, the State must assume a large role in market development.

Existing efforts to reduce the toxicity of solid waste will be expanded through public education and greater opportunities to dispose of household hazardous waste properly (Household Hazardous Waste Element). Goals of the household hazardous waste program include: diversion of household hazardous waste from the landfill; ensuring its proper handling, treatment, and disposal; and reducing the amount of household hazardous waste that enters the waste stream. The program includes: expanding the number of collection days from two to four events per year; working with adjacent communities and the County in developing a comprehensive program; developing a permanent drop-off facility for household hazardous waste; including small quantity generators (e.g., businesses) in the program, if feasible; implementing a household hazardous waste source reduction public information and education campaign; and other programs.

The City intends to use its existing rate system to fund the implementation of the provisions of AB 939 and other applicable legislation (Section 8). Opportunities for supplemental funding to help offset these costs will be evaluated.

The source reduction, recycling, composting, and special wastes components have been integrated so that the programs selected for implementation from each component achieve their maximum potential (Section 10).

Waste Characterization Component



SECTION 2

WASTE CHARACTERIZATION COMPONENT

INTRODUCTION

The quantities of waste generated in the City of Sunnyvale have been estimated based upon the results of waste characterization surveys. The characterization of disposed wastes was conducted during the period of October 8 through October 14, 1990 at the Sunnyvale Sanitary Landfill. The purpose of the disposed waste characterization study was to determine the quantity and composition of the material that reaches the landfill. The waste diversion study was carried out to determine a baseline for the quantity of waste diverted in the City. The baseline will be used to assess future programs.

The information presented in this section provides the basis for the identification of existing conditions and the rationale for selection of specific materials to be diverted. Annual and projected waste quantities were computed based on the average compositions of the sampled waste sources, the apportionment of scalehouse data to respective waste types, regional population, and the estimated quantities of diverted wastes. A Test Plan prepared for the sampling program served as the basis for the field analysis. The test plan is presented in Appendix A.

DISPOSED WASTE CHARACTERIZATION

CURRENT SOLID WASTE DISPOSAL PRACTICES

With a few minor exceptions, all of the solid waste collected by the City's franchised hauler, Specialty Garbage and Refuse Service, Inc., is disposed at the City of Sunnyvale Landfill. Very little solid waste is imported or exported across the City limits. A very small amount of solid waste is disposed at several other landfills in the region, including Newby Island, Altamont, NorCal (South San Francisco), and Zanker Road. Some of this solid waste includes a frac-



tional amount of residuals from the processing of recyclable and compostable materials by various private intermediate processors used by the City.

NUMBER OF VEHICLES SAMPLED

The proposed as well as the actual number of vehicles sampled for the disposed waste analysis are presented in Table 2-1. The table also shows the number of vehicles by waste type. Unbiased sampling was achieved by selecting the vehicles to be sampled in random order at the time of their arrival to the disposal site. As shown in the table, the actual number of vehicles sampled was higher than that proposed due to the frequency of loads available to the field crew during the sampling period.

ACCURACY STATEMENT

The sampling program for the disposed waste was designed to achieve composition results that would be within $\pm 2\%$ and 10% of the population mean of the City's composite disposed waste sources at the 90% level of confidence for the majority of waste categories (see Test Plan in Appendix A). The plan assumes a coefficient of variation of $0.3 (s/x)$, based on the average and standard deviations of the component compositions measured in previous waste characterizations in California after 1984. The coefficient of variation is independent of the waste category and therefore the calculation of the number of samples applies to all waste categories as a first order approximation.

Using the ASTM Draft "Method for Determination of the Composition of Unprocessed Municipal Solid Waste," the appropriate number of samples (n) required to achieve an accuracy within 10% of the population mean is computed by invoking the relation for accuracy (e) as a fraction and the number of samples (n):

$$n = \left[\frac{t^* (s/\bar{x})}{e} \right]^2$$

where t^* is the t-statistic and s/\bar{x} is the coefficient of variation. Through substitution:



**Table 2-1. Proposed and Actual Number of Vehicles
Sampled for the City of Sunnyvale Disposed Waste
Field Analysis (October 8-12, 1990)**

| Waste Source | Proposed | Actual |
|---------------------|-----------------|---------------|
| Residential | 10 | 14 |
| Commercial | 15 | 15 |
| Industrial | <u>15</u> | <u>17</u> |
| TOTAL | 40 | 46 |



$$n = \left[\frac{1.684 (0.3)}{0.08} \right]^2$$

$$n \approx 40$$

Under these conditions, the minimum number of samples that should be collected is 40. As shown in Table 2-1, the actual number of samples analyzed in the field was 46; that is, 6 additional samples were collected and sorted.

RESULTS

The average compositions for residential, commercial, and industrial wastes (by % weight) are shown in Table 2-2. The average compositions and quantities for self-haul are presented in Table 2-3 and Table 2-4, respectively. The results are presented in accordance with the categories set forth by the California Integrated Waste Management Board. In addition, in this particular study the category labeled appliances/white goods was used to describe items such as stereos, radios, and telephones commonly found in compacted residential waste. These types of appliances predominate in compacted residential waste (i.e., wastes usually collected in rear loaders). On the other hand, white goods are more commonly found in self-haul wastes. Self-haul waste is composed of residues transported by local residents, small-scale contractors, and businesses, as well as that portion of the roll-off waste not identified as industrial waste according to the AB 939 legislation and haulers.

Industrial

A total of seventeen samples of industrial waste were collected and analyzed. In order to obtain a clear understanding of the composition of this waste stream in Sunnyvale, additional samples of selected large-scale industrial generators (generators with continuing daily service and multiple debris boxes) were collected and sorted during the planned random sampling of all industrial generators. Several of the City's largest electronic equipment manufacturers, whose loads could easily be identified, were sampled. These loads were sampled because large-scale generators are the primary source of industrial wastes.

The results of the analysis are shown in Table 2-2. The data in the table show that disposed industrial waste consists of more than 44% paper products. The paper fraction contains a



**Table 2-2. City of Sunnyvale Average Compositions (% Weight)
Disposed Waste (October 8-12, 1990)**

| Material | Waste Type | | |
|------------------------|-----------------------|----------------------|----------------------|
| | Residential N = 14 | Commercial N = 15 | Industrial N = 17 |
| Paper | 40.8 | 51.8 | 44.2 |
| OCC/Kraft | 5.9 | 18.6 | 11.1 |
| Mixed Paper | 13.5 | 13.1 | 9.2 |
| Newsprint | 8.2 | 4.7 | 3.5 |
| High Grade | 0.9 | 2.4 | 7.3 |
| Magazines/Glossy ins. | 2.4 | 1.2 | 2.9 |
| Other Paper | 9.9 | 11.8 | 10.2 |
| Plastic | 7.6 | 12.4 | 22.8 |
| Film | 3.0 | 4.1 | 3.0 |
| HDPE | 0.8 | 1.6 | 1.2 |
| PET | 0.4 | 0.1 | 0.0 |
| Polystyrene Foam | 0.5 | 0.9 | 1.5 |
| Other Plastic | 2.9 | 5.7 | 17.1 |
| Food | 8.6 | 18.8 | 2.5 |
| Yard Waste | 25.5 | 5.0 | 5.1 |
| Wood | 1.1 | 0.4 | 9.0 |
| Textiles/Leather | 1.5 | 0.8 | 1.2 |
| Rubber/Tires | 1.5 | 1.4 | 0.4 |
| Agri. Crop Residue | 0.0 | 0.0 | 0.0 |
| Manure | 0.0 | 0.0 | 0.0 |
| Other Organics | 4.3 | 1.0 | 0.3 |
| Metals | 3.5 | 4.5 | 7.9 |
| Tin F&B Cans | 1.4 | 1.6 | 0.6 |
| Other Ferrous | 1.2 | 2.4 | 6.7 |
| Bi-Metal Cans | 0.0 | 0.0 | 0.0 |
| Aluminum Cans | 0.6 | 0.3 | 0.2 |
| Non-Ferrous | 0.2 | 0.0 | 0.3 |
| Other Aluminum | 0.1 | 0.1 | 0.1 |
| Glass | 4.4 | 3.4 | 2.3 |
| Redeemable Beverage | 1.5 | 1.6 | 0.4 |
| Non-Redeemable Bev | 1.6 | 1.2 | 0.4 |
| Other Recyclable | 0.8 | 0.3 | 1.2 |
| Other Non-Recyclable | 0.5 | 0.4 | 0.3 |
| Other Inerts | 1.0 | 0.3 | 3.2 |
| Other Wastes | 0.3 | 0.1 | 1.0 |
| Appliances/White Goods | 0.2 | 0.0 | 0.0 |
| Other Hazardous Wastes | - | 0.1 | 1.0 |
| Household Haz Waste | 0.1 | - | - |
| Total | 100.0 | 100.0 | 100.0 |

Average may not sum to 100.0% due to rounding.
N = Number of vehicles sampled.



**Table 2-3. City of Sunnyvale Average Compositions (% Weight)
Disposed Uncompacted Self-haul Waste (October 8-12, 1990)**

| Material | Construction/ Demolition | Miscellaneous | Yard | Dirt/ Rubble | |
|------------------------|-----------------------------|---------------|--------------|-----------------|-----|
| Paper | | 1.7 | 29.7 | 1.0 | 0.0 |
| OCC/Kraft | 1.2 | 8.9 | 0.4 | 0.0 | |
| Mixed Paper | 0.0 | 0.0 | 0.0 | 0.0 | |
| Newsprint | 0.0 | 0.4 | 0.0 | 0.0 | |
| High Grade | 0.0 | 4.7 | 0.0 | 0.0 | |
| Magazines/Glossy ins. | 0.0 | 0.0 | 0.0 | 0.0 | |
| Other Paper | 0.5 | 15.7 | 0.7 | 0.0 | |
| Plastic | | 2.4 | 14.9 | 0.8 | 0.0 |
| Film | 0.5 | 4.8 | 0.5 | 0.0 | |
| HDPE | 0.0 | 0.0 | 0.0 | 0.0 | |
| PET | 0.0 | 0.8 | 0.0 | 0.0 | |
| Polystyrene Foam | 0.2 | 0.8 | 0.0 | 0.0 | |
| Other Plastic | 1.7 | 8.4 | 0.2 | 0.0 | |
| Food | 0.0 | 0.9 | 0.0 | 0.0 | |
| Yard Waste | 2.3 | 6.1 | 87.6 | 0.4 | |
| Wood | 30.2 | 17.3 | 4.3 | 0.5 | |
| Textiles/Leather | 0.4 | 9.0 | 0.1 | 0.0 | |
| Rubber/Tires | 0.0 | 0.0 | 0.0 | 0.0 | |
| Agri. Crop Residue | 0.0 | 0.0 | 0.0 | 0.0 | |
| Manure | 0.0 | 0.0 | 0.0 | 0.0 | |
| Other Organics | 0.4 | 1.8 | 0.0 | 0.0 | |
| Metals | | 11.2 | 6.1 | 1.8 | 0.1 |
| Tin F&B Cans | 0.0 | 0.0 | 0.0 | 0.0 | |
| Other Ferrous | 10.9 | 5.9 | 1.8 | 0.1 | |
| Bi-Metal Cans | 0.0 | 0.0 | 0.0 | 0.0 | |
| Aluminum Cans | 0.0 | 0.0 | 0.0 | 0.0 | |
| Non-Ferrous | 0.0 | 0.0 | 0.0 | 0.0 | |
| Other Aluminum | 0.3 | 0.1 | 0.0 | 0.0 | |
| Glass | | 0.1 | 0.1 | 0.0 | 0.0 |
| Redeemable Beverage | 0.0 | 0.0 | 0.0 | 0.0 | |
| Non-Redeemable Bev | 0.0 | 0.0 | 0.0 | 0.0 | |
| Other Recyclable | 0.1 | 0.1 | 0.0 | 0.0 | |
| Other Non-Recyclable | 0.0 | 0.0 | 0.0 | 0.0 | |
| Other Inerts | 51.2 | 5.8 | 2.7 | 99.1 | |
| Other Wastes | | 0.2 | 8.4 | 1.7 | 0.0 |
| Appliances/White Goods | 0.0 | 0.0 | 0.0 | 0.0 | |
| Household Haz Waste | 0.2 | 8.4 | 1.7 | 0.0 | |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | |

Average may not sum to 100.0% due to rounding.



Table 2-4. City of Sunnyvale Estimated Quantities of Disposed Uncompacted Self-Haul Wastes (Tons/Year, 1990)

| Material | Waste Type | | | | | TOTAL |
|------------------------|------------------|---------------|---------------|-----------------|--|---------------|
| | Const./ Demo. | Misc. | Yard Waste | Dirt/ Rubble | | |
| Paper | 137 | 3,104 | 35 | 0 | | 3,276 |
| OCC/Kraft | 96 | 925 | 12 | 0 | | 1,034 |
| Mixed Paper | 0 | 0 | 0 | 0 | | 0 |
| Newsprint | 0 | 41 | 0 | 0 | | 41 |
| High Grade | 0 | 495 | 0 | 0 | | 495 |
| Magazines/Glossy ins. | 0 | 0 | 0 | 0 | | 0 |
| Other Paper | 41 | 1,643 | 22 | 0 | | 1,706 |
| Plastic | 195 | 1,556 | 25 | 0 | | 1,777 |
| Film | 40 | 503 | 17 | 0 | | 560 |
| HDPE | 0 | 0 | 0 | 0 | | 0 |
| PET | 0 | 85 | 0 | 0 | | 85 |
| Polystyrene Foam | 17 | 87 | 0 | 0 | | 104 |
| Other Plastic | 138 | 882 | 8 | 0 | | 1,028 |
| Food | 0 | 90 | 0 | 0 | | 90 |
| Yard Waste | 189 | 632 | 2,958 | 32 | | 3,811 |
| Wood | 2,503 | 1,810 | 147 | 39 | | 4,499 |
| Textiles/Leather | 34 | 942 | 5 | 0 | | 980 |
| Rubber/Tires | 3 | 0 | 0 | 0 | | 3 |
| Agri. Crop Residue | 0 | 0 | 0 | 0 | | 0 |
| Manure | 0 | 0 | 0 | 0 | | 0 |
| Other Organics | 36 | 184 | 0 | 1 | | 221 |
| Metals | 928 | 632 | 59 | 6 | | 1,626 |
| Tin F&B Cans | 0 | 0 | 0 | 0 | | 0 |
| Other Ferrous | 904 | 619 | 59 | 6 | | 1,589 |
| Bi-Metal Cans | 0 | 0 | 0 | 0 | | 0 |
| Aluminum Cans | 0 | 0 | 0 | 0 | | 0 |
| Non-Ferrous | 0 | 0 | 0 | 0 | | 0 |
| Other Aluminum | 24 | 13 | 0 | 0 | | 37 |
| Glass | 8 | 7 | 1 | 0 | | 16 |
| Redeemable Beverage | 0 | 0 | 0 | 0 | | 0 |
| Non-Redeemable Bev | 0 | 0 | 0 | 0 | | 0 |
| Other Recyclable | 8 | 7 | 1 | 0 | | 16 |
| Other Non-Recyclable | 0 | 0 | 0 | 0 | | 0 |
| Other Inerts | 4,247 | 607 | 91 | 8,520 | | 13,466 |
| Other Wastes | 17 | 876 | 57 | 0 | | 950 |
| Appliances/White Goods | 0 | 0 | 0 | 0 | | 0 |
| Household Haz Waste | 17 | 876 | 57 | 0 | | 949 |
| Total | 8,297 | 10,441 | 3,378 | 8,599 | | 30,715 |

Totals may not sum exactly due to rounding.



large amount of old corrugated cardboard and high-grade office paper, both of which are readily recyclable materials with relatively high market values. Plastic and plastic products make up almost 23% of the industrial waste stream. The concentration of wood is on the order of 9%. According to visual inspections of the sampled industrial wood waste, much of the wood consists of clean pallets. Pallets can be reused, repaired, or processed into wood chips.

Commercial

Generators of commercial waste were sampled randomly from front- and rear-loaders and, upon inspection and confirmation in the field, from commercial roll-off containers.

The results of the analysis also are presented in Table 2-2. The data in the table show that over half of the commercial disposed waste consists of paper products. Corrugated cardboard represents the highest proportion of the paper products. The results of the analysis also show that food waste makes up a large portion of the commercial sector disposed waste, reflecting the large number of food establishments among commercial waste generators.

Residential

Rear loading vehicles were the primary source of residential waste. Samples of residential waste were obtained from all collection areas within the City limits. However, in order to identify and represent the portion of the residential waste stream that is generated in multi-unit dwellings, front loading vehicles defined as containing high percentages (>90%) of wastes from multi-unit dwellings were also sampled.

The results of the analysis of the residential waste stream are presented in Table 2-2. As shown in the table, paper is the largest component of residential disposed waste. Mixed paper, newspaper, and old corrugated cardboard/Kraft paper constitute more than 25% of residential disposed waste. Yard waste also makes up about 25.5% of the residential waste stream. Yard waste is the single largest contributor to residential disposed waste. The concentration of food waste is on the order of 8.6%. The data indicate that a substantial amount of the material types currently collected for recycling still remain in the waste stream. The estimated quantities of disposed wastes are given in Table 2-5. The data in the table show that residential disposed waste constitutes about 33% of the total disposed waste in the City of Sunnyvale.



Table 2-5. City of Sunnyvale Estimated 1990 Disposed Quantities and Compacted Volume

| Material | Tons/Year | | | | Total | % of Total |
|------------------------------------|--------------|--------------|--------------|--------------|---------------|------------|
| | Residential | Commercial | Industrial | Self-Haul | | |
| Paper | 22009 | 24274 | 13544 | 3276 | 63103 | 38.9 |
| OCC/Kraft | 3183 | 8718 | 3408 | 1034 | 16343 | 10.1 |
| Mixed Paper | 7287 | 6138 | 2831 | 0 | 16257 | 10.0 |
| Newsprint | 4422 | 2193 | 1076 | 41 | 7732 | 4.8 |
| High Grade | 472 | 1141 | 2222 | 495 | 4331 | 2.7 |
| Magazines/Glossy Inserts | 1307 | 577 | 893 | 0 | 2776 | 1.7 |
| Other Paper | 5338 | 5506 | 3113 | 1706 | 15663 | 9.7 |
| Plastic | 4111 | 5807 | 6969 | 1777 | 18663 | 11.5 |
| Film | 1611 | 1926 | 904 | 560 | 5002 | 3.1 |
| HDPE | 449 | 728 | 367 | 0 | 1543 | 1.0 |
| PET | 231 | 56 | 5 | 85 | 377 | 0.2 |
| Polystyrene Foam | 275 | 412 | 454 | 104 | 1245 | 0.8 |
| Other Plastic | 1544 | 2686 | 5239 | 1028 | 10496 | 6.5 |
| Food | 4611 | 8812 | 780 | 90 | 14293 | 8.8 |
| Yard Waste | 13742 | 2344 | 1559 | 3811 | 21456 | 13.2 |
| Wood | 570 | 174 | 2761 | 4499 | 8004 | 4.9 |
| Textiles/Leather | 800 | 356 | 381 | 980 | 2518 | 1.6 |
| Rubber/Tires | 795 | 637 | 128 | 3 | 1563 | 1.0 |
| Agri. Crop Residue | 0 | 0 | 0 | 0 | 0 | 0.0 |
| Manure | 0 | 0 | 0 | 0 | 0 | 0.0 |
| Other Organics | 2290 | 452 | 90 | 221 | 3054 | 1.9 |
| Metals | 1876 | 2123 | 2410 | 1626 | 8035 | 5.0 |
| Tin F&B Cans | 764 | 769 | 170 | 0 | 1703 | 1.1 |
| Other Ferrous | 651 | 1121 | 2062 | 1589 | 5422 | 3.3 |
| Bi-Metal Cans | 1 | 0 | 0 | 0 | 1 | 0.0 |
| Aluminum Cans | 300 | 164 | 56 | 0 | 520 | 0.3 |
| Non-Ferrous | 81 | 20 | 106 | 0 | 207 | 0.1 |
| Other Aluminum | 78 | 50 | 16 | 37 | 181 | 0.1 |
| Glass | 2391 | 1614 | 712 | 16 | 4733 | 2.9 |
| Redeemable Beverage | 827 | 735 | 110 | 0 | 1672 | 1.0 |
| Non-Redeemable Bev. | 861 | 572 | 133 | 0 | 1565 | 1.0 |
| Other Recyclable | 457 | 128 | 381 | 16 | 981 | 0.6 |
| Other Non-Recyclable | 247 | 180 | 88 | 0 | 515 | 0.3 |
| Other Inerts | 517 | 158 | 985 | 13466 | 15126 | 9.3 |
| Other Wastes | 169 | 69 | 300 | 949 | 1487 | 0.9 |
| Appliances/White Goods | 120 | 22 | 0 | 0 | 142 | 0.1 |
| Other Hazardous Wastes a) | - | 47 | 300 | - | 347 | 0.2 |
| Household Haz. Waste | 49 | - | - | 949 | 997 | 0.6 |
| Total | 53880 | 46820 | 30620 | 30715 | 162035 | 100 |
| % Total | 33.2 | 28.9 | 18.9 | 19.0 | 100 | |
| Compacted Volume (cu yd) b) | | | | | 222575 | |

Totals may not sum exactly due to rounding.

a) Includes those wastes not disposed by the residential sector that were identified as hazardous.

b) Volume based on 1456 lb/cu yd as reported by City of Sunnyvale.



Self-Haul/Small-Haul

A visual inspection of the self-haul waste, as well as that delivered by small contractors and that observed in private roll-off containers, was carried out at the same time as the manual sorting activity. The visual inspection included observation at the landfill on a Saturday and a Sunday to account for public usage during this portion of the week. Approximately 300 vehicles were visually inspected for volumetric quantities, waste type, and composition.

As shown in Table 2-5, self/small-haul waste constitutes a significant portion (approximately 19%) of the City's disposed solid waste. This waste is typically bulky and relatively uniform in composition, enabling trained field observers to analyze a high number of samples.

Self-haul/roll-off waste was classified into one of four categories: yard debris, construction/demolition debris, dirt/rubble, or miscellaneous. For example, if a load was estimated to contain more than 50% yard debris, it was designated as a "yard debris" load. The results of the self-haul composition and quantity are presented in Tables 2-3 and 2-4. The apportionment of respective waste quantities and the projected yearly quantities are based on discussions with hauler representatives, field observations by City consultants (Cal Recovery Systems, Inc.), and data supplied by the landfill scalehouse.

SEASONALITY

It has been assumed that four seasons could potentially impact the waste generation in the City of Sunnyvale. The six-month sampling period for disposed and diverted wastes included the late spring, summer, and fall seasons. For the purpose of the waste generation study, the quantities obtained during the six-month analysis were doubled to provide the quantities on a twelve-month basis.

The potential seasonal impacts on the Sunnyvale waste stream were considered based on the following factors: demographics of the area, degree of commercial development, local meteorology, the results of the disposed waste characterization, and the results of seasonal waste characterization studies conducted for the City and County of San Francisco (1985/86),¹ the

¹ "Solid Waste Characterization Study" report prepared by Cal Recovery Systems, Inc. for the City of San Francisco, 1987.



City of Berkeley (1988/89), North Santa Clara County (NSCC) (1982/83),² and San Diego County (1988/89).³ The study for North Santa Clara County included wastes from the City of Sunnyvale. Based on a review of all of this information, with particular emphasis placed upon the prior four-season waste characterization study for north Santa Clara County, it was determined that yard waste is the only component that undergoes a significant seasonal variation. However, the concentration of yard waste measured during the month of October should be representative of the annual average concentration. The concentration of yard waste is expected to fluctuate within $\pm 20\%$ of the estimated annual average over the course of a year. The results of the four-season NSCC study showed that the concentrations of yard waste in the spring and fall were 21% and 31%, respectively. These amounts are approximately $\pm 20\%$ of the average of the four seasons (26%). Similarly, the diverted percentages of yard waste are estimated to fluctuate $\pm 20\%$ over the course of a year.

SUMMARY OF DISPOSED WASTE

The estimated annual disposed quantities of each waste source by component are presented in Table 2-5. The data in the table show that paper represents the largest category of total disposed waste (39% of total). In addition, the data show that corrugated cardboard is the largest single type of disposed paper, followed closely by mixed paper. The information in Table 2-5 also indicates that the concentration of yard waste is about 13% of the total and thus it is the single largest category of total disposed waste.

DIVERTED WASTE ANALYSIS

The estimated annual quantities of diverted waste for the City of Sunnyvale are shown in Table 2-6. The quantities of diverted waste were compiled through utilization of existing City (residential recycling and drop-off programs) and State (AB 2020) data, and through a telephone survey, discussed below.

² "North Santa Clara County Comprehensive Waste Characterization Study (1982-83) Final Summary Report," prepared by Cal Recovery Systems, Inc. for the NSCC Solid Waste Management Authority, 1984.

³ "Waste Characterization and Market Study," prepared for the County of San Diego by Recovery Sciences, Inc., 1989.



Table 2-6. City of Sunnyvale Estimated Waste Diversion (Tons), 1990

| Waste Category/Type | Residential | Commercial | Industrial | Total |
|-------------------------------|--------------|--------------|---------------|---------------|
| Paper | | | | |
| Corr Cardboard | 43 | 2,753 | 4,676 | 7,472 |
| Mixed | NF | 100 | 1,615 | 1,715 |
| Newspaper | 3,713 | NA | NA | 3,713 |
| High Grade Ledger | NF | 144 | 1,513 | 1,657 |
| Other | NF | NF | NA | NA |
| Plastic | | | | |
| HDPE | NF | 11 | 1,379 | 1,390 |
| PET | 15 | NF | NA | 15 |
| Film | NF | 33 | 1,318 | 1,351 |
| Other | NF | NF | NA | NA |
| Glass | | | | |
| Refill Bev Containers | NA | 8 | 40 | 48 |
| CA Redemption | 54 | 8 | 42 | 104 |
| Other Recyclable | 923 | 23 | 546 | 1,492 |
| Metals | | | | |
| Aluminum Cans | 87 | NA | 46 | 133 |
| Bi-Metal | NF | NF | NF | NF |
| Ferrous & Tin | 158 | 12 | 1,333 | 1,503 |
| Non-Fer & Al Scrap | NF | NF | 143 | 143 |
| White Goods | 50 | NF | NF | 50 |
| Yard Waste | NF | NF | NF | NF |
| Other Organics | | | | |
| Food Waste | NF | NF | NF | NF |
| Tires & Rubber | NF | NF | NF | NF |
| Wood Waste | NF | 11 | 1,948 | 1,959 |
| Agricultural Crop | | | | |
| Residue, Manure, | NF | NF | NG | NF |
| Textiles & Leathers | NF | NF | NG | NF |
| Other Wastes | | | | |
| Inerts | NF | NF | 15,000 | 15,000 |
| HHW & HHW Containers | 150 | -- | -- | 150 |
| Special Wastes | | | | |
| Industrial Sludge | NF | NF | NA | NA |
| Ash, Asbestos, Sewage Sludge, | NF | NF | NF | NF |
| Auto Shredder/Bodies, Other | NF | NF | NF | NF |
| TOTAL | 5,193 | 3,103 | 29,599 | 37,895 |

NF: No diversion programs were found for these materials.
 NA: Quantity estimates either not available or could not be determined from available data.
 NG: Materials not generated.
 All data is Tons Per Year unless otherwise noted.



The purpose of the waste diversion study was to estimate a baseline level of waste diversion in the City of Sunnyvale from which to measure future progress. The study determined that the current level of waste diversion is approximately 19% of the City's total generated waste.⁴ This indicates that current efforts by the City to recycle have resulted in a large amount of materials being diverted from the landfill. Since the current diversion rate is close to the goal of 25% set by the State for 1995, it is expected that the State's goal should be reached before 1995.

Due to the lack of data and proper recording procedures, it is likely that the present analysis did not include all the materials that currently are diverted. For example, the diversion rate for aluminum cans presented in Table 2-6 is well below the average for the entire state. Consequently, several of the entries in Table 2-6 show that materials are likely being diverted, but the quantity could not be determined from available data and thus were not counted.

As shown in Table 2-6, the single largest category of waste currently diverted in the City of Sunnyvale is industrial inerts. This material consists mainly of construction and demolition waste, especially concrete and asphalt. Approximately 7% of the total waste stream is diverted through the City's concrete and asphalt recycling program. This quantity is larger than the amount of materials being diverted by the City's residential curbside recycling program. Industrial sources contribute approximately 78% of the overall waste diverted, while the residential recycling program is about 7% of the overall waste diverted.

Solid waste diversion facilities used by the City of Sunnyvale include: L&K Debris Box (San Francisco); Zanker (San Jose); Arata-Western (San Jose); San Jose Wood Recyclers (San Jose); Weyerhaeuser (San Jose/Fremont); ABC Recycling (Santa Clara); Secondary Fiber (Union City); two AB 2020 Centers (Sunnyvale); Raisch (Sunnyvale); and the City of Sunnyvale Recycling Center (Sunnyvale).

The telephone survey targeted large industrial and commercial businesses and also included small retailers (e.g., antiques dealers, second-hand stores, tire dealers, repair shops) and non-profit organizations involved in waste diversion. The survey utilized a stratified random sample. The strata was based on the number of employees in a company or organization.

A total of 39 businesses and organizations were included in the telephone survey. Approximately 32, or 82%, of the total sample responded to the survey. The survey was conducted between October 19 and November 8, 1990. Sixteen of the respondents were companies

⁴ Diversion Rate (%) = Amount Diverted/(Amount Disposed + Amount Diverted).



which employ more than 100 people in the City of Sunnyvale. The survey sampled the employers of more than 30% of all of Sunnyvale's employees.

In an effort to gather data representative of the City of Sunnyvale, the survey concentrated on high-tech industries, the largest employment sector in the City of Sunnyvale. Nearly one-third of all the jobs in Santa Clara County are in high-tech industries, such as electronics, defense, aerospace, computer wholesale, research and development, computer systems, and other related industries. In the City of Sunnyvale, the percentage of high-tech jobs may be even higher than the County average.

A total of fifteen electronics, defense, aerospace, and related industries were surveyed. These industries employ approximately 42,000 people in the City of Sunnyvale. Survey information also was sought from several manufacturers, retailers, recycling centers, repair shops, and non-profit service organizations.

In order to improve the accuracy of this survey, the City will ask the County to request or require intermediate processors to keep and supply records on, at minimum, quantity, type, and jurisdiction source of diverted material.

WASTE GENERATION

A summary of the quantities of disposed and diverted materials is presented in Table 2-7. A summary of existing diversion rates for each material by sector is given in Table 2-8. Fifteen-year projections of generated, disposed, and diverted wastes are shown in Table 2-9 and Table 2-10. The estimated diversion rates are based on expansion of existing programs and implementation of new programs, as discussed in the Program Selection portions of this document.

Waste generation rates for the City of Sunnyvale were calculated by using published demographic information provided by the Association of Bay Area Governments (ABAG) and the State Department of Finance. The population estimates for 1990 are based on data from the State Department of Finance. These data were then interpolated to meet the population projection provided by ABAG for 1995. Due to economic factors and the commuting workforce (i.e., available jobs vs. resident population), sub-populations were established to determine generation rates for residential, commercial, industrial, and self-haul waste types. Since the available population data are presented in five-year intervals, the data were interpolated to pro-



**Table 2-7. City of Sunnyvale Estimated Quantities of
Disposed, Diverted, and Generated Wastes (Tons/Year, 1990)**

| Material | Disposed | Diverted | Generated | Percent Diverted |
|------------------------|-----------------|-----------------|------------------|-----------------------------|
| Paper | | | | |
| OCC/Kraft | 16,343 | 7,472 | 23,815 | 31.4 |
| Mixed Paper | 16,257 | 1,715 | 17,972 | 9.5 |
| Newsprint | 7,732 | 3,713 | 11,445 | 32.4 |
| High Grade | 4,331 | 1,657 | 5,988 | 27.7 |
| Magazines/Glossy ins. | 2,776 | | 2,776 | 0.0 |
| Other Paper | 15,663 | | 15,663 | 0.0 |
| Plastic | | | | |
| Film | 5,002 | 1,351 | 6,353 | 21.3 |
| HDPE | 1,543 | 1,390 | 2,933 | 47.4 |
| PET | 377 | 15 | 392 | 3.8 |
| Polystyrene Foam | 1,245 | | 1,245 | 0.0 |
| Other Plastic | 10,496 | 0 | 10,496 | 0.0 |
| Food | 14,293 | | 14,293 | 0.0 |
| Yard Waste | 21,456 | | 21,456 | 0.0 |
| Wood | 8,004 | 1,959 | 9,963 | 19.7 |
| Textiles/Leather | 2,518 | | 2,518 | 0.0 |
| Rubber/Tires | 1,563 | | 1,563 | 0.0 |
| Agri. Crop Residue | 0 | | 0 | 0.0 |
| Manure | 0 | | 0 | 0.0 |
| Other Organics | 3,054 | | 3,054 | 0.0 |
| Metals | | | | |
| Tin F&B Cans | 1,703 | 170 | 1,873 | 9.1 |
| Other Ferrous | 5,422 | 1,333 | 6,755 | 19.7 |
| Bi-Metal Cans | 1 | | 1 | 0.0 |
| Aluminum Cans | 520 | 133 | 653 | 20.4 |
| Non-Ferrous | 207 | 30 | 237 | 12.7 |
| Other Aluminum | 181 | 113 | 294 | 38.5 |
| Glass | | | | |
| Redeemable Beverage | 1,672 | 104 | 1,776 | 5.9 |
| Non-Redeemable Bev | 1,565 | 48 | 1,613 | 3.0 |
| Other Recyclable | 981 | 1,492 | 2,473 | 60.3 |
| Other Non-Recyclable | 515 | | 515 | 0.0 |
| Other Inerts | 15,126 | 15,000 | 30,126 | 49.8 |
| Other Wastes | | | | |
| Appliances/White Goods | 142 | 50 | 192 | 26.0 |
| Other Hazardous Wastes | 347 | | 347 | 0.0 |
| Household Haz Waste | 998 | 150 | 1,148 | 13.1 |
| Total | 162,035 | 37,895 | 199,930 | 19.0 |

Totals may not sum exactly due to rounding.



Table 2-8. City of Sunnyvale Estimated 1990 Diversion (%) by Material

| Material | Waste Type | | | |
|-------------------------------|-------------|------------|------------|-----------|
| | Residential | Commercial | Industrial | Self-Haul |
| Paper | | | | |
| OCC/Kraft | 1 | 24 | 58 | - |
| Mixed Paper | - | 2 | 36 | - |
| Newsprint | 46 | - | - | - |
| High Grade | - | 11 | 41 | - |
| Magazines/Glossy ins. | - | - | - | - |
| Other Paper | - | - | - | - |
| Plastic | | | | |
| Film | - | 2 | 59 | - |
| HDPE | - | 1 | 79 | - |
| PET | 6 | - | - | - |
| Polystyrene Foam | - | - | - | - |
| Other Plastic | - | - | - | - |
| Food | | | | |
| Yard Waste | - | - | - | - |
| Wood | - | 6 | 41 | - |
| Textiles/Leather | - | - | - | - |
| Rubber/Tires | - | - | - | - |
| Agri. Crop Residue | - | - | - | - |
| Manure | - | - | - | - |
| Other Organics | - | - | - | - |
| Metals | | | | |
| Tin F&B Cans | 21 | 2 | - | - |
| Other Ferrous | - | - | 89 | - |
| Bi-Metal Cans | - | - | - | - |
| Aluminum Cans | 22 | - | 45 | - |
| Non-Ferrous | - | - | 57 | - |
| Other Aluminum | - | - | - | - |
| Glass | | | | |
| Redeemable Beverage | 6 | 1 | 28 | - |
| Non-Redeemable Bev | - | 1 | 23 | - |
| Other Recyclable | 67 | 15 | 59 | - |
| Other Non-Recyclable | - | - | - | - |
| Other Inerts | | | | |
| Other Inerts | - | - | 94 | - |
| Appliances/White Goods | | | | |
| Appliances/White Goods | 29 | - | - | - |
| Other Hazardous Waste | - | - | - | - |
| Household Haz Waste | 76 | - | - | - |



Table 2-9. City of Sunnyvale Projected Waste Diversion and Disposal, Based on City Diversion Goals (1990 through 2005)

| Year | Population a) | Tons/Year | | | Percent Diversion b) |
|------|---------------|-----------|----------|---------|----------------------|
| | | Generated | Diverted | Dispose | |
| 1990 | 117300 c) | 199930 | 37895 | 162035 | 19.0 |
| 1991 | 119140 | 201563 | 44344 | 157219 | 22.0 |
| 1992 | 120980 | 203203 | 54865 | 148338 | 27.0 |
| 1993 | 122820 | 204797 | 67583 | 137214 | 33.0 |
| 1994 | 124660 | 206347 | 76348 | 129999 | 37.0 |
| 1995 | 126500 | 207852 | 83141 | 124711 | 40.0 |
| 1996 | 127520 | 209309 | 90003 | 119306 | 43.0 |
| 1997 | 128540 | 210762 | 96950 | 113811 | 46.0 |
| 1998 | 129560 | 212212 | 101862 | 110350 | 48.0 |
| 1999 | 130580 | 213658 | 104692 | 108965 | 49.0 |
| 2000 | 131600 | 215100 | 107550 | 107550 | 50.0 |
| 2001 | 131820 | 215729 | 110022 | 105707 | 51.0 |
| 2002 | 132040 | 216358 | 112506 | 103852 | 52.0 |
| 2003 | 132260 | 216988 | 115004 | 101985 | 53.0 |
| 2004 | 132480 | 217620 | 117515 | 100105 | 54.0 |
| 2005 | 132700 | 218252 | 120038 | 98213 | 55.0 |

- a) Population projections extrapolated from Projection '90, an Association of Bay Area Governments (ABAG) publication.
- b) Based on expansion of existing programs and implementation of new programs (see Program Selection portions of this document).
- c) State Department of Finance.



Table 2-10. City of Sunnyvale Projected Waste Diversion and Disposal, Based on Existing Diversion Rates (1990 through 2005)

| Year | Population a) | Tons/Year | | | Percent Diversion b) |
|------|---------------|-----------|----------|---------|----------------------|
| | | Generated | Diverted | Dispose | |
| 1990 | 117300 c) | 199930 | 37895 | 162035 | 19.0 |
| 1991 | 119140 | 201563 | 38297 | 163266 | 19.0 |
| 1992 | 120980 | 203203 | 38609 | 164594 | 19.0 |
| 1993 | 122820 | 204797 | 38912 | 165886 | 19.0 |
| 1994 | 124660 | 206347 | 39206 | 167141 | 19.0 |
| 1995 | 126500 | 207852 | 39492 | 168360 | 19.0 |
| 1996 | 127520 | 209309 | 39769 | 169540 | 19.0 |
| 1997 | 128540 | 210762 | 40045 | 170717 | 19.0 |
| 1998 | 129560 | 212212 | 40320 | 171891 | 19.0 |
| 1999 | 130580 | 213658 | 40595 | 173063 | 19.0 |
| 2000 | 131600 | 215100 | 40869 | 174231 | 19.0 |
| 2001 | 131820 | 215729 | 40988 | 174740 | 19.0 |
| 2002 | 132040 | 216358 | 41108 | 175250 | 19.0 |
| 2003 | 132260 | 216988 | 41228 | 175761 | 19.0 |
| 2004 | 132480 | 217620 | 41348 | 176272 | 19.0 |
| 2005 | 132700 | 218252 | 41468 | 176784 | 19.0 |

- a) Population projections extrapolated from Projection '90, an Association of Bay Area Governments (ABAG) publication.
- b) Based on continuation of existing conditions.
- c) State Department of Finance.



vide yearly estimates. The aggregate generated quantities were then combined and presented as total waste generated quantities.

The diversion rates anticipated to be achieved through the implementation of the programs selected in this document exceed the required diversion goal of 25% by 1995. The 25% goal is expected to be reached by the City in 1992. A 40% diversion rate is expected to be achieved by the year 1995. The 50% goal will be reached by 2000, with diversion rates increasing to 55% in 2005.

Source Reduction Component



SECTION 3

SOURCE REDUCTION COMPONENT

INTRODUCTION

By California law (AB 939 -- California Integrated Waste Management Act of 1989), source reduction must receive the highest priority of all waste management strategies. Source reduction decreases the quantity of materials that must be collected and processed via recycling, composting, incineration and other forms of transformation, and landfilling. A comprehensive approach to source reduction requires the participation of an interrelated web of waste generators, including residents, businesses, institutions and industry, and local, state, and federal government policy makers.

Definition: Source reduction can be defined as the decreased generation of solid waste resulting from:

- reduced product weight or volume
- reduced packaging
- increased product durability and reusability
- alterations in consumer behavior regarding purchase patterns
- greater efficiency in manufacturing processes, resulting in lower generation of wastes
- home composting and related organic waste reduction techniques
- alteration of the waste stream to make it less toxic

General Approaches: The City can draw on several approaches to propel source reduction into its proper position as the most preferred component of solid waste management:

- public education and publicity



- materials reuse
- home composting and other organic waste reduction techniques
- reducing the use of non-recyclable materials
- volume-based user fees for refuse collection
- packaging regulations
- toxicity reduction
- restrictions on what materials will be accepted by local solid waste disposal facilities
- manufacturing initiatives to improve efficiency in materials use

GOALS & OBJECTIVES

The overall goal is to reduce the generation of solid waste, whether disposed or diverted, as much as possible. Major source reduction avenues to be pursued by the City include:

- increased efficiency in use of materials (through reuse, decreased use of non-recyclable materials, and numerous other innovations in the production of materials)
- reduction in the amount of yard waste generated
- reduction in packaging
- toxicity reduction in products, by-products, and packaging

SHORT-TERM OBJECTIVES

In the short-term (through the year 1995), the objectives of the source reduction program are to:



- develop a comprehensive public education and publicity program, such that 50% of the residents and commercial businesses regularly engage in three or more source reduction activities that were begun after 1990 (including but not limited to increasing efficiency in the use of materials, reduction of packaging, and reduction in the amount of yard waste generated)
- modify user fee structure for trash collection to clarify and enhance financial incentives for source reduction
- adopt City procurement policies that give preference to used materials, such as office equipment, which are in satisfactory condition
- collect detailed baseline information on source reduction activities by waste category, using a methodology (developed with guidance from the California Integrated Waste Management Board) for gathering and analyzing data
- conduct a waste audit of City facilities and construct a source reduction program accordingly
- develop a comprehensive home composting and yard waste reduction program such that 5,000 households regularly engage in these activities
- promote and encourage manufacturing source reduction initiatives (including but not limited to increasing the efficiency in the use of materials, reduction of packaging, and packaging containing recyclables materials, such that 50% of manufacturers in the City regularly engage in three or more source reduction activities that were begun after 1990
- evaluate the need for modifying zoning and permitting requirements to encourage physical and site layout changes that will result in greater source reduction

MEDIUM-TERM OBJECTIVES

In the medium-term (through the year 2000), the objectives above are to be continued and expanded to:



- broaden of the comprehensive public education and publicity program, such that 80% of the residents and commercial businesses regularly engage in four or more source reduction activities that were begun after 1990 (including but not limited to increasing the efficiency in the use of materials, reduction of packaging, and use of packaging containing recyclable materials)
- expand promotion and encourage manufacturing source reduction initiatives, such that 80% of manufacturers in the City regularly engage in four or more source reduction activities that were begun after 1990 (including but not limited to increasing the efficiency in the use of materials, reduction of packaging, and use of packaging containing recyclable materials)
- work with local, regional, and state governments and non-governmental organizations to devise legislation or voluntary agreements that will reduce the level of toxic materials in manufacturing processes or products
- expand the home composting and yard waste reduction programs such that 10,000 households regularly engage in these activities

PRIORITY MATERIALS

Source reduction will occur through reduced materials use and unwanted generation of by-products. The City's source reduction program will target materials, products, or packaging which are: 1) non-reusable or non-recyclable in the City (such as various types of composite materials and some plastics); 2) hazardous when disposed (such as many household cleaning and gardening supplies); and 3) simple to prevent from entering the waste stream (such as leaves and grass clippings). Other materials targeted for reduction include paper, glass, metal, plastic, wood, textiles, and food waste. The key is to infuse a source reduction ethic in consumers, businesses, institutions, and manufacturers that expresses itself in small steps and in innumerable ways.



EXISTING CONDITIONS

City staff utilize several informal source reduction techniques, including double-sided copying, use of electronic mail instead of printed communication, and routing reading materials instead of making multiple copies. No systematic, formal source reduction program had been implemented in the City, however, as of November 1990.

The City's single-family residential trash collection rate structure does not provide clear incentives for source reduction, and in some cases may discourage source reduction. For example, residents in single-family dwellings pay a fixed price for collection of an unlimited amount of trash. However, commercial and industrial rates do provide incentives. All solid waste management costs are paid by user fees, not by tax revenues.

Some residents and businesses currently are composting or otherwise reducing the disposal of organic materials. A portion of these residents are composting both yard waste and food scraps at home, while some businesses are leaving grass clippings on their lawns or composting them on their premises. No quantification of this form of source reduction is yet available. It is assumed that the current home composting participation rate is very low, but could be raised significantly.

Much of the existing source reduction activity in Sunnyvale involves the reuse of materials. Common reuse techniques include donating used clothing, repairing old appliances and clothes, attending swap meets or rummage sales, using reusable diapers, and buying antiques. No verified data are available on these approaches. Shopkeepers contacted for this work were unable to provide average weight or volume estimates. According to one regional estimate, the City of Sunnyvale has a baseline diversion of 465 tons/year that can be attributed to the use of reusable diapers. (Baseline source reduction figures are not counted toward existing diversion.) The appropriateness of the methodology used to generate this estimate would be evaluated in the context of a source reduction survey, as discussed later in this section. (See Section 7, Education and Public Information, for a discussion of City steps toward encouraging the use of reusable diapers.)

Three examples of reuse are discussed. The Santa Clara St. Vincent de Paul Society (San Jose) picks up approximately six refrigerators per week from Sunnyvale residences. These refrigerators are either sold or given to needy individuals.



Goodwill Industries receives from Sunnyvale sources hundreds of tons per year of reusable items, including clothing, furniture, toys, and household goods. This reuse outlet utilizes a network of drop-offs in various parts of the City.

Several businesses that use wooden pallets, including retail stores and electronics manufacturers, have them reused or repaired. For example, pallets can be returned to the materials supplier for reuse, or sent to a pallet distributor for reuse or repair.

The City intends to conduct a survey in 1991 of source reduction activities--including home composting, reuse, double-sided copying, reusable diapers, and others--to determine a quantified baseline from which to measure future progress. This quantified progress (not the baseline) would count toward diversion goals in the future.

EVALUATION OF PROGRAM ALTERNATIVES

A source reduction program involves providing the impetus for changes in manufacturing and packaging, and in consumption and disposal habits. To be comprehensive and effective, the City of Sunnyvale will need to utilize a combination of public education and technical assistance, economic incentives, and regulations. Approaches to the various sectors are similar in some respects, and different in others. For the sake of brevity, the word "commercial" in this section often refers to the commercial, institutional, and industrial sectors as a group. An evaluation of the alternatives is presented in the text that follows and in Tables 3-1 through 3-3.

RESIDENTIAL ALTERNATIVES

Public Education & Publicity

The City could supervise the development and distribution of source reduction education materials, provide general coordination of efforts, and support the program with funding assistance. A comprehensive source reduction education and promotion campaign targets consumers, businesses, and institutions, including schools. Each of these groups merits specific attention. The more tailored the education and promotion campaign is in addressing the needs and in



Table 3-1. Source Reduction Alternative: Public Education/Technical Assistance

| PARAMETERS | DISCUSSION |
|------------------------|--|
| Effectiveness | <ul style="list-style-type: none"> • Diversion stemming directly from these programs is difficult to quantify and substantiate • Wide range of program designs • Eliminates collection and off-site processing of waste |
| Impacts | <ul style="list-style-type: none"> • Very minimal • Possible increase in vectors if instructions are not followed properly in the case of home composting |
| Accommodation | <ul style="list-style-type: none"> • Generator participation unlimited • Minor limitations on use of certain methods for some generators |
| Waste Composition | <ul style="list-style-type: none"> • Does not result in the generation of other wastes |
| Implementation | <ul style="list-style-type: none"> • 3-12 months |
| Facilities | <ul style="list-style-type: none"> • Utilizes existing facilities, possibly with minor changes, or new small-scale facilities (e.g., home composting units) |
| Consistency | <ul style="list-style-type: none"> • Consistent with local plans |
| Institutional Barriers | <ul style="list-style-type: none"> • None |
| Costs | <ul style="list-style-type: none"> • Minimal relative to avoided cost of waste collection, handling and processing • Approaches taken under this alternative tend to strengthen citizen efforts in recycling |
| Markets | <ul style="list-style-type: none"> • Manufacturers and packagers need encouragement from informed consumers and the public sector regarding source reduction in product and packaging design |
| Regional Approach | <ul style="list-style-type: none"> • Compatible with programs planned in other jurisdictions • Coordinated efforts, where appropriate, would reduce costs |
| Public vs. Private | <ul style="list-style-type: none"> • For maximum success, programs involve local government, schools, citizen organizations, and manufacturers and distributors |



Table 3-2. Source Reduction Alternative: Economic Incentives

| PARAMETERS | DISCUSSION |
|------------------------|---|
| Effectiveness | <ul style="list-style-type: none"> • Can have immediate, substantial effect on waste generation and disposal behavior • Encourages waste reduction, reuse, and recycling • Diversion stemming directly from these programs is difficult to quantify and substantiate |
| Impacts | <ul style="list-style-type: none"> • Moderate potential for increased illegal dumping of refuse • User fees exhibit a regressive rate structure |
| Accommodation | <ul style="list-style-type: none"> • Generator participation unlimited • Allows for modifications to be made rapidly, as the situation warrants |
| Waste Composition | <ul style="list-style-type: none"> • Does not result in generation of other wastes |
| Implementation | <ul style="list-style-type: none"> • 3-12 months |
| Facilities | <ul style="list-style-type: none"> • No new facilities required |
| Consistency | <ul style="list-style-type: none"> • Consistent with local plans |
| Institutional Barriers | <ul style="list-style-type: none"> • None |
| Costs | <ul style="list-style-type: none"> • Costs to be recovered in new rates established • Depends on type and level of incentives (e.g., higher if grants, lower if low-interest loans) |
| Markets | <ul style="list-style-type: none"> • Not applicable |
| Regional Approach | <ul style="list-style-type: none"> • Refuse collection rates should be established on City-wide basis • Tipping fees should be evaluated on a regional basis |
| Public vs. Private | <ul style="list-style-type: none"> • Rates can be set by the public sector |



Table 3-3. Source Reduction Alternative: Regulation

| PARAMETERS | DISCUSSION |
|------------------------|---|
| Effectiveness | <ul style="list-style-type: none"> • Limits on number of refuse containers and restrictions on disposal of certain types of materials may be effective • Material bans not likely to reduce waste generation, and likely to face legal challenges • Other government policies on source reduction may be effective |
| Impacts | <ul style="list-style-type: none"> • Moderate potential for increased illegal dumping or burning of refuse • Materials bans may result in widespread impacts, depending on the material |
| Accommodation | <ul style="list-style-type: none"> • Generator participation unlimited |
| Waste Composition | <ul style="list-style-type: none"> • Does not result in generation of other wastes |
| Implementation | <ul style="list-style-type: none"> • 3-12 months |
| Facilities | <ul style="list-style-type: none"> • Restrictions on disposal of certain types of materials must be preceded by viable alternative processing facilities, such as composting and recycling sites |
| Consistency | <ul style="list-style-type: none"> • Consistent with local plans |
| Institutional Barriers | <ul style="list-style-type: none"> • City authority to impose material bans may be limited • Key is to enact regulations in systematic, phased-in approach |
| Costs | <ul style="list-style-type: none"> • Enforcement costs range from minor to substantial |
| Markets | <ul style="list-style-type: none"> • Encouragement of "environmental shopping" habits may induce desired market changes (e.g., product or packaging modification) |
| Regional Approach | <ul style="list-style-type: none"> • State or national product and packaging legislation would be most effective • Disposal restrictions can be local or regional |
| Public vs. Private | <ul style="list-style-type: none"> • Affects both public and private sector • Some provisions may be unnecessary if private sector adopts desired changes voluntarily |



terests of various groups and sub-groups, the more successful the overall program is likely to be.

A public education and promotion campaign for source reduction should focus on changing the values and behavior patterns of individuals and organizations. The following values, among others, should be highlighted: environmental protection and pollution prevention ("saving the environment"); energy and resource conservation; cost-effectiveness ("being thrifty"); ingenuity ("creative reuse"); simplicity; pursuit of community spirit; and excellence rather than consumption.

One type of public education and promotion program the City could institute is known as an "environmental shopper" or "precycle" campaign. This program provides consumers with suggestions or tangible examples of direct substitutes for products or packaging, in support of waste reduction goals. An environmental shopper campaign involves the distribution of a booklet which advises consumers to:

- purchase items in reusable, recyclable, or minimal packaging
- avoid purchasing single-use, disposable items
- write to or telephone manufacturers to encourage them to shift to reusable and recyclable materials

The booklet could include available lists of hundreds of "environmentally-friendly" products. It could also include advice on how local consumer groups can organize environmental shopping campaigns in their own communities.

Through this campaign, the City would urge residents to base their purchases on the "environmental friendliness" of a product and its packaging, and to ask themselves the following questions before, during, and after shopping:

- Is the item durable? reusable? recyclable? biodegradable?
- Is the packaging reusable or recyclable?
- Is the item over-packaged?
- Does the item contain recycled materials?



- Is the item easy to repair, if necessary?
- Does the manufacturing process result in the generation of harmful wastes?
- Do the product's raw materials come from renewable or non-renewable resources?
- Does the extraction or harvesting of the product's raw materials cause severe environmental degradation?

This education campaign could be supported directly by the City, in conjunction with local civic and consumer groups.

Source reduction themes can be used effectively in various media, including bus ads, public service announcements on radio and television, buttons, and posters to alert consumers to the relationship between consumption patterns and the solid waste crisis. Berkeley, California and Newark, New Jersey, among others, have adopted this approach. The campaign should target disposable products and over-packaging, suggesting that consumers should purchase durable and reusable goods, repair broken or damaged items, purchase items in bulk, and communicate their buying preferences to businesses.

The program should also suggest that consumers should utilize products until their useful lifetimes have elapsed, or give them to others to use. However, in some cases, emphasizing only durability may not represent the most environmentally responsible option. For example, improvements are continually being made in appliances to alleviate air pollution, increase energy efficiency, eliminate toxic components, and improve safety features.

The City would make every reasonable effort to minimize the potential generation of additional waste in its source reduction education campaign by encouraging residents to save, reuse, or recycle the information they receive. The City would develop materials in a way that reflects the source reduction and recycling principles the City seeks to convey.

Economic Incentives

The City could develop a volume-based user fee system for single-family home trash collection to encourage source reduction, reuse, and recycling. This concept is known interchangeably as "user fees," "generator-pay," "baseline," "cost of service," "pay-per-container," or "pay-per-bag" systems. Multi-family dwellings already have volume-based fees for trash collection. The



City also could explore the possibility of developing a rate structure whereby individual households in multi-family dwellings receive direct economic incentives to reduce their disposal of solid waste.

Volume-based user fees for trash collection provide a direct economic incentive to reduce the amount of waste generated and to reuse and recycle as much as possible. Waste generators pay for their collection service based on the amount of waste requiring disposal. For example, the cost of collection service for one can per week would be one rate, while the cost for two cans would be higher, and so forth. This cost can be escalated on a straight-line or other basis; it can also be raised at an increasing rate per container.

User fees can have an immediate and substantial impact on how individuals view their own generation of trash. Responses to the reflection of solid waste management costs in individual bills tend to be rapid. People develop ways to re-use items, and seek to reduce the amount they discard (and hence reduce their solid waste bill) by altering their purchasing habits.

A user-fee approach is not without drawbacks, however, including:

- regressivity of rate structure, by which low-income residents allocate a relatively higher percentage of their income for a public service
- moderate potential for increased illegal dumping of trash
- moderate potential for increased burning of trash, with negative consequences for air quality

An alternative economic incentive for waste generators is called the "reduced rate option." A reduced rate option should be continued by the City when modifying the rate structure for trash collection. For customers who consistently generate a below-normal amount of solid waste, a lower flat rate is charged than the regular collection fee. In general, customers must request this reduced rate service. The reduced rate option is particularly well-received by elderly and single people. Collection crews monitor the number of containers set out.

Determining whether the advantages of using economic incentives outweigh the disadvantages is a policy question that should be addressed openly and directly.



Regulation

The City could consider legislative steps to promote source reduction by residents. Four examples are presented here.

- 1) Legislation on product or packaging content or availability can be used to alter consumption and production patterns. The City could work with state or federal organizations and governments to influence regulations on what products and packaging may enter the market. The City would not take unilateral steps to ban the sale of certain products or materials.

- 2) City ordinances could also be used to restrict access to local solid waste disposal facilities for certain types of materials, in an effort to promote reduced use, reuse, substitution with recyclable products, and recycling. This approach has been taken by several municipalities, counties, and state governments, especially regarding yard waste, so that it is recycled rather than disposed. At least ten states have passed legislation that restrict the flow of some types of yard waste to landfills. Illegal dumping could increase moderately. One upstate New York county has banned the following recyclable materials from local solid waste disposal facilities, beginning in December 1990: recyclable paper products; recyclable metal, plastic, and glass food and beverage containers; large appliances; yard waste; demolition debris; tires; and wet and dry cell batteries. While primarily used to stimulate recycling, such bans could also play some part in promoting source reduction.

- 3) Ordinances could be enacted to limit the number of containers or bags (up to a certain size) that generators may place at the curb. Collection crews would be allowed to pick up only a certain maximum number of containers or bags. Legislation of this type might help to encourage source reduction.

- 4) The City could work with regional and state organizations and governments to lobby for and to coordinate greater product regulation, which could include mandated source reduction in products or packaging, product initiation fees, product bans, and others.



One specific example of the type of source reduction legislation the City could support is state legislation that removes disincentives to using cloth diapers, by prohibiting day care centers from refusing to care for a child that uses reusable cloth diapers.

Home Composting

On-site composting can be defined as the process of managed decomposition of organic materials on one's own premises that results in the creation of a usable soil amendment. This concept is known as "home" or "backyard" composting.

Yard waste can be composted successfully at home fairly easily with minimal bad odors or disturbances from animals. Often, yard waste is composted together with food scraps. This works well, provided that meat by-products, which attract animals, are excluded from the compost pile. This approach is generally most suitable for single- or two-family residences which have available space in their backyards. According to the City of Sunnyvale Planning Department, backyard compost piles should not be visible from the front yard or street.

Home composting requires careful management in order that compost piles do not provide food or breeding habitat for vectors. The high degree of public education associated with the home composting program should reduce the risk to public health to insignificant. Home composting presents the potential for significant aesthetic impact if compost piles are not properly managed. Aesthetic impacts would be mitigated through the planned education of the public, and planned requirements imposed by the City related to the location of the compost pile (e.g., not in the front yard), the size of the compost pile (e.g., not higher than fencing or other screening), and containment. Significant impacts would not be expected as long as the requirements can be enforced.

On-site composting and yard waste reduction (for example, through leaving cut grass clippings on the lawn, and making other changes in landscaping practices) is the least expensive yard waste management alternative. This alternative eliminates the public and private costs of collection, transport, tipping fees, and processing. Research in Westchester County, New York demonstrated that home composting savings could be approximately \$35 or more per participating Westchester County household, from a public perspective. Stopping the flow of materials before they become waste products that require outside handling is gaining recognition as the best yard waste management option. A sizable amount of residential waste can be com-



posted at home. Together, yard waste and food waste constitute over one-third of residential solid waste in the City.

Managing one's own yard waste, as well as other wastes, instills a sense of individual responsibility for solid waste management. Consequently, residents may develop a greater interest in recycling and other solid waste management issues.

The City could develop a comprehensive home composting education and promotion program by:

- developing flyers, brochures, and other how-to literature
- establishing demonstration sites, where residents can view different home composting methods, bin construction materials, and end-products
- using mass media, plus billboards, inserts in utility bills, signs, and related measures
- supporting a master composters program, in which residents are trained by experts to teach other residents proper composting techniques
- possibly distributing compost bins, accompanied by instruction in use, and follow-up

The implementation of volume-based rates for refuse collection would also help to stimulate home composting activity. Those who engage in composting at home will reduce their volume of trash, and consequently reduce their disposal costs.

Reuse

Reuse means the use, in the same form as it was produced, of a material which might otherwise be discarded. Reuse can either be direct (such as with used clothing) or indirect (such as with refillable beverage containers). Common reuse techniques include donating used clothing, repairing old appliances, attending swap meets or rummage sales, and buying antiques.

The City could support reuse programs in several ways, including:

- helping non-profit organizations to locate material drop-off donation sites



- publicly endorsing donation programs that assist in meeting people's basic needs
- sponsoring periodic swap meets
- assembling a directory that lists local shops that purchase or sell used items
- providing assistance in developing appliance repair programs at local technical or trade schools, sheltered workshops, and senior citizen organizations
- providing assistance to non-profit organizations that are primarily involved in enabling materials reuse

Household Hazardous Waste Reduction

The City could promote household hazardous waste reduction by adopting an aggressive public education and publicity campaign that identifies problem substances and their less toxic or non-toxic alternatives. Residents could be urged to use products that are less toxic or non-toxic, to apply no more than the recommended amount of a toxic substance, and to give away for reuse the remainder of products that contain low concentrations of toxic substances (such as unused paint).

COMMERCIAL, INSTITUTIONAL, & INDUSTRIAL SECTOR ALTERNATIVES

Public Education & Publicity

In order to provide leadership in source reduction, the City could:

- serve as an institutional model for source reduction in the City's offices, parks, public works yards, and other facilities
- revise the City's policies and procurement specifications for equipment, vehicles, supplies, furniture, parts, and materials to ensure that the City systematically and visibly buys durable, reusable, recycled, and recyclable products with a minimum of packaging



- institutionalize the informal source reduction now conducted by City employees and contractors (e.g., minimizing photocopies, using double-sided materials, encouraging the use of recyclable paper, encouraging the use of electronic media, and so forth)

Regarding industry, the City could encourage companies to adopt source reduction as an explicit goal. The City could also require companies that employ more than 250 employees at a single site in the City to respond to City requests for detailed source reduction information (see Section 4).

Economic Incentives & Disincentives

The City could encourage commercial sector source reduction by initiating or supporting economic incentives or disincentives to promote commercial sector source reduction at the state or national level. These measures can include subsidies, rebates, tax credits, advanced disposal fees, taxes, and waste generation quotas.

Voluntary Measures

The City could promote voluntary corporate source reduction initiatives in several ways, including informing businesses of the City's source reduction campaign, providing technical assistance, and helping to publicize source reduction efforts by businesses.

Regulation

The City could consider legislative steps to promote source reduction by businesses and institutions. Four examples are presented here:

- 1) The City could restrict the use of disposable, non-recyclable products or packaging in government-sponsored activities.



- 2) The City could work with state or federal organizations and governments to influence regulations on what products and packaging enter the market. The City would not take unilateral steps to ban the sale of certain materials or products.

- 3) City ordinances could also be used to restrict access to local solid waste disposal facilities for certain types of materials, in an effort to promote reduced use, reuse, substitution with recyclable products, and recycling.

- 4) The City could work with regional and state organizations and governments to support efforts to regulate certain aspects of product manufacturing and packaging.

On-Site Composting

The City could promote on-site composting and other organic source reduction techniques for businesses and institutions by following the same type of approach outlined in the discussion of residential home composting. In addition, the City could provide technical assistance to local businesses and institutions on how to develop their own small-scale composting programs.

Reuse

The City could encourage local industries to participate in industrial waste exchanges. Regional industrial waste exchanges are gaining in popularity among manufacturers throughout much of the country. Industrial waste exchanges link manufacturers that have industrial by-products to dispose of with manufacturers who can utilize those by-products in their own operations. These materials include inorganic and organic chemicals, oils and waxes, textiles, wood, and metals. Several of these materials are hazardous or bulky. Preventing their entrance into the waste stream or reducing their quantities on toxicity minimizes potential environmental hazards and the quantities of solid waste requiring disposal.

The central industrial waste exchange in California is administered by the California State Department of Health Services, Toxic Substances Control Program, Alternative Technology Division, in Sacramento. This exchange publishes a newsletter/catalog to assist industries in the exchange of industrial wastes. The system resembles a highly specialized classified adver-



tisement service, in which suppliers and recipients can both place and scan listings for materials available and in demand.

The City could adopt a policy to reuse or make available for reuse items for which there are willing recipients.

PROGRAM SELECTION

Effective source reduction programs rely on a combination of public education and publicity, economic incentives, and regulations. The City's source reduction program will consist of the following multi-faceted approaches, since noticeable change will occur as a result of myriad small actions taken by producers, distributors, consumers, and government. The selected source reduction programs and policies have several benefits for the overall solid waste system:

- synergy with recycling, composting, and household hazardous waste programs
- relative ease of implementation
- relative low cost of implementation
- community acceptance
- reduced strain on solid waste facility capacity
- reduced collection and off-site handling of materials, resulting in lower system costs

No new public facilities are anticipated to be required. New private facilities may include additional drop-off donation bins, repair shops, and space for swap meets and other materials exchanges. Some source reduction will occur through on-site handling, such as home composting. Some will occur precisely at the source, and will result in a lower quantity of materials needing off-site handling, whether by the disposal system or by the reuse/recycling network. These programs and policies will be updated and improved as data are collected and analyzed and as source reduction strategies are further defined and improved in the future.



RESIDENTIAL PROGRAM SELECTION

The City will implement several approaches to residential sector source reduction, as presented below.

Public Education & Publicity

The City will:

- supervise the development and distribution of source reduction education materials, provide general coordination of efforts, and support the program with funding assistance
- develop a campaign to encourage the public to make environmentally-sound purchasing decisions, donate used materials for reuse, compost organic materials at home, and leave grass clippings on the lawn
- work with schools to integrate source reduction, reuse, recycling, and composting topics into school curricula and activities

Economic Incentives & Disincentives

The City will develop a volume-based user fee system for single-family home trash collection to encourage source reduction, reuse, and recycling.

Regulation

The City will:

- adopt and enact policies, regulations, and legislation to promote source reduction in a deliberate, phased-in manner so that viable alternatives to existing practices can emerge
- study the feasibility of restricting access to local solid waste disposal facilities for certain types of materials in an effort to promote reduced use, reuse, and substitu-



tion with recyclable products; if feasible, pass ordinances that include such a restriction

- work with regional and state organizations and governments to lobby for and to coordinate greater product regulation, which could include mandated source reduction in products or packaging, product initiation fees, product bans, and others

Home Composting

In order to develop a comprehensive home composting education and promotion program, the City will:

- develop flyers, brochures, and other instructional literature
- create demonstration sites, where residents can view different home composting methods, bin construction materials, and end-products
- use mass media, plus billboards, inserts in utility bills, signs, and related measures
- support a master composters program, in which residents are trained by experts to teach other residents proper techniques
- possibly distribute compost bins, accompanied by instruction in use, and follow-up

Reuse

The City will support reuse programs in several ways, including:

- help non-profit organizations locate material drop-off donation sites
- publicly endorse donation programs that assist in meeting people's basic needs
- sponsor periodic swap meets
- assemble a directory that lists local shops that purchase or sell used items



- provide assistance in developing appliance repair programs at local technical or trade schools, sheltered workshops, and senior citizen organizations
- provide assistance to non-profit organizations that are primarily involved in enabling materials reuse

Household Hazardous Waste Reduction

The City will promote household hazardous waste reduction by adopting an aggressive public education and publicity campaign that identifies problem substances and their less toxic or non-toxic alternatives. Residents will be urged to use products that are less toxic or non-toxic, to apply no more than the recommended amount of a toxic substance, and to give away for reuse the remainder of recyclable household hazardous waste products (such as unused paint). To influence attitudes, purchasing decisions, and behavior regarding products that contain hazardous substances, the campaign will be as specific as possible about products without identifying brand names.

The City should not ban the sale of certain non-recyclable products or packaging. For example, the City should not, in the name of source reduction, ban the use of plastic bags for trash disposal, unless the use of alternative trash containers clearly results in a reduced overall generation of solid waste. In addition, public health issues and control of odor could become concerns if plastic trash bags were banned. While the use of plastic bags should not be completely eliminated, the City could encourage reduced use.

Increasingly, local and state governments are claiming packaging and its effect on the environment to be within the legislative purview. Ban proposals from around the country and elsewhere have addressed such items as non-refillable beverage containers, non-recyclable packaging, disposable diapers, and assorted plastic products. To the extent that they increase the recyclability of the waste stream, bans can serve a limited purpose. For example, the recent State-wide ban on the sale of glass bottles with affixed ceramic lids will help to increase the recyclability of glass and reduce the contamination caused by ceramics.

Materials bans, however, typically lead to the substitution of one type of material for another, and, as such, generally do not significantly reduce the generation of solid waste. As such, bans are not considered an effective source reduction alternative.



COMMERCIAL, INSTITUTIONAL, & INDUSTRIAL SECTOR PROGRAM SELECTION

Public Education & Publicity

Appropriate strategies for this sector expand upon the residential campaigns discussed earlier. Business participation in these programs will help to integrate source reduction into the daily lives of consumers and employees alike.

The City will take the following steps to provide leadership in source reduction, including but not limited to:

- serving as an institutional model for source reduction in the City's offices, parks, public works yards, and other facilities (see also Reuse, below)
- studying and implementing, if reasonable, the revision of the City's policies and procurement specifications for equipment, vehicles, supplies, furniture, parts, and materials to ensure that the City systematically and visibly buys durable, reusable, recycled, and recyclable products with a minimum of packaging
- institutionalizing an office paper reduction program to conserve paper (e.g., minimizing photocopies, using double-sided materials, encouraging the use of recyclable paper, encouraging the use of electronic media)

These approaches and goals should be endorsed as City policy. They will help to educate City employees and residents about the City's program, and will provide an example to other institutions of what could and should be done to reduce the generation of solid waste.

The City will develop and distribute source reduction education and information materials tailored to the commercial sector.

The City should encourage companies to adopt source reduction as an explicit goal. More specifically, the City should urge companies to:

- adopt procurement policies that promote source reduction and recycling
- encourage suppliers to incorporate source reduction and recycling into their internal and external corporate activities, to be consistent with purchasers' procurement policies



- offer rewards to individuals and divisions which develop source reduction programs
- promote source reduction and recycling in internal newsletters and other internal media
- track source reduction measures, including annual tonnage avoided and avoided production and disposal costs

The City will require companies that employ more than 250 employees at a single site in the City to respond to City requests for detailed source reduction information; see Section 4 (Recycling).

Economic Incentives & Disincentives

The City will encourage commercial sector source reduction by initiating or supporting economic incentives or disincentives to promote commercial sector source reduction at the state or national level, where such proposals are likely to be more effective than at the local level. These measures can include:

- subsidies, rebates, and credits for manufacturing or purchasing products and packaging that incorporate source reduction principles
- investment tax credits and/or sales tax exemptions on manufacturing equipment that enhance source reduction
- elimination of economic and tax incentives for the use of virgin materials
- taxes on virgin materials to encourage the use of recyclable materials, where applicable, in manufacturing processes
- tax exemption to manufacturers for development of products or packaging using recycled materials
- advanced disposal fees on packaging materials at the point of manufacture or sale
- waste generation quotas, above which financial penalties are imposed on generators



Voluntary Measures

In order to promote voluntary corporate source reduction initiatives, the City will:

- inform industry leaders of City source reduction goals and source reduction's pre-eminent position in the State's hierarchy of solid waste management options
- explain City expectations of industry leadership in support of source reduction
- issue statements in support of consumer groups that are working to promote changes in product design, use and choice of feedstock materials, and packaging that reduces the generation of waste
- encourage industry efforts to reward employees for useful suggestions that lead to source reduction
- support standardized labeling (e.g., logos, symbols, wording) for products and packaging that promote source reduction and recyclability
- provide technical assistance on source reduction to industry and consumer organizations
- alert the business community to potential legislation that could be enacted if voluntary industry measures in support of source reduction are not forthcoming or are insufficient

These steps will require minimal investment of time and effort, yet will assist in creating a business approach that favors and enables greater recycling and waste reduction. See Reuse and On-site Composting for additional details.

Regulation

If voluntary measures and economic incentives and disincentives do not significantly reduce solid waste, regulations may be enacted to ensure that source reduction occurs. Mandatory requirements and restrictions can act as catalysts when the private sector does not or is not expected to respond quickly or sufficiently to market mechanisms.



The City will restrict the use of disposable, non-recyclable products or packaging in government-sponsored activities. This will institutionalize new consumption patterns, and help to stimulate market demand for recyclable and recycled materials.

City ordinances also will be used to restrict access, if feasible, to local solid waste disposal facilities for certain types of materials, in an effort to promote reduced use, reuse, substitution with recyclable products, and recycling.

The City will work with regional and state organizations and governments to support efforts to regulate certain aspects of product manufacturing and packaging. These efforts could include mandated source reduction in products or packaging, reduction of toxic substances in packaging, product initiation fees, product bans, and others.

On-Site Composting

The City will promote on-site composting and other organic source reduction techniques for businesses and institutions by following the same type of approach outlined in the discussion of residential home composting. The City will consider focusing its promotion program on green industry members, including golf courses and nurseries. In addition, the City will provide technical assistance to local businesses and institutions on how to develop small-scale composting programs to handle their own organic waste. These programs may range in size from as small as a few cubic yards formed into a pile to one hundred cubic yards or more in a windrow.

On-site composting can be an inexpensive way to manage yard waste for those businesses and institutions that have sufficient space to process materials themselves (or under contract with their landscape maintenance service). On-site composting eliminates or reduces the public and private costs of collection, transport, tipping fees, and processing. The end-products can be used on local property, thus reducing expenditures for soil amendments. In terms of public relations, businesses and institutions can point with pride to their efforts to reduce environmental degradation and to reduce disposal costs.



Reuse

The City will encourage local industries to participate in industrial waste exchanges. Use of industrial waste exchanges can prevent the entrance of hazardous or bulky materials into the waste stream or reduce the quantities, and thus can reduce potential environmental hazards and the quantities of solid waste requiring disposal. This effort will require minimal commitment of administrative time for program promotion.

The City will adopt a policy of reusing or making available for reuse items for which there are willing recipients. For example, if a City department utilized discarded materials no longer wanted by another department, City procurement and solid waste disposal costs would be reduced. The key is to institute a procedure by which all City departments are made aware of what surplus or discarded materials are available for reuse.

PROGRAM IMPLEMENTATION

Primary responsibility for designing a comprehensive source reduction program rests with the City. The City will need to enlist the support and cooperation of several groups and institutions, including local schools, business associations, consumer groups, and government agencies. To the extent that the City can utilize existing materials or can work with neighboring cities and the County to develop programs and materials, overall program costs can be scaled down.

The main tasks and implementation timeline for the source reduction program are listed in Table 3-4.

The municipal costs of the program are expected to be approximately \$100,000/annually. The allocation covers program development and implementation, educational and promotional materials, monitoring, and staffing. Program administration and implementation is anticipated to require approximately 2,000 staff hours annually.



Table 3-4. City of Sunnyvale Source Reduction Implementation Timeline

| Task | Date |
|--|-------|
| RESIDENTIAL | |
| Public Education & Publicity | |
| Begin developing source reduction education materials | 1-92 |
| Develop a publicity campaign to encourage residents and businesses to make environmentally-sound purchasing decisions, donate materials for reuse, reduce organic waste, and engage in related source reduction activities | 3-92 |
| Begin working with schools to integrate source reduction, reuse, recycling, and composting topics into school curricular activities | 10-92 |
| Economic Incentives & Disincentives | |
| Complete evaluation of volume-based user fee system for single-family dwelling trash collection | 4-92 |
| Regulation | |
| Examine feasibility of adopting and enacting policies, regulations, and legislation to promote source reduction | 12-92 |
| If feasible, begin such adoption and enactment | 3-93 |
| Study the feasibility of restricting access to local solid waste disposal facilities for certain types of recyclable and compostable materials | 12-92 |
| If feasible, enact such restrictions | 5-93 |
| Begin working with regional and State organizations and governments to lobby for and to coordinate greater product regulation | 8-91 |
| Home Composting | |
| Begin developing home composting education and promotion program | 7-92 |
| Reuse | |
| Study the feasibility of supporting reuse programs | 10-91 |
| If feasible, help non-profit organizations to locate material drop-off donation sites | 1-92 |



Table 3-4. City of Sunnyvale Source Reduction Implementation Timeline (Continued)

| Task | Date |
|---|---------|
| Reuse (Continued) | |
| Publicly endorse donation programs that assist in meeting people's basic needs | 3-92 |
| Sponsor periodic swap meets | 4-92 |
| Assemble a directory of local shops that purchase or sell used items | 1-92 |
| Provide assistance in developing appliance repair programs | 1-92 |
| Provide assistance to non-profit organizations that are primarily involved in enabling materials reuse | 1-92 |
| Household Hazardous Waste Reduction | |
| Develop and begin distributing household hazardous waste reduction materials | 9-91 |
| COMMERCIAL, INSTITUTIONAL, INDUSTRIAL | |
| Public Education & Publicity | |
| Serve as model of source reduction | |
| Begin institutionalizing source reduction as policy (such as office paper reduction and making items available for reuse) | 12-91 |
| Begin revising City policies and procurement specifications so that City purchases durable, reusable, recycled, recyclable products with a minimum of packaging | 12-91 |
| Begin developing and distributing education and information materials tailored to these sectors | 2-92 |
| Begin encouraging businesses and institutions to adopt source reduction as an explicit goal | 2-92 |
| Begin receiving commercial sector source reduction responses to City requests for detailed information from qualifying businesses | 1-94 |
| Economic Incentives & Disincentives | |
| Initiate or support regional or statewide efforts to promote source reduction by product and packaging manufacturers | ongoing |



Table 3-4. City of Sunnyvale Source Reduction Implementation Timeline (Continued)

| Task | Date |
|--|-------|
| Voluntary Measures | |
| Begin providing technical assistance on source reduction to industry and consumer organizations | 9-92 |
| Regulation | |
| Begin restricting the use of certain disposable, non-recyclable products or packaging in government-sponsored activities | 2-92 |
| Study the feasibility of restricting access to local solid waste disposal facilities for certain types of recyclable and compostable materials | 6-93 |
| If feasible, enact such restrictions | 1-94 |
| Reuse | |
| Begin encouraging local industries to participate in industrial waste exchanges | 7-92 |
| GENERAL | |
| Monitoring: | |
| Develop source reduction survey methodology with assistance of the CIWMB | 8-91 |
| Conduct baseline source reduction survey | 12-91 |



MONITORING & EVALUATION

Baseline data on source reduction activities--including home composting, reuse, reduced use, and other approaches--will be collected in 1991 through a survey. The City will seek guidance from the California Integrated Waste Management Board in developing the methodology for administering the survey and evaluating the results. Future reductions in waste generation will be computed based on the level of source reduction occurring in 1991, i.e., the baseline level will be the starting point from which to measure future progress in waste reduction. The difference between the levels of source reduction determined for any particular year and of the baseline year (1991), divided by the baseline level, will be attributed to the diversion rate of the City for that particular year.

To ensure that the source reduction program is meeting its objectives, the program will be monitored and evaluated on a regular basis. Periodic evaluations will be made of changes in residential solid waste disposal patterns. Commercial businesses and institutions that have over 250 employees at one site in the City of Sunnyvale will be required to document source reduction activities, and to provide periodic updates. The City may also conduct periodic surveys of residents and small businesses to assess the level of source reduction activities.

A waste generation study will be undertaken at a time agreed upon by the State to evaluate changes in overall waste generation. Data gathered in the waste generation study will be compared with data gathered in a similar 1990 study conducted for the City. The monitoring and evaluation methods described here involve minimal cost, except for the waste generation study, which could be considerable depending on the level of detail required by the State.

The effectiveness of the residential source reduction program can be measured most easily in terms of the change in the per capita generation of residential waste. Evaluation of commercial and industrial sector source reduction programs may rely on a combination of quantitative and qualitative analysis since quantitative results may not be directly comparable or available. For example, changes in product components and production over time can be attributed to several factors, of which source reduction/solid waste is simply one. However, efforts will be made to gather quantifiable information, where possible.

The effect of source reduction programs extends beyond pure reduction of waste. An in-depth source reduction program strengthens recycling and composting programs; it is difficult to quantify the size of this multiplier effect.



If source reduction efforts do not result in meeting the City's expectations, the City will consider additional legislative and economic measures, supplemented by expanded public education activities, to ensure program success.

Recycling Component



SECTION 4

RECYCLING COMPONENT

INTRODUCTION

This section of the SRRE addresses the following topics: 1) existing recycling activities in the City of Sunnyvale, 2) previously planned modifications to the existing activities, and 3) ways to expand the City's recycling program. In addition, objectives for increased waste diversion from recycling are described, alternative ways to expand upon the City's existing recycling program are evaluated, expanded programs are selected and their implementation described, and a system for monitoring and evaluating the program is discussed.

Recycling involves a series of activities through which waste materials are collected, processed, re-manufactured into new products, and marketed. Each of these activities constitutes a link in the recycling system; all are interdependent. Not one of these activities by itself constitutes recycling. In addition to the mechanics of handling the materials, other activities are vital to the success of recycling programs. Education and public information (see Section 7) create awareness and stimulate participation. Consumers, including residents, businesses, institutions, and the City, must purchase products made with recycled materials in order to complete the recycling loop.

The existing recycling program in the City of Sunnyvale already is diverting some materials from some segments of the residential, commercial, and industrial sectors. The City's efforts to build a materials recovery facility (combined with a transfer station) will result in an improved capability for processing recyclables. In order to meet the City's goal of 40% diversion by the year 1995 and the City's and State's diversion goal of 50% by the year 2000, all sectors must both divert greater quantities of materials currently accepted for recycling as well as recycle additional types of materials.

Any recycling program requires adequate markets for the materials collected for diversion. For recycling to occur, it is imperative to divert materials that are of sufficient quantity and quality, and for which there is a market demand. The rate at which expansions to the City's recycling program can be implemented depends, in part, on market and technological innovations. If the



innovations take place sooner than expected, then additional materials may be amenable for recycling sooner than anticipated in this document.

However, if markets do not develop or expand sufficiently to meet the growing supply of available materials, the City may be constrained in meeting its diversion goals. Although the City can take some limited steps to increase market demand, it is not a strong market force. As such, the City would look toward the State to provide the proper environment in which absolute market capacity would be increased significantly, so that the State's diversion goals can be attained.

Should the County or other regional entities decide to explore the feasibility of regional marketing and market development, the City will consider participating in those efforts.

OBJECTIVES

The main objective of the Recycling Component is to develop a comprehensive recycling program for the City of Sunnyvale. The program includes the residential, commercial, industrial, and institutional sectors of the population. (For the sake of brevity, recycling by the commercial, industrial, and institutional sectors will be referred to as "commercial recycling.") The selected program is designed to meet all short- and medium-term waste diversion goals set forth by the City of Sunnyvale and the State of California. The materials and amounts identified for diversion are listed in Section 10 (Integration) in Tables 10-2 through 10-5.

The City will make every effort to assure that all parties involved in the City's recycling program -- haulers, intermediate processors, building owners, end users, and others -- will be acting in a coordinated manner.

Specifically, the short-term objectives (through the year 1995) of the recycling program are to:

- divert materials and amounts identified in Tables 10-2 through 10-5
- expand the residential recycling program to include all multi-family dwellings
- divert through the residential recycling program approximately 10,500 tons/year of newspaper, magazines, old corrugated cardboard/Kraft as well as metal/glass/plastic (PET) food and beverage containers



- expand existing commercial recycling programs and encourage and assist in the development of new programs so that diversion goals by sector are reached (Tables 10-3 to 10-5)
- establish a volume-based user fee system for trash collection which promotes source reduction and recycling of single-family household trash
- establish a materials recovery facility (MRF)
- establish recycling programs throughout City facilities
- seek State assistance via its Recycling Market Development Zone and similar programs
- expand current education and public information programs
- systematically purchase recycled products in City-sponsored programs, and encourage similar procurement practices throughout the City
- implement a plan to monitor the recycling program

Medium-term objectives (through the year 2000) are to:

- divert materials and amounts identified in Tables 10-2 through 10-5
- expand the residential recycling program to include additional materials (mixed paper, high-grade paper, and HDPE plastic), if markets are adequate and economic
- divert from the waste stream approximately half of commercial sector food waste (see Section 5, Composting Component)
- expand recycling by self-haul generators
- divert through the residential curbside recycling program approximately 12,600 tons/year of newspaper, magazines, old corrugated cardboard/Kraft, mixed paper, high-grade paper, and metal/glass/plastic (PET) food and beverage containers
- consider the expansion of MRF operations proposed for the short-term
- continue market evaluations to identify and develop new opportunities



- continue to seek State financial and technical assistance in developing markets for recyclables

EXISTING CONDITIONS

RESIDENTIAL SECTOR

The City of Sunnyvale's recycling program currently includes residential curbside recycling programs for single-family dwellings, two buy-back centers, a drop-off center, a facility for recycling concrete and asphalt, and a public education and information program.

The curbside recycling program is available to approximately 28,000 households (primarily single-family dwellings, and a lesser number of duplexes, triplexes, and multi-family dwellings). In the program, two burlap bags are given to each user. Aluminum cans, tin cans, and PET containers are placed in one bag. The second bag is used to store glass containers. The glass containers are not sorted by color. Newspapers are either tied in a bundle or placed in paper sacks. Used motor oil is collected in special containers provided by the City or in any non-breakable, sealed container. All recyclable materials are placed by the curb and are picked up on the same day as trash collection. A special truck-trailer combination is used to collect the recyclable materials. The vehicle is equipped with bins. All the metal cans, plastic, glass, and newspaper are sorted during collection into separate bins. The materials are taken to the Sunnyvale Recycling Center for processing.

A pilot multi-family recycling program was started in March of 1989. In the program, five large complexes consisting of approximately 1,250 apartment units received collection of newspaper and glass/metal food and beverage containers. Approximately 100 tons of recyclable materials have been collected from March 1989 through February 1990. During this period, the diversion of recyclables per pilot household in a multi-family dwelling was approximately half the tonnage of what was recycled from the average single-family household. This recovery rate is understandable, given the fact that the pilot program is relatively new and the waste generation per household in multi-family dwelling is considerably less. The City of Sunnyvale recently passed an ordinance which requires all new commercial activity to make allowances for recycling in the building design. This ordinance covers multi-family dwellings and other commercial develop-



ments. The materials collected in the pilot program are transported to the Sunnyvale Recycling Center for processing.

At the recycling center, the mixed cans and the PET containers are discharged into a hopper. As materials travel on a conveyor, manual labor is used to remove contamination from the load. Large tin cans and PET containers are manually sorted into separate bins. The remainder of the tin cans are removed magnetically and crushed. Aluminum cans are conveyed pneumatically into 27-foot trailers for transport. The bimetal cans are shipped in 45-yard roll-off containers and the PET is shipped loose in 30-yard roll-off containers.

The quantities of materials collected in the residential curbside and drop-off programs between May 1989 and June 1990 are presented in Table 4-1. The drop-off at the Sunnyvale Recycling Center is open 24 hours per day (unstaffed). About 4,800 tons of materials were recycled between May 1989 and June 1990. This amount constitutes approximately 8% of the total amount of residential waste generated during this period. In addition, approximately 34,000 gallons of used motor oil were collected.

At present, there are two buy-back (AB 2020) centers in the City of Sunnyvale. The centers collected approximately 100 tons of aluminum, glass, and PET plastic during 1989 and approximately 35 tons during the first five months of 1990. A breakdown of the types and quantities of materials collected is presented in Table 4-2.

The City's concrete and asphalt recycling program has been highly successful. The facility is privately operated and located on a site owned by the City adjacent to the landfill. It has been estimated that this facility processes approximately 15,000 tons of concrete and asphalt per year from Sunnyvale sources. This constitutes about 7% of the entire waste stream generated in the City.

For a description of the recycling public education and information program, see Section 7 (Education and Public Information Component).

In an effort to increase program effectiveness, the City will replace the burlap bag recycling containers with plastic stacking bin sets in July 1991. The City will also replace its existing recycling collection vehicles with a more efficient fleet in July 1992. The City's new contract with its waste hauler modifies the existing recycling program to aid program expansion. The new franchise term begins in July 1991.



Table 4-1. City of Sunnyvale Residential Curbside and Drop-off Recycling Tonnages, May 1989 - June 1990

| Material | Tons Recycled |
|--------------|---------------|
| OCC/Kraft | 43 |
| Newsprint | 3,713 |
| Glass | 923 |
| Mixed Cans | <u>158</u> |
| TOTAL | 4,837 |

Table 4-2. City of Sunnyvale: Recycling Buy-backs (AB 2020) (Tons)

| Material | 1989 | 1/90-5/90 |
|---------------------|------------|-----------|
| Aluminum Cans | 29 | 14 |
| Glass Bottles | 65 | 17 |
| PET Plastic Bottles | <u>6</u> | <u>4</u> |
| TOTAL | 100 | 35 |



The City's existing rate structure for refuse collection and disposal from single-family residents does not encourage source reduction and recycling. Residents are permitted to place an unlimited amount of trash at the curb for a fixed rate.

COMMERCIAL SECTOR

Some large industries have begun recycling programs on their own initiative. Most, if not all, of these programs can increase the amount that is recycled or reduced. For instance, some of these companies do not as yet recycle wooden pallets, while others do not recycle materials from on-site cafeterias. In addition, further efforts could be taken to reduce, reuse, and recycle the large amount of plastics that some companies generate. According to the waste generation study conducted in October 1990, plastics constitute approximately 23% of the disposed waste from the industrial sector.

A significant portion of the diverted waste from the commercial sector is processed by sorting dry mixed materials at private intermediate processing facilities to recover saleable recyclables. More than 10,000 tons of recyclables are diverted annually via this type of operation. One Sunnyvale business recycles over 5,000 tons of dry mixed recyclables via this method each year. Dry mixed recyclables processed by private intermediate processors constitute more than half of the tonnage recycled by the industrial and commercial sectors excluding concrete and asphalt. Many commercial businesses are foregoing the potential financial advantage of processing and selling their own source-separated secondary materials.

In this type of operation, the materials-generator separates various dry materials from wet materials. The dry materials are recycled and the wet ones generally are disposed. Dry materials include high-grade office paper, corrugated cardboard, mixed paper, plastic, glass, and metal. Some companies use cardboard boxes outside of office cubicles to store source-separated computer printout separately from other recyclable materials. Other companies have paper recycling bins located at strategic points around the complex. Others ask custodians to collect and to separate recyclable materials. Most of the dry waste is compacted on site. Compactors typically range in size from 3 cu yd to 45 cu yd.

Intermediate processors sort dry mixed recyclables at their own facilities using either a manual or mechanical sorting system, or both. Such processors which receive materials generated by the City of Sunnyvale include, but may not be limited to: L&K Debris Box (San Francisco);



Zanker (San Jose); Arata-Western (San Jose); ABC Recycling (Santa Clara); Secondary Fiber (Union City); and Raisch (Sunnyvale). At least one processor which receives dry mixed recyclables from businesses in Sunnyvale is known to require incoming loads to contain at least 80% recyclable materials. Typically, incoming loads are checked for wood, corrugated cardboard, high-grade paper, mixed paper, plastic, and aluminum. After the materials are sorted, they are processed in various ways. For example, wood is sometimes chipped and sold as boiler fuel, while corrugated cardboard, other paper, and plastics are baled and sold as recyclables.

The City's concrete and asphalt recycling program diverts 7% of the total waste stream. This program is the largest single contributor to the existing diversion rate. Concrete and asphalt recycling contributes 39% of the total diversion.

Corrugated cardboard/Kraft paper constitutes 23% of the total commercial and industrial waste generated in the City of Sunnyvale. Approximately 38% of this amount is currently recycled. The potential exists to recycle considerably larger quantities of this material.

The City's contract with its waste hauler stipulates that, beginning in July 1991, old corrugated cardboard be collected from a limited number of small- to medium-size businesses and institutions including several City buildings. Under an existing contractual arrangement with the hauler, the City's office paper recycling program also will be expanded. Collection will be provided on a weekly basis by means of one collection vehicle specifically dedicated to that task. The collected materials will be marketed by the City.

EVALUATION OF ALTERNATIVES

A successful recycling program consists of effective and efficient collection, processing, and marketing of recyclable materials. In order to maximize diversion, collection programs must seek to recycle a large variety of materials collected in several ways from all sectors. Collection programs for recycling must be expanded to include commercial/industrial/self-haul and multi-family dwellings because these sectors and sub-sectors generate most of the City's solid waste. The materials processing operation must have sufficient capacity and flexibility to produce quality products for what is expected to be a rapidly changing market.

An evaluation of collection and processing alternatives is presented in Tables 4-3 through 4-8.



Table 4-3. Recycling Alternative: Residential Curbside

| PARAMETERS | DISCUSSION |
|------------------------|---|
| Effectiveness | <ul style="list-style-type: none"> • Diversion potential 25% to 65% of the residential waste stream (including yard waste) • Wide range of program designs • Highest opportunity for retrieving source-separated materials |
| Impacts | <ul style="list-style-type: none"> • Usually minimal • Possible traffic congestion • Possible noise and litter • Containers left at curb possible neighborhood concern |
| Accommodation | <ul style="list-style-type: none"> • Generator participation unlimited • Allows adding new recyclable materials as markets open • Minor limitations due to storage capacity of residential containers and/or collection vehicles |
| Waste Composition | <ul style="list-style-type: none"> • Reduces wastes disposed in landfill • Does not result in generation of other wastes aside from motor oil containers |
| Implementation | <ul style="list-style-type: none"> • Implementation time 3 to 12 months |
| Facilities | <ul style="list-style-type: none"> • Existing facility can adequately handle existing quantity of materials • Development of materials processing facility would improve cost-effectiveness |
| Consistency | <ul style="list-style-type: none"> • This alternative is consistent with local plans |
| Institutional Barriers | <ul style="list-style-type: none"> • None • Maximum success (participation and diversion) achieved through coordinated efforts of jurisdictions |
| Costs | <ul style="list-style-type: none"> • Household recycling containers (\$3 - \$8) • Development of processing facility • It is anticipated that this program will cost between \$1.70 and \$2.15/household/month (excluding yard waste) |
| Markets | <ul style="list-style-type: none"> • Markets available for all materials targeted in the short-term; Markets expected to develop for new materials targeted in the medium-term • Distance to some markets a cost factor • Existing markets are listed in the following table |
| Regional Approach | <ul style="list-style-type: none"> • Accommodates expansion of existing curbside programs • Compatible with programs planned in other jurisdictions • Coordinated effort key to maximizing diversion and minimizing cost |
| Public vs. Private | <ul style="list-style-type: none"> • Programs involve waste hauling contractor, private sector, and volunteer cooperation |



Table 4-4. Recycling Alternative: Commercial Sector Programs

| PARAMETERS | DISCUSSION |
|------------------------|---|
| Effectiveness | <ul style="list-style-type: none"> • Diversion potential 25% - 70% of commercial waste stream (including yard waste) • Wide range of program designs • Wide range of materials to be targeted |
| Impacts | <ul style="list-style-type: none"> • Usually minimal • Possible traffic congestion • Possible noise and litter |
| Accommodation | <ul style="list-style-type: none"> • Usually targets businesses, institutions, multi-family dwelling units • Allows for increase in generator participation • Programs can be added as markets develop • Commercial customers may have storage/access limitations • Collected materials can be processed at a MRF or directly marketed (in some cases) |
| Implementation | <ul style="list-style-type: none"> • Programs can be implemented in 6 to 12 months • Should tie in with existing waste hauling contract • Allows for ease of phase-in approach • Special collection containers and vehicles may be required |
| Facilities | <ul style="list-style-type: none"> • Development of materials processing facility or broker arrangements would be required • Existing private facilities to sort dry mixed recyclables could be utilized |
| Consistency | <ul style="list-style-type: none"> • Would require coordination with existing waste collection service • May require separate/special agreements • Markets available for selected items |
| Institutional Barriers | <ul style="list-style-type: none"> • None at this time • Fluctuating market prices may affect program • Avoided disposal costs can be factor |
| Costs | <ul style="list-style-type: none"> • Accounts should be targeted for specific material and ease of access for diversion • Each commercial account will have individual costs • Facility to accommodate diverted materials required |
| Markets | <ul style="list-style-type: none"> • Markets available for materials targeted in the short-term • Distance to some markets a cost factor |
| Regional Approach | <ul style="list-style-type: none"> • Appropriate for suburban areas • Focus on need of central processing/handling facility |
| Public vs. Private | <ul style="list-style-type: none"> • Current contract hauler would operate some aspects of the program • Materials sold to private sector |



Table 4-5. Recycling Alternative: Drop-Off Centers

| PARAMETERS | DISCUSSION |
|------------------------|---|
| Effectiveness | <ul style="list-style-type: none"> • Diversion potential 1% - 5% • Minimum diversion compared to other recycling programs • Higher diversion if other options not available |
| Impacts | <ul style="list-style-type: none"> • Usually minimal; depending on location, buffer zone may be required • Possible traffic congestion • Site noise, litter, appearance |
| Accommodation | <ul style="list-style-type: none"> • Generator participation unlimited • Allows adding new recyclable materials as markets develop • Can be located at a MRF |
| Waste Composition | <ul style="list-style-type: none"> • Does not result in the generation of other wastes |
| Implementation | <ul style="list-style-type: none"> • Implementation time 3 to 12 months (depending on site) |
| Facilities | <ul style="list-style-type: none"> • Site and some equipment, or broker arrangements, required |
| Consistency | <ul style="list-style-type: none"> • Could impact local buy-back center operations • Compatible with other alternatives • Consistent with local plans • Can target wide range of selected items • Markets available for selected items |
| Institutional Barriers | <ul style="list-style-type: none"> • None |
| Costs | <ul style="list-style-type: none"> • Site availability/cost a consideration • Capital costs \$5,000 - \$50,000 per site • Storage containers and handling equipment major expense |
| Markets | <ul style="list-style-type: none"> • Markets available for all targeted materials |
| Regional Approach | <ul style="list-style-type: none"> • Appropriate for suburban areas • Should be coordinated with other jurisdictions' programs |
| Public vs. Private | <ul style="list-style-type: none"> • Public or public sector supported • Possible non-profit/volunteer involvement • Materials sold to private sector • Could be tied into other programs |



Table 4-6. Recycling Alternative: Buy-Back Centers

| PARAMETERS | DISCUSSION |
|------------------------|---|
| Effectiveness | <ul style="list-style-type: none"> • Diversion potential 1% - 6% • Potential increases when market prices high • Greater potential in lower economic areas |
| Impacts | <ul style="list-style-type: none"> • Usually minimal; depending on location, buffer zone may be required • Possible traffic congestion • Possible noise and litter |
| Accommodation | <ul style="list-style-type: none"> • Generator participation unlimited • Allows adding new recyclable materials as markets develop • Can be located at a MRF |
| Implementation | <ul style="list-style-type: none"> • Implementation time 6 to 15 months • Would require staff/management |
| Facilities | <ul style="list-style-type: none"> • Would require new facilities • Would compete with existing private sector operations |
| Consistency | <ul style="list-style-type: none"> • Compatible with other alternatives • Can target wide range of selected items • Markets available for selected items |
| Institutional Barriers | <ul style="list-style-type: none"> • None |
| Costs | <ul style="list-style-type: none"> • Site cost a consideration • Capital costs \$25,000 - \$75,000 per site • Processing equipment major expense |
| Markets | <ul style="list-style-type: none"> • Markets available for all targeted materials • Distance to some markets a cost factor |
| Regional Approach | <ul style="list-style-type: none"> • Appropriate for suburban areas • Should be coordinated with other jurisdictions' programs |
| Public vs. Private | <ul style="list-style-type: none"> • Materials sold to private sector • Currently operated by City • Most often a private sector operation |



Table 4-7. Recycling Alternative: Materials Recovery Facility (Mrf)

| PARAMETERS | DISCUSSION |
|------------------------|--|
| Effectiveness | <ul style="list-style-type: none"> • Diversion potential 15% - 70% • Based on waste composition and materials targeted |
| Impacts | <ul style="list-style-type: none"> • Impacts depend upon location and facility design • Possible traffic congestion • Possible noise, litter, and odor • Proper siting and operation can control impacts |
| Accommodation | <ul style="list-style-type: none"> • Limited generator involvement • Site and operation may require alteration should change occur in waste stream or markets |
| Implementation | <ul style="list-style-type: none"> • Implementation time 9 to 18 months • Important to coordinate with collection and marketing factors • May impact site traffic flow design • May require additional staffing/management • May require use permit |
| Facilities | <ul style="list-style-type: none"> • Collection program to be updated for consistency • Would require facility development |
| Consistency | <ul style="list-style-type: none"> • Must be coordinated with collection, buy-back, and drop-off programs • Design can target materials based on changes in waste supplied • Consistent with City's plans • Markets available for selected materials |
| Institutional Barriers | <ul style="list-style-type: none"> • None |
| Costs | <ul style="list-style-type: none"> • Capital costs \$500,000 to \$4,000,000 • Important to integrate with other systems to economize operations |
| Markets | <ul style="list-style-type: none"> • Markets available for specific materials • Distance to some markets a cost factor |
| Regional Approach | <ul style="list-style-type: none"> • Usually critical key in regional planning • Appropriate for suburban areas • Will be used in connection with other jurisdictions' programs • Coordinated effort key to maximizing diversion and minimizing cost |
| Public vs. Private | <ul style="list-style-type: none"> • Operation will be private |



Table 4-8. Recycling Alternative: Salvaging

| PARAMETERS | DISCUSSION |
|------------------------|---|
| Effectiveness | <ul style="list-style-type: none"> • Diversion potential 1% - 5% |
| Impacts | <ul style="list-style-type: none"> • Hazards known and controllable |
| Accommodation | <ul style="list-style-type: none"> • Limited generator involvement • Easily accommodates waste stream changes |
| Implementation | <ul style="list-style-type: none"> • Implementation time less than 12 months • Program integrated into existing system |
| Facilities | <ul style="list-style-type: none"> • Landfills, transfer stations • Could require expansion of facilities to increase diversion of recyclables |
| Consistency | <ul style="list-style-type: none"> • Compatible with other recycling alternatives, but may compete for materials • Can target wide range of selected items • Requires coordination with existing waste disposal methods and other recycling alternatives • Markets available for selected items |
| Institutional Barriers | <ul style="list-style-type: none"> • Legal requirements, space constraints |
| Costs | <ul style="list-style-type: none"> • Minimum capital costs \$5,000 - \$40,000 • Storage containers, transportation vehicles |
| Markets | <ul style="list-style-type: none"> • Markets available for all targeted materials • Distance to some markets a cost factor |
| Regional Approach | <ul style="list-style-type: none"> • Appropriate for suburban areas • Compatible with programs planned in other jurisdictions |
| Public vs. Private | <ul style="list-style-type: none"> • Either is possible |



Public education and publicity, rate adjustment considerations, enforcement, and market evaluations are key factors which support successful programs.

RESIDENTIAL SECTOR

There are two primary ways to expand upon the City's existing residential recycling program. One involves the separation and collection of additional types of materials at the point of generation. The other approach involves the expansion of recycling services to additional residents.

The City intends to rely upon a combination of curbside collection, drop-off centers, buy-back centers, and a materials recovery facility to expand its existing programs. Particular emphasis will be placed on curbside collection and the processing of recyclables at a materials recovery facility.

Curbside Collection

The collection of recyclable materials at the curbside has been demonstrated to be a reliable means of diverting considerable quantities of wastes from the landfill. The current curbside recycling program diverts approximately 9% of the residential solid waste generated in the City.

There are two general approaches to enhance the recovery of materials collected in the City's curbside recycling program. The first approach involves the separation of more types of recyclable materials at the point of generation (source separation) by additional residents. Source-separated materials would be collected and processed into a marketable form. Advantages of source separation include: 1) improvement of the marketability of collected materials, and 2) a reduction in the need for sophisticated processing. A major disadvantage of source separation is the limits on program effectiveness due to the reluctance of some residents to alter their disposal behavior. Capital investment for an expanded program includes that associated with the purchase of containers, collection vehicles, enhanced processing capacity, and promotional materials. Operational costs include labor, maintenance, and fuel. Revenues from the sale of recyclable materials can be used to offset some of the program costs.

The second approach involves the recovery of recyclable materials from mixed solid waste in a central processing facility. The main advantage of this approach is that residents are not re-



quired to alter their behavior since the separation of recyclables takes place at a processing facility. Disadvantages include the capital-intensive nature of the processing facility and the recovery of potentially contaminated materials that may be difficult to market.

Based upon the data obtained in the waste generation study, approximately 54,000 tons of residential waste were disposed in 1990. It is estimated that a curbside program which would collect newsprint, magazines, corrugated cardboard, and glass/metal/plastic (PET) food and beverage containers from the residential sector would divert approximately 10,500 tons (or about 5%) of the City's total solid waste generated in the short-term (see Table 10-2). This is equivalent to a diversion of the City's residential waste stream of approximately 17%. These figures exclude the additional diversion that would be achieved through the curbside collection of yard waste.

In the medium-term it is estimated that the diversion will increase to approximately 12,600 tons/year (or about 6% of the City's total solid waste) (see Table 10-2). This diversion is equivalent to approximately 20% of the City's residential waste stream. These levels of diversion will be attained through the anticipated addition of mixed paper, high-grade paper, and HDPE plastic to the recycling program as well as through the greater diversion rate for each recyclable collected. These estimates also exclude additional diversion resulting from curbside collection of yard waste and possibly other organic materials.

Multi-family Dwellings

Nearly 40% of Sunnyvale residents live in multi-family dwellings. This sector of the population generates more than 25% of all residential solid waste. It has been estimated that the City has approximately 1,100 multiple-family dwellings, each of which consists of four or more living units. The total estimated number of individual living units is 21,000, housing approximately 45,000 residents. The City does not have specific data on the amount of waste disposed by residents of multi-family dwellings. However, based upon the results of two studies, one conducted for the City of Berkeley covering the four seasons (City of Berkeley, 1990) and the other one for the City of San Jose for a one-week period (R.W. Beck, 1989), it was determined that the generation rate varies between 1.9 and about 2 lb/cap-day. Because of the differences in the lengths of the sampling program, this study opted to use 1.9 lb/cap-day as the generation rate by multi-family unit residents. Consequently, the estimated waste generation by multi-family dwellings in the City of Sunnyvale in 1990 is approximately 16,000 tons. The



estimated generation rate for this sector is 17,000 tons in 1995 and 18,000 tons in the year 2000.

Recyclable materials that are generated in substantial quantities by residents of multi-family dwellings include metal and glass food and beverage containers, newspaper, mixed paper, and yard waste. Among the recyclable materials that are generated in lesser quantities are plastics and corrugated cardboard. Yard wastes that are presently generated on the grounds of the apartment complexes may or may not be disposed with the wastes from the residences. In many cases, yard wastes are collected and disposed separately by the landscapers and gardeners retained by the owners of the complexes for maintaining the grounds.

The primary short-term alternative for the existing pilot recycling program (which includes approximately 6% of all multi-family households) is to extend recycling collection services to all multi-family households. The collection program can be tailored for each complex depending upon the number of units in the complex, availability of space for storage, collection of recyclable materials, and other site-specific factors.

In the short-term, the following materials could be targeted for recovery through a regular collection program:

- glass food and beverage containers
- metal (tin and aluminum) food and beverage containers
- newspapers

Additional materials, such as magazines, also have the potential of being collected in the short-term.

In the medium-term, targeted materials could be expanded to include yard waste (for composting), some plastics, corrugated cardboard, mixed paper, and other materials.

Recyclables generated by residents living in multi-family dwellings can be collected either by utilizing a centralized storage system or a local collection system. In the centralized storage system, residents carry their recyclables to a central drop-off location (typically at ground level) in the multi-family complex. In the local collection system, residents carry their recyclables to an interim drop-off location on their floor, or nearby floor. Typically, a building custodian then transports recyclables to a central storage area for subsequent collection.



In existing multi-family dwellings, sufficient space for storage and access for collection of the recyclable materials are important constraints on both the size of the recycling program and on the appropriate method of storage and collection. Commonly, storage space for source-separated recyclable materials in existing buildings is limited. Sometimes a portion of the space originally designated for another purpose (e.g., parking spaces, common recreational open spaces, etc.) can be allocated to the recycling program. The implementation of recycling services may reduce the amount of trash that requires storage, thus allowing a smaller container to be used. This change could free space for the storage of recyclables.

A study on the franchise collection contract conducted in October 1989 concluded that the additional vehicle-miles attributed to the expansion of the recycling service to multi-family residents would not make a significant impact to the air basin, but would add to the cumulative air quality impacts caused by the use of combustion engines in the basin.

Drop-Off Centers

Recycling programs based on drop-off centers require that individuals or businesses segregate reusable or recyclable materials at the point of generation and transport them to a specific location. These programs can include one or more centers, depending upon the size of the community. The design of drop-off centers can range from a simple, unstaffed site, outfitted with containers for just a few materials, to a large, fully-staffed site capable of receiving several materials.

This recycling alternative is a cost-effective supplement to a curbside recycling program because it reduces collection costs, which typically are the largest component of program expense. Recycling programs based solely on drop-off centers, particularly in large metropolitan areas, have not achieved high diversion levels. The City's existing drop-off center accepts old corrugated cardboard, newsprint, glass, mixed cans, and used oil. The City intends to continue to use a recycling drop-off program to supplement curbside collection of recyclables. The City's new materials recovery facility is expected to include a drop-off center.

Buy-Back Centers

Buy-back centers are recycling facilities very similar to staffed drop-off centers. The main difference between buy-back and drop-off centers is that buy-back centers pay for the materials



received. These centers generally accept certain specific materials and pay customers according to the quality and quantity of the material. The buy-back centers in the City are redemption centers for beverage containers covered by the California Container Deposit legislation (AB 2020).

Materials Recovery Facilities

Materials Recovery Facilities (MRFs) are centralized plants that are specifically designed to receive, separate, and process recyclable materials. Materials recovery facilities can be operated in conjunction with both drop-off and curbside collection programs. These facilities can be designed to process mixed wastes, mixed recyclable materials (also known as "commingled"), or source-separated recyclable materials. A MRF can take advantage of economies of scale for processing and at the same time produce sufficient quantities of quality materials to command high market prices. Furthermore, a MRF can be designed such that it offers a high degree of flexibility. The facility can be operated to recover several items from the waste stream. Provisions can be made to increase the number of materials that can be recovered and processed at these facilities. Based on these reasons, the City's existing plan for program expansion includes the use of a MRF.

Salvaging

A certain amount of reclamation is practiced at many landfills and transfer stations. The types of materials that are commonly reclaimed largely depend upon the availability of markets for the materials. Generally, these materials include: scrap metals, wood waste, large appliances, furniture, toys, and other items that can be readily repaired.

COMMERCIAL SECTOR

The City can be active in at least four interrelated ways in developing commercial recycling programs, including:

- education, including a commercial recycling manual and "how-to" workshops for businesses



- promotion, including publicity and newsletters
- technical assistance, including waste audits, market information, and help in program set-up
- monitoring, including requiring businesses which meet certain criteria to respond to City requests for source reduction and recycling information, such as in a detailed questionnaire

There are essentially two alternatives for the recovery of recyclable material from the commercial sector:

- on-site source separation; and
- subsequent sorting of mixed loads containing high percentages of recyclable materials, such as paper.

In the first alternative, source-separated materials could be marketed either directly to a broker or end user, or could be collected by the City's hauler for subsequent processing at the City's recycling center or materials recovery facility. This alternative would allow for businesses to contract with other recyclers for the collection of recyclables as well. In the second alternative, dry mixed recyclables could be processed at a private operation or at the City's planned materials recovery facility/transfer station.

Generally, both methodologies can apply to large businesses and small businesses alike. However, large businesses often can generate large enough quantities to justify initiating an on-site source separation program, with direct marketing of the materials to a broker or end user. The City's MRF could be designed to handle either or both of these material streams (source-separated or dry loads containing high percentages of recyclable materials).

The dry mixed recyclables option offers an outlet for the small generator or for a large generator which experiences difficulties in locating markets. Savings in disposal costs can be passed on to the generator, if possible. Large generators of materials often choose to deal with their wastes in this manner in order to avoid labor costs and other expenses associated with source separation. It is anticipated that existing facilities which provide this service could be expanded to handle additional materials.



The City could seek assistance from the State in developing local processing capability to utilize post-consumer waste. One such a program is known as the Recycling Market Development Zone Program and is administered by the California Integrated Waste Management Board. Under this program, the Board will provide low-interest loans for up to 50% of the cost of any project, with a maximum of \$1,000,000 to each qualifying business or local agency. The loans may be made on infrastructure, buildings, equipment, or working capital for projects that support utilization of post-consumer waste.

Each facet of these alternatives is selected and is discussed further in Program Selection.

PROGRAM SELECTION

RESIDENTIAL SECTOR

The City will increase diversion from its existing recycling program by:

- expanding recycling services to additional residents (multi-family dwellings)
- including additional types of recyclable materials in collection programs
- instituting volume-based user fees for refuse collection and disposal of single-family household trash
- broadening and intensifying the education and public information program

The City will rely upon a combination of curbside collection, drop-off centers, buy-back centers, and a materials recovery facility to expand its recycling programs. Particular emphasis will be placed on curbside collection and processing of recyclables at a materials recovery facility.

Residential recycling programs depend upon citizen cooperation. The results of several programs have shown that the degree of separation must be simple and convenient in order to reach high levels of participation and waste diversion. Public education and promotion must also be frequent and comprehensive in order to achieve maximum levels of participation and waste diversion. In addition, the program requires continuous and thorough monitoring, man-



agement, and supervision. Requirements regarding materials preparation for curbside collection typically result in higher participation and diversion rates.

The expanded residential curbside program has the following attributes:

- affords an easy transition from the existing program
- accommodates the addition of new materials
- takes advantage of the proposed MRF
- leads to higher waste diversion rates

The existing drop-off program will be maintained because it supplements the curbside collection program well.

By 1995, the amount of recyclable materials collected through the residential recycling program (excluding organic materials) is projected to be twice that of the existing level. That is the amount of recyclable materials will increase from approximately 5,000 tons to approximately 10,500 tons. That figure will continue to increase after 1995, but at a slower rate. It is expected that by the year 2000, approximately 12,600 tons will be diverted through this program.

In the short-term (through the year 1995), the following source-separated materials will be collected for recycling from single-family households:

- newspapers
- magazines
- corrugated cardboard
- glass food and beverage containers
- PET plastic containers
- metal (tin and aluminum) food and beverage containers

In the short-term, an evaluation will also be made regarding the feasibility of collecting HDPE plastic.



In the medium-term (i.e., through the year 2000), additional source-separated materials to be collected for recycling from single-family households are likely to include mixed paper, high-grade paper, additional types of plastics, and other materials if possible. The rate of expansion may be governed by availability of adequate and economic markets for plastics, mixed paper, and other materials.

A sample of available markets for each of the materials is presented in Appendix B. A market for mixed residential paper is expected to emerge by the medium-term, based on the recent paper industry trend to establish greater recycling opportunities for currently-recycled and additional materials.

Effective July 1, 1991, the residential curbside recycling program will be contracted to a private firm. At that time, the program will be expanded and updated. In the new program, the burlap bags will be replaced with three rigid plastic containers. Furthermore, the new program will utilize new collection vehicles. Promotion of the program will be updated and expanded. According to program specifications, all residents will be required to place their recyclables at the curb or at a designated location in multi-family dwellings. The City will work with the hauler to evaluate how best to monitor program participation. A volume-based user fee system for refuse collection and disposal from single-family households will be developed to encourage source reduction and recycling. These modifications should result in a higher participation rate and lead to the collection of higher quantities of recyclable materials.

The recycling program for multi-family dwellings will be structured so that residents will understand program details and find it convenient to participate. In addition, the program will be structured such that recycling collection equipment can be accommodated at multi-family dwellings. All multi-family dwellings will be offered recycling services by December 1992. The City will work with the collection company to institute the program. The collection program will be tailored for each complex depending upon the number of units in the complex, availability of space for the storage and collection of recyclable materials, and other site specific factors. The City will encourage cooperation from building owners through public education and rate modifications for waste collection services. Mandatory participation will be considered by the City only if these measures are not successful.

In the short-term (through the year 1995), the following source-separated materials will be targeted for recovery from multi-family dwellings through a regular collection program:

- newspapers



- glass food and beverage containers
- PET plastic containers
- metal (tin and aluminum) food and beverage containers

Additional materials, such as magazines, may be included in the program during the short-term.

In the medium-term (through the year 2000), the City will determine the feasibility of expanding the collection of recyclable materials to include additional types of plastics, mixed paper, magazines, and corrugated cardboard. If feasible, collection of some or all of these materials for recycling will begin in the medium-term.

Recyclable materials generated by residents living in multi-family dwellings will be collected either by utilizing a centralized storage system or a local collection system (see Program Alternatives). The City, the hauler, and residents of multi-family dwellings will work together to ensure that there is sufficient storage space for recyclable materials and that recycling collection vehicles have adequate access.

A modern materials recovery facility is currently under development in conjunction with a new transfer station in the City of Sunnyvale. The facility will be located on a site owned by the City of Sunnyvale and will serve the Cities of Sunnyvale, Mountain View, and Palo Alto.

The new MRF is expected to be completed by 1994. Until that time, all recyclable materials will continue to be transported to the Sunnyvale Recycling Center for processing. A description of the recycling center is given in the Existing Conditions portion of this section.

Once the MRF becomes operational, it will be able to handle all the materials that are currently collected. It is expected that processing at the new MRF will be more efficient and will result in the production of high-quality end-products.

The facility will make provisions for accepting clean loads of recoverable materials such as yard waste, wood waste, curbside recyclables, and buy-back materials. The MRF will also incorporate a processing area for sorting recoverable materials from dry mixed commercial loads. Refuse that cannot be recycled will be loaded into transfer trailers and transported to the Kirby Canyon Landfill for disposal.



COMMERCIAL SECTOR

The City's central role in commercial recycling programs will be primarily to serve as a resource, both for information and for technical assistance. City efforts to encourage participation will focus on:

- using refuse collection rates to clearly promote and reward source reduction and recycling activities
- education and publicity
- technical assistance
- monitoring of programs success

Priority commercial sector materials to be targeted for recycling in the short-term (through the year 1995) include:

- corrugated cardboard
- high-grade office paper
- wooden pallets
- glass/metal (tin and aluminum) food and beverage containers
- other industry-specific materials determined to be potentially recyclable

These materials are targeted for recycling because, according to the results of the waste generation study (Table 2-2), they constitute more than 30% of disposed industrial waste and more than 25% of disposed commercial waste. Additional materials to be recycled in the short-term are listed in Tables 10-2 through 10-5.

Since food waste constitutes nearly 20% of disposed commercial sector waste, food waste will receive particular attention for diversion in the medium-term (through the year 2000). Other materials to be recycled in the medium-term are listed in Tables 10-2 through 10-5.

The City will take the following approaches in expanding commercial sector recycling:



- develop a commercial recycling manual; drawing, where appropriate, on available existing information from guides developed by Santa Clara County municipalities and business associations
- conduct "how-to" workshops for businesses
- arrange for tours of ongoing recycling programs
- assemble a "speakers bureau" with recycling industry representatives to address the Chamber of Commerce, voluntary clubs, and other trade associations
- develop a newsletter aimed at the business community (facility managers in particular), and include information on markets; contacts for assistance; results of contests for best program, most innovative program, most improved program, and so forth; and description of other successful programs
- encourage the commercial sector (through education and technical assistance) to purchase products made from recycled materials
- organize collection for small commercial generators, by working closely with the City's waste hauler
- evaluate whether or not to provide incentives for expanded dry mixed recyclables operations
- seek State assistance via its Recycling Market Development Zone and similar programs
- dedicate one full-time staff person to deal with technical questions, provide assistance in identifying potential markets, and offer assistance on site-specific program design
- require the approximately 40 to 50 businesses and institutions with more than 250 employees at a single site¹ in Sunnyvale to respond to City requests for detailed and extensive source reduction and recycling information, and to pro-actively plan

¹ The City will consider allowing businesses which have more than one qualifying site to submit a single response, on a case-by-case basis.



to achieve goals set by the City, as part of their business license renewal application, or through other appropriate mechanisms

- require all businesses to report a summary of source reduction and recycling activities and achievements as part of the business license renewal application
- suggest diversion goals initially on a site-specific basis and eventually develop them on a business category basis
- consider requiring businesses which employ more than 500 people in the City of Sunnyvale to conduct waste characterizations, based on categories and a methodology developed in consultation with the City
- ensure that commercial refuse collection rate structures clearly promote and reward efforts to reduce and recycle waste materials

Source reduction and recycling information that the City will require from businesses and organizations will serve as a planning tool for the City. The information will help the City to effectively tailor its assistance program to the needs of various sub-sectors, and will help to ensure that businesses and institutions are contributing to the City's recycling goals. The City will target its outreach program initially for large businesses and institutions, since they represent a small fraction of the total amount of businesses in the City but generate a major portion of commercial and industrial waste. For example, approximately 20 companies provide nearly 50,000 jobs, or approximately 35% of all jobs in the City. These companies are assumed to generate large quantities of solid waste.

The following information will be included in a questionnaire to businesses and institutions which have more than 250 employees at a single site in the City:

- estimated waste quantities, using the categories of materials listed in the waste generation analysis (Section 2, Waste Characterization Component)
- current disposal activities, such as number and size of central disposal receptacles, and whether or not the waste is compacted
- description of existing recycling activity, including which materials are source-separated, which are included in dry mixed waste, and the primary generators of these materials



- list of materials that the business has identified as potentially recyclable
- plan for new or expanded recycling and source reduction programs, with tonnage goals to be achieved by year
- assistance needed, such as technical or market information, and education materials

PROGRAM IMPLEMENTATION

RESIDENTIAL SECTOR

Implementation of the expanded residential curbside recycling program is the responsibility of the City of Sunnyvale's Department of Public Works. Requirements regarding the preparation of materials for curbside collection of source-separated materials are well developed for single-family residences. The recycling program will include multi-family residences as services are expanded. Specific direction will be provided by the City Council.

In the short-term, the contractor will collect source-separated newspaper, cardboard, glass/metal/plastic (PET) food and beverage containers, and used motor oil from all households. Additional materials, such as magazines, could be included in the program, at the City's discretion, as markets emerge. Collection of the materials will take place Monday through Friday on a weekly basis. The collection of recyclable materials will be conducted on the same day as waste collection.

All single-family dwellings, duplexes, triplexes, and mobile home parks will be provided with two rigid plastic containers for storage of recyclable glass/metal/plastic (PET) food and beverage containers. Newspaper will be collected in Kraft bags or tied with a string. A third container will be provided in 1992 to accommodate loose newspaper. Regular collection of source-separated recyclables will also be extended to multi-family dwellings as directed by the City. Special provisions will be made for the collection of recyclable materials from residences occupied by elderly or handicapped individuals. A plastic jug will be provided by the City to all those that wish to participate in the used motor oil recycling program. Any time a full jug is collected, the contractor is responsible for replacing it with an empty one. The collection contractor will also



share responsibility with the City for program publicity. All materials that will be collected in the curbside program will be transported to the City of Sunnyvale's Recycling Center for processing until the City's new materials recovery facility is operational. Curbside recyclables from the City of Mountain View will also be processed at the recycling center until the City's new materials recovery facility is operational.

The City of Sunnyvale will continue to operate its drop-off center and support the two buy-back centers located within the City limits.

In the event that the MRF encounters delays in commencement of operation, the City would continue to process single-family residential recyclables at its existing facility. Regarding multi-family and commercial sector recyclables, the City would consider negotiating with an existing intermediate processor (merchant MRF) or would broker specific materials directly with minimal or no processing.

The City's intention is for the MRF to continue accepting materials designated for recycling, even when market price fluctuations reduce program cost-effectiveness. As a note, the City is currently paying to market used motor oil, glass, and tin. However, if markets are unavailable or uneconomic, the City might be forced to declare that meeting the State's goals is unfeasible, unless the State provides strong leadership in market development.

The expected implementation schedule for the new and expanded programs is presented in Table 4-9. The City is responsible for determining program details; awarding collection, processing, and marketing contracts, if determined to be in the City's best interests; and working with collection contractors to develop and implement the education and public information necessary for program success. A recycling collection contractor will be responsible for acquiring the necessary equipment, including recycling collection vehicles and containers.

Programs costs include staff time, education and public information, collection, processing, and monitoring. Approximately 3,000 staff hours will be required annually for program implementation and monitoring. Collection costs will vary depending on set-out and participation patterns, methods of collection, and other factors. Processing costs will vary depending on quantity, composition, and quality of incoming materials; specific processing methods employed; market conditions; and other factors. Estimated program costs are summarized in Table 4-10.



Table 4-9. City of Sunnyvale Recycling Implementation Timeline

| Task | Date |
|--|-------------|
| RESIDENTIAL SECTOR | |
| Award contract for single-family household recyclables collection | completed |
| Distribute single-family household recycling containers | 7-91 |
| Begin distributing updated education and public information materials | 5-91 |
| Establish volume-based user fees for single-family household refuse collection | 7-91 |
| Begin enhancing single-family household recycling collection program | 7-91 |
| Begin operating new materials recovery facility | 1993 - 1994 |
| Award contract for multi-family household recycling collection program | 9-91 |
| Expand recycling collection services to all multi-family households | 1992 |
| COMMERCIAL SECTOR | |
| Hire staff | 1992 |
| Distribute first newsletter | 1992 |
| Begin distributing commercial recycling manual | 1992 - 1993 |
| Begin developing other program materials | 1992 |
| Begin publicizing program | 1992 |
| Begin technical assistance | 1993 |
| Begin receiving commercial responses to City requests for information | 1994 |
| Seek State assistance in market development | ongoing |



Table 4-10. City of Sunnyvale Residential Recycling Program Estimated Short-term Implementation Costs (Annual)

| | |
|---|------------------------------|
| Collection (10,500 tons @ 40 - 60/ton) | \$420,000 - 630,000 |
| Processing (10,500 tons @ 20 - 30/ton)* | \$210,000 - \$315,000 |
| Education and Public Information | \$50,000 |
| Monitoring | \$5,000 - \$10,000 |
| Administration (3000 hours) | \$75,000 |
| TOTAL | \$760,000 - 1,080,000 |

* Net of anticipated revenues from the sale of materials.



COMMERCIAL SECTOR

A timeline for implementation of the City's commercial recycling program is presented in Table 4-9. The estimated first year cost for this program (excluding collection) is \$85,000: \$50,000 for staff (2,000 hours), \$10,000 for the development of a manual (assumes City writes manual), and \$25,000 for education and outreach. In subsequent years, additional staff hours may need to be allocated and new programs developed or expanded to implement the commercial recycling program and to achieve program goals. Therefore, costs in subsequent years (excluding collection and processing) are expected to increase to nearly \$120,000 per year. Collection costs are excluded from these estimates because at this time it cannot be determined how much of the commercial recyclable materials will be handled by the City and how much will be handled via private arrangements between generators and private intermediate processors, brokers, and end users.

MONITORING & EVALUATION

RESIDENTIAL SECTOR

The collection contractor will be required to provide the City with daily and monthly records. The records will include information that will be used to monitor the program such as routing, number of stops, type and quantity of materials collected, and weather conditions. Data from the multi-family dwelling recycling program will be presented separately from single-family household recycling data. This information, combined with the data obtained from processing and marketing, will be used to evaluate the effectiveness of the residential curbside recycling program. All the data collected from this program will be recorded along with the results of other recycling efforts. This information will be used to assess the relative merit of the various programs, as well as the total quantities of materials diverted from the landfill. The City shall review the data with the contractor to ascertain program progress and areas for improvement or expansion.

The collection contractor will be responsible for monitoring, evaluating, and reporting on the residential curbside collection program. The contractor will develop a monitoring and evaluation program in consultation with the City.



Should the residential curbside program not meet expected diversion goals, a series of additional programs will be initiated. Some of these programs may include:

- expanded education and public information campaigns
- further economic incentives to recycle
- enforced penalties for non-compliance with City policies and regulations
- greater involvement in market development
- expansion of services to include more materials designated for recycling, if markets are available

COMMERCIAL SECTOR

The City's waste hauler will be required to provide records on the amount and type of recyclables that it must collect (under contract with the City) from commercial, industrial, and institutional clients. This information will be supplemented by information that will be required to be submitted by businesses and institutions on a periodic basis (see Commercial portion of Program Selection).

Monitoring costs are included as part of routine responsibilities for the City and its contractors.

The commercial recycling program (including commercial, industrial, institutional, and self-haul sectors) will seek to divert 30% of the entire generated solid waste stream by the year 1995 and nearly 50% by the year 2000. These estimates include materials that will be composted. (The current estimate is approximately 16%, based on information contained in Tables 2-6 and 2-7.) With strong City influence and assistance, these goals should be possible to attain.

Should the commercial recycling program not attain these goals, the City would expand its outreach programs to businesses, and may help to strengthen the recycling infrastructure in various ways. As a last resort, the City would develop various mechanisms to penalize those businesses whose recycling rates fall below the diversion goals identified for businesses.

Composting Component



SECTION 5

COMPOSTING COMPONENT

It is expected that composting will make a major contribution toward achieving the recycling and waste reduction goals by the years 1995 and 2000. Composting can be defined as the biological degradation of organic matter under controlled conditions to produce a usable soil amendment. Since well over half of the City of Sunnyvale's municipal solid waste consists of compostable material, composting has the potential to become a primary means of diverting solid waste from land disposal.

The economic and environmental benefits of composting as a solid waste management approach are numerous, but in some cases, not so obvious. Economic benefits of composting include:

- avoided disposal fees
- reduced solid waste processing costs
- reduced strain on incinerator or landfill capacity
- reduced soil amendment expenditures

Environmental benefits can include:

- reduction in the strength of the leachate from landfills
- reduced incinerator emissions and ash
- elimination of leaf disposal
- improved soil fertility and aesthetics from application of compost
- heightened community environmental awareness

It is expected that composting will become a major component of an integrated approach to solid waste management in the City of Sunnyvale.



OBJECTIVES

The City of Sunnyvale has established the following objectives with respect to composting during the 1990s.

SHORT-TERM OBJECTIVES

In the short-term (through the year 1995), the objectives of the composting program are to:

- develop the collection and processing infrastructure to handle source-separated yard and wood wastes from throughout the City
- enlist the cooperation of all sectors in the City, targeting government and residential sectors first
- identify particular subgroups of potential end users and their anticipated demands for product quality and quantity
- encourage municipal departments to use compost products generated by the program, and inform residents of their availability
- inform residents about how to participate in the yard waste collection program
- establish a yard waste drop-off site at the composting facility or in another convenient location
- divert through composting and wood waste processing approximately 9% of the total amount of solid waste generated¹

MEDIUM-TERM OBJECTIVES

In the medium-term (through the year 2000), the short-term objectives will be expanded. The objectives will be to:

- refine the yard and wood wastes collection and processing systems

¹ This is equal to approximately 58% diversion of total disposed yard and wood waste.



- enlist the participation of all sectors in the City
- compost at least 50% of the food waste from the commercial sector, and include other biodegradable materials, if feasible
- divert through composting and wood waste processing at least approximately 11% of the total amount of solid waste generated²
- require that the City give preferential consideration to the use of compost (if similar quality to material currently used) in the maintenance of public lands, should the supply of the program's compost products exceed demand at prevailing prices

PRIORITY MATERIALS

The major categories of potentially compostable materials and their contribution to the solid waste stream, by sector, are presented in Table 5-1. Yard waste constitutes the largest portion of the City of Sunnyvale's solid waste that can be easily kept separate and processed into soil amendments, such as compost, mulch, and wood chips. Clean wood materials, such as damaged pallets, can also be processed effectively and efficiently into similar products, either separately or together with yard waste. Yard and wood wastes constitute approximately 18% (by weight) of the solid waste generated in the City.

Typically, yard waste includes the following materials:

- leaves
- grass clippings
- garden waste (weeds, plants, discarded fruits and vegetables from residential gardens)
- brush and branches
- Christmas trees
- other woody materials

² This is equal to approximately 72% diversion of total disposed yard and wood waste.



**Table 5-1. Organic Wastes Disposed in Sunnyvale
Annual Quantities (Tons)**

| Material | Tons/Year | Percent of Total Disposed MSW |
|---------------------------|--------------|-------------------------------|
| Paper | 63,103 | 38.9 |
| Food | 14,293 | 8.8 |
| Yard Waste | 21,456 | 13.2 |
| Wood | 8,004 | 4.9 |
| Agricultural Crop Residue | -- | -- |
| Other Organics | <u>3,054</u> | <u>1.9</u> |
| TOTAL | 109,910 | 67.8 |
| TOTAL DISPOSED MSW | 162,080 | |



For the short-term, composting efforts will focus primarily on yard waste and clean wood waste (such as pallets and untreated lumber) that can be processed by the composting equipment³. In the intermediate-term, food waste (primarily from the commercial sector), and perhaps other biodegradable materials, may be composted.

EXISTING PROGRAMS

As of December 1990, the City of Sunnyvale has no systematic collection and processing of yard and wood waste into usable soil amendments. Presently, approximately 29,500 tons of yard and wood waste are landfilled each year. Approximately 20% of the City's wood waste is diverted, mostly by industry.

Under the present contract with its waste hauler, the City has the option to require the hauler to collect source-separated yard waste on a weekly basis from single-family households, duplexes, triplexes, and mobile home parks. If the City exercises this contractual option, the hauler would provide the service recipients with 96-gallon rigid plastic carts for storage of their yard waste. The City would approve the design and color of the carts, which would be clearly marked as yard waste storage containers with decals approved by the City. The City has the option to arrange for yard waste processing capabilities under the conditions set by the City's agreement with its waste hauler. This option can be exercised until January 1992, with collection scheduled to begin in July 1992.

Under the contractual option, the hauler would collect the yard waste using four 2-person rear-loading vehicles equipped with tippers. The yard waste would be delivered to a subcontractor approved by the City for processing and composting. The hauler guarantees that the yard waste collected under this program would not be landfilled. The hauler would be active in program publicity, as described in the contract.

The development of a yard waste composting program for the City of Sunnyvale may result in an expansion of yard waste processing operations by the private sector in Santa Clara County.

³ Unacceptable materials include: gritty leaves, excessively large tree materials, palm fronds, and mixed construction and demolition wood (including plywood, particle board, pressure-treated wood, and any additional materials containing creosote, glues, resins, paint, glass, plastic, industrial chemicals, and metals, other than nails). These materials are considered unacceptable because the resulting product may be environmentally unsafe if used as a horticultural product, or because processing them may damage or otherwise inhibit machinery.



The yard waste processor designated in the City's franchise agreement with its hauler may have sufficient capacity at its current facility in San Jose. Otherwise, the facility may have to be expanded in order to accommodate the City's materials.

EVALUATION OF PROGRAM ALTERNATIVES

A successful composting program consists of effective and efficient collection, processing, and marketing of compostable materials. The program is particularly effective when it deals with materials which are found in large quantities in the solid waste stream and which are not otherwise recycled.

The City's current plan for composting yard waste, as discussed earlier, constitutes a major step in developing a comprehensive composting program.

An evaluation of composting alternatives is presented in the text that follows and in Tables 5-2 through 5-4.

COLLECTION OPTIONS

Since yard waste composting is the preferred processing alternative in the short-term, this section focuses on potential collection alternatives for the material. Yard waste can be collected separately for processing into usable end-products through either curbside collection, a drop-off program, or both. Collection programs must be accompanied by aggressive promotion of home composting and other waste reduction methods. Acceptable wood waste can be dropped off in source-separated form at the processing facility or other drop-off site by individuals or commercial haulers.

The yard waste generated in the City is estimated to consist of approximately 75% brush and other woody materials, and 25% leaves and grass. The collection system must be capable of handling these materials regularly and efficiently.



Table 5-2. Composting Alternative: Yard Waste Drop-off

| PARAMETERS | DISCUSSION |
|------------------------|---|
| Effectiveness | <ul style="list-style-type: none"> • Diversion potential 2% to 5% |
| Impacts | <ul style="list-style-type: none"> • Usually minimal • Possible traffic congestion • Possible noise and litter • Processing facility is potential source of odor and dust, both of which can be controlled |
| Accommodation | <ul style="list-style-type: none"> • Generator participation low • Primary alternative for commercial sector |
| Implementation | <ul style="list-style-type: none"> • Rapid once drop-off facility located, and composting facility operational • Separation required at drop-off |
| Facilities | <ul style="list-style-type: none"> • Use of composting facility • Use of drop-off site • Equipment storage |
| Consistency | <ul style="list-style-type: none"> • Consistent with local policy • Relatively high visibility generates acceptable participation |
| Institutional Barriers | <ul style="list-style-type: none"> • Might require agreement policy (among participants) if implemented through a regional approach • New facility might conflict with local land use policies and zoning ordinances |
| Costs | <ul style="list-style-type: none"> • Variable: less than curbside • Generally, no collection costs associated • Development of drop-off and processing facility |
| Markets | <ul style="list-style-type: none"> • Markets available for high-grade compost and mulch • Internal use of finished products possible • Distance to some markets a cost factor |
| Regional Approach | <ul style="list-style-type: none"> • Viable alternative • Accommodates expansion of programs • Compatible with programs planned in other jurisdictions • Coordinated effort key to maximizing diversion and minimizing cost |
| Public vs. Private | <ul style="list-style-type: none"> • Program involves residential and commercial generators hauling to drop-off site • Program could be operated either by public or private sector |



Table 5-3. Composting Alternative: Residential Yard Waste

| PARAMETERS | DISCUSSION |
|------------------------|---|
| Effectiveness | <ul style="list-style-type: none"> • Diversion potential 8% to 18% of residential waste |
| Impacts | <ul style="list-style-type: none"> • Usually minimal • Possible traffic congestion • Possible noise and litter • Containers left at curb possible neighborhood concern • Processing facility is potential source of odor and dust, both of which can be controlled |
| Accommodation | <ul style="list-style-type: none"> • Generator participation unlimited • Minor limitations due to storage capacity of residential containers and/or collection vehicles |
| Implementation | <ul style="list-style-type: none"> • Implementation time 9 to 15 months • Separate collection of yard waste |
| Facilities | <ul style="list-style-type: none"> • Use of (regional) composting facility, utilizing turned windrow and size reduction methods of processing • Intended processing facility has received necessary permits • Transfer facilities possible • Equipment storage |
| Consistency | <ul style="list-style-type: none"> • Consistent with local policy • High visibility generates high participation • Education and public information important |
| Institutional Barriers | <ul style="list-style-type: none"> • Generally none • Might require agreement policy (among participants) if implemented through a regional approach |
| Costs | <ul style="list-style-type: none"> • Collection vehicles (\$35,000 - \$80,000 each) • Household containers (\$50 - \$85 each) • Implementation costs: \$60 - \$130/ton • Development of processing facility |
| Markets | <ul style="list-style-type: none"> • Markets available for high-grade compost and mulch • Internal use of finished products possible • Distance to some markets a cost factor |
| Regional Approach | <ul style="list-style-type: none"> • Viable alternative • Accommodates expansion of programs • Compatible with programs planned in other jurisdictions • Coordinated effort key to maximizing diversion and minimizing cost |
| Public vs. Private | <ul style="list-style-type: none"> • Programs often involve waste hauling contractor, private sector, and volunteer cooperation |



Table 5-4. Composting Alternative: Commercial Yard Waste

| PARAMETERS | DISCUSSION |
|------------------------|---|
| Effectiveness | <ul style="list-style-type: none"> • Diversion potential 3% to 6% of commercial, industrial, and self-haul waste |
| Impacts | <ul style="list-style-type: none"> • Usually minimal • Possible traffic congestion • Possible noise and litter • Processing facility is potential source of odor and dust, both of which can be controlled |
| Accommodation | <ul style="list-style-type: none"> • Generator participation unlimited • Minor limitations due to storage capacity at business or multi-family unit containers and/or collection vehicles |
| Implementation | <ul style="list-style-type: none"> • Implementation time 9 to 15 months • Separate collection and drop-off of yard waste |
| Facilities | <ul style="list-style-type: none"> • Use of (regional) composting facility, utilizing turned windrow and size reduction methods of processing • Intended processing facility has received necessary permits • Transfer facilities possible • Equipment storage |
| Consistency | <ul style="list-style-type: none"> • Consistent with local policy • High visibility generates high participation • Education and public information important |
| Institutional Barriers | <ul style="list-style-type: none"> • Generally none • Might require agreement policy (among participants) if implemented through a regional approach • Might require changes in zoning and/or building codes to allow for additional space for containers • Limited space at some businesses might prevent placement of collection bins |
| Costs | <ul style="list-style-type: none"> • Collection vehicles (\$35,000 - \$80,000) • Containers: Toters and/or drop-off bins • Implementation costs: \$60 - \$130/ton • Development of processing facility |
| Markets | <ul style="list-style-type: none"> • Markets available for high-grade compost and mulch • Internal use of finished products possible • Distance to some markets a cost factor |
| Regional Approach | <ul style="list-style-type: none"> • Viable alternative • Accommodates expansion of programs • Compatible with programs planned in other jurisdictions • Coordinated effort key to maximizing diversion and minimizing cost |
| Public vs. Private | <ul style="list-style-type: none"> • Programs often involve waste hauling contractor, private sector, and volunteer cooperation |



Curbside Collection

Important considerations in the curbside collection of yard waste include: identification of the types of yard waste to be collected and the frequency of collection; method of set-out for yard waste (bags, loose, or in a rigid container); and type of collection vehicle.

Advantages of curbside collection include:

- convenience for residents
- high community profile and awareness
- high participation and recovery rates
- linkage of yard waste handling with trash collection

Disadvantages of curbside collection include:

- higher cost
- greater complexity
- longer implementation time than with a drop-off program

Yard Waste Program

Commencing July 1, 1992, if directed to do so by the City, the City's franchised waste hauler will collect source-separated yard waste from single-family, duplex, triplex, and mobile home park residents.

In the event that the City does not choose this option, the City would select a contingency:

- A) contract for yard waste processing services with another facility in the region
- B) set up a composting operation at the City of Sunnyvale landfill or another site
- C) defer program implementation until the medium-term and evaluate all existing and emerging options



In keeping with the City's short-term goal of 40% diversion, the third contingency would be selected only as a last resort.

If the option is selected, the hauler will provide each household with one 96-gallon container for the collection of yard waste. In addition, the hauler will collect source-separated yard waste from an unlimited number of 32-gallon cans and tied bundles of yard waste not exceeding 4 ft in length and 1 ft in diameter.

The hauler will deliver yard waste to an existing composting site in San Jose, operated by Zanker Road Resource Management Company. End products resulting from this processing will be returned to the City for its use on City facilities or for sale or distribution to its residents.

In 1991, the hauler will cooperate and assist the City in investigating markets and end users for products made from yard waste.

The City will notify the hauler by January 1992 whether or not it is to commence operation of the yard waste program.

Execution of this plan is contingent upon the availability of a processing facility and the ability of the City to use or market the resulting end products. Further details are available in the City's franchise agreement for collection of solid waste.

Drop-Off Program

A drop-off program relies on residents and/or private commercial haulers to bring separated yard and wood wastes to a designated site. This type of program keeps collection costs low, but may result in less volume recovered. A drop-off program can be supplemented by a curb-side collection program, for maximum recovery.

It is anticipated that the only drop-off site will be at the composting site itself. Small or informal private composting sites may also serve as drop-off sites.

To encourage self-haul, residents could be allowed to use the drop-off site at no cost, and could be given a voucher for finished compost or wood chips. Self-hauling reduces the overall costs of collection.



PROCESSING OPTIONS

There are several composting methods, ranging from highly rudimentary to highly complex. In its franchise agreement with its waste hauler, the City has indicated an inclination to deliver source-separated yard waste to a private processor in Santa Clara County. The processor would be expected to compost leaves and grass, and to chip or grind woody yard waste, such as brush. The resulting products would be returned to the City for its use on City properties or for sale or distribution to residents.

Following is a description for processing the yard wastes.

Turned Windrows

Turned windrow implies stacking the raw material in elongated piles (windrows) and allowing the composting process to proceed. One common approach is to utilize a front-end loader to form and turn windrows. Alternatively, specialized equipment (e.g., a windrow turner) can be used to turn and aerate piles effectively and rapidly. Rudimentary operations tend to cost \$10 to \$20/ton (amortized capital and operating expenses), while sophisticated operations often cost approximately \$30 to \$50/ton. The cost of many operations nationwide is between these extremes.

Turned windrow composting has minimal associated hazards; odors from poor site or process management is the most frequently mentioned concern, followed by dust. Methods of odor mitigation include regular aeration of windrows, application of odor masking agents if odor becomes noticeably unpleasant, and restriction of residence time of stockpiled materials. Dust can be controlled through watering, use of a dust palliative, and by not turning windrows during high wind conditions. Other potential hazards, such as flow of runoff into surface water, generally can be controlled effectively with simple steps.

This method of composting can accommodate changing economic, technological, and social conditions rapidly and effectively. Turned windrow composting can be implemented in a short timeframe, partly since site improvements are usually minor and new facilities usually need not be constructed. This approach supports local source reduction and recycling efforts, and can be effectively developed by existing local institutions. Turned windrow composting is preferred over other methods for composting yard waste.



Aerated Static Pile

Composting of strictly yard waste via the aerated static pile method is rare. Expense and needless complexity render this method generally inapplicable to yard waste. Aerated static piles are commonly used to compost sewage sludge. In this process, a blower connected to a network of pipes is used to provide the aeration.

Aerated static pile composting has minimal associated hazards; odors from poor site or process management is the most frequently mentioned concern. Other potential hazards, such as build-up of ammonia gas in indoor facilities, generally can be controlled effectively by adequate ventilation and process monitoring.

The static pile method can accommodate changing economic, technological, and social conditions relatively quickly and effectively, and does not interfere with or impede progress toward the State's waste reduction and recycling goals. A program using this method can be implemented in an intermediate timeframe; construction of a new facility is usually needed. Institutional barriers to its development are few.

Given the same feedstock, static and turned windrows produce identical products if both operations are managed properly.

Typical combined capital and processing costs for a 10,000 ton/yr facility are approximately \$25 to \$50/ton.

In-Vessel Composting

As the name implies, in-vessel composting involves the use of an enclosed unit to carry the process. Advantages of this method include rapid processing, avoidance of weather-related problems and inefficiencies, and more complete process and odor control. High capital costs and potential for system failure render this option not viable unless more than yard and wood wastes are composted and a rapid throughput time is employed. This technology cannot be implemented in the short-term, and is not particularly flexible in response to changing economic, technological, and social circumstances. Construction of a new facility is essential to support program implementation.

Typical combined capital and processing costs for a 10,000 ton/yr facility are approximately \$40 to \$60/ton.



Brush & Wood Waste Processing

Shredding or grinding of woody yard waste supports local source reduction and recycling efforts, and can be implemented in the short-term with relative ease. The technology can be adapted to adjust to technological, social, and economic conditions. Hazards from flying projectiles can be minimized by locating the size reduction processing site at least 300 ft from public access. Noise impacts can be prevented by restricting the hours of use or locating the shredder where distance or topography attenuate the noise to within acceptable levels. No new facilities would be required for the operation, although a covered structure for the equipment would be desirable.

Suitable grinders, both mobile and stationary, can process approximately 5 to 10 tons/hour. Regular maintenance and unplanned downtime for certain types of grinders can be significant.

Amortized capital costs (excluding labor and other operating costs) generally translate into a cost of approximately \$10 to \$20/ton for a 10,000 ton/yr operation.

SITING OPTIONS

The City's current short-term plan is to utilize an existing private composting facility in San Jose. A decision on whether to proceed with the plan will be made by January 1992, as discussed earlier in the Collection Options section. If this plan does not come to fruition, sites that may be appropriate as a City composting facility include:

- unused portions or completed sections of solid waste facilities such as landfills
- wastewater treatment facilities
- transfer station
- large, unused paved areas
- buffer area around industrial sites and institutions
- utility rights-of-way
- privately-owned land



- municipally-owned land used for buffer areas or storage

A centralized site generally is preferred on the basis of economies of scale and administrative convenience, provided a large enough site is available.

The selection of a City composting site requires careful consideration of, among other parameters:

- proximity to the waste stream
- proximity to potential markets
- potential for utilizing the land at no direct cost
- distance from residential and other sensitive land uses
- size (area)
- accessibility
- public attitudes
- physical site conditions
- need for permits
- availability of utilities
- current and adjacent land uses
- need for improvements

If an existing facility is used, the increase in compostable materials might increase visual impacts due to the need for larger, longer, or more windrows. Possible mitigation to reduce visual impacts include landscaping, minimizing windrow heights, and using topography to screen composting activities. If a specific new facility is proposed, additional environmental review would be required to determine potential impacts.



MAIN PROCESSING OPTIONS

Four primary options for composting Sunnyvale's yard and wood wastes are:

- 1) local municipal satellite sites in various parts of the City
- 2) centralized City site to service all residents
- 3) centralized County site to service all residents
- 4) private site to service major portions or all of the City's residents

Option 1--A few sites could be developed in several areas throughout the City to serve residents living in such areas. The primary advantage of this approach is the reduced transport time and cost from collection point to processing location. Disadvantages of this approach include: possible delays and other difficulties in siting several composting facilities; and lack of economies of scale, resulting in greater expenditures for equipment or for transport costs associated with moving heavy equipment among composting sites.

Option 1 is not recommended.

Option 2--A centralized City site has, among other advantages, economies of scale in processing, administrative, and logistical ease. A primary disadvantage is the greater transport time and cost from collection point to processing location.

Option 2 is recommended, provided that a suitable site can be identified that does not require purchase or extensive site preparation and that is not located excessively distant from the City.

Option 3--A centralized County site would relieve the City of the burden of processing and marketing materials. This advantage, however, is outweighed by several disadvantages, including:

- possible long distances and time from collection point to processing location
- possible loss of local control over program parameters, including materials accepted, delivery specifications, tipping fee, access to end product, and others
- possible lengthy delays in program initiation

Option 3 is not recommended.



Option 4--A privately-owned and -operated (or publicly-owned and privately-operated) processing site that could serve the needs of the City has several advantages, including:

- reduced allocation of City staff and equipment
- no City need to identify and develop the composting facility (if privately-owned)
- contractually fixed or per unit fee for processing services
- private responsibility for marketing of end products, unless otherwise arranged

Disadvantages of this option include:

- limited City control over end product outlets, unless stipulated by contract
- possible greater transport time and cost from collection point to processing location (if privately-owned)

At least one experienced yard and wood waste processor in San Jose is known to be interested in providing processing services for yard and wood waste collected from Sunnyvale. The City intends to pursue this option, if the terms set forth in the City's franchise agreement with its waste hauler can be met regarding yard waste processing and marketing.

Option 4 also is recommended, provided that a private sector arrangement can be favorably developed. The City could issue a Request for Qualifications and/or a Request for Proposals to own and operate, or just to operate, a private site in order to determine whether to pursue this option.

END USES

Processed yard materials yield three general types of marketable product:

- compost: conditions and stabilizes soil; increases soil fertility; eases weeding; improves root development; increases soil's capacity to retain water;
- mulch: retards weed growth; preserves water retention in soil; reduces fluctuations in soil temperature; provides structural support for plants;



- wood chips: serves as a product with similar uses as mulch or as a bulking agent; can also be used as a boiler fuel.

Yard waste compost is used in two primary ways:

- soil amendment: tilled into soil to augment soil structure and fertility;
- soil substitute: pre-mixed with sand and stone-free sub-soil, for use as enhanced topsoil.

The City of Sunnyvale's composting program can yield any or all of these products, depending on the composition of the feedstock, the level of source separation, and the processing regime.

END USERS

Provided that high-quality products are generated on a consistent basis, markets for organic soil amendments, including those produced from yard and wood waste, are relatively stable.

Typical end users of compost products include:

- | | |
|-------------------|----------------|
| local governments | greenhouses |
| local residents | garden centers |
| landscapers | farm suppliers |
| developers | golf courses |
| nurseries | private fields |
| excavators | country clubs |
| sod growers | cemeteries |
| universities | |

Municipally-processed yard materials can be used by local governments, in such areas as parks, landfills (as cover), roadside shoulders, and around municipal buildings. Occasionally, businesses and institutions serve as major markets. Municipalities often make available finished compost for use by local residents. Such a program promotes good will and usually helps to publicize the overall recycling program.

For municipally-run programs, much of the end product often is used by the participating municipal governments themselves and given away free to local residents on a first-come, first-



served basis. If a high-quality end product is produced, however, it could be sold. Markets for yard waste compost products tend to be local, and are generally within 20 to 50 miles of the processing site.

To stimulate internal use, municipalities can require that their departments or any private contractor with a municipal contract use or give preference to municipally-processed yard waste materials. Municipalities can also publicize the availability and benefits of compost products to increase demand by local residents. Points of distribution typically include yard waste handling sites, recycling centers, community gardens, and other Department of Public Works sites.

Various departments in the City of Sunnyvale could absorb a very large amount of soil amendments made from organic materials collected from yards. An arrangement could be made with the processor such that the City would receive all finished products for internal use or distribution. This arrangement exists as an option under the City's current franchise agreement. The City could alter or develop specifications for soil amendments for use by the City, including compost, mulch, and wood chips.

Landscapers are expected to represent a substantial part of the demand for high-quality compost. Other significant private users are expected to include nurseries and recreational facilities, such as golf courses. Intermediate users may include companies that blend soil.

It is anticipated that all the soil amendments generated from the City's yard waste collection program could be marketed, provided that product quality is maintained.

QUALITY CONSTRAINTS

Quality constraints associated with yard waste compost include:

- immaturity -- material has not been fully decomposed
- presence of sticks, stones, debris, and other contaminants
- low nutrient content -- as compared to fertilizer, manure, and other soil additives
- moisture content too high or too low
- particle size too large or too small



- soluble salts and pH -- may limit use in potting mixes

Quality concerns and constraints vary by end user. Understanding market requirements ("user needs") is the key in addressing quality issues. Generally, nurseries will have the most stringent quality requirements, especially for compost that will be used in potting mixes. They may require screened, shredded compost. If compost is used for typical projects in the public sector, several factors (moisture content, pH, presence of sticks and stones) tend to be much less important. It is possible to develop two or more quality levels of compost made from the same feedstock, and to market the products accordingly.

Testing for impurities in the end product will help to engender market confidence in the product's quality. Commonly, tests are used to determine the concentration of plant nutrients, presence of viable weed seeds, and concentration of toxic compounds. Some programs conduct tests quarterly, using independent laboratories.

EXPANSION OPTIONS

The scope of a yard waste composting operation could be expanded by:

- composting additional quantities of yard waste
- shredding wooden pallets, clean construction and demolition wood, and other wood; resulting wood chips could be used as a mulch and/or as boiler fuel⁴
- co-composting other types of organic waste with the yard and wood wastes

Receiving additional amounts of yard and wood waste for composting can be accomplished by various methods, including:

- mandating separate collection and processing of yard waste
- banning the disposal of yard waste at solid waste disposal facilities, once the yard waste collection and processing system is in place

⁴ The City could conceivably use wood waste as boiler fuel to count as up to 10% of the required 50% diversion of solid waste from landfills by the year 2000 if all relevant stipulations in the AB 939 legislation are met.



- adopting a user fee for collection of yard waste that is lower than the user fee for trash collection
- placing or encouraging the placement of a user fee on trash collection, with a lower (or no) fee for yard waste collection
- more extensive monitoring and enforcement of recycling regulations
- more extensive public education and publicity
- developing a network of local drop-off sites to supplement curbside collection and self-haul to the composting site
- reducing the tipping fee for source-separated, clean yard and wood wastes

Yard and wood wastes can be co-composted with other organic waste materials, often with mutually beneficial results. Examples include, among others, grape pomace, animal manures, food processing residues, and sewage sludge. Food waste can be composted or co-composted.

Co-composting yard waste with sewage sludge is commonly practiced in many operations nationwide. However, the introduction of sewage sludge complicates the composting operation. The City of Sunnyvale should investigate the possibility of co-composting sewage sludge with yard and wood wastes in the intermediate- or long-term planning periods, or composting it separately.

PROGRAM SELECTION

The selected composting program expands upon the City's existing plan to collect and process source-separated yard waste from single-family dwellings, duplexes, triplexes, and mobile home parks, for use as soil amendments. The City's existing plan calls for these constituents of the residential sector to receive weekly curbside collection of source-separated yard waste, starting in July 1992.

If processing capacity and end users are available, the composting program could be expanded to include multi-family dwellings, as well as the commercial and industrial sectors, ei-



ther through curbside collection, or drop-off, or both. Given the distance to the composting facility and the likely reliance on a drop-off program for these sectors and sub-sectors, the City should evaluate the feasibility of developing a yard waste drop-off transfer point at the City's SMaRT station.

Additional materials, including food waste, may be composted in the medium-term. Program requirements may be clearly delineated, and the City will assist in market development.

Under the City's existing plan, the hauler would deliver source-separated yard waste from City residents to a private centralized yard and wood waste composting facility. This facility would process yard and wood wastes via size reduction and turned windrow to produce usable soil amendments.

Composting methods used at a centralized facility would be controlled to meet health standards, and would not pose a significant risk to human health. When properly managed, compost does not harbor vectors or disease.

Yard and wood waste size reduction and composting are demonstrated, cost-effective, and environmentally beneficial techniques for managing a large portion of the solid waste stream. The costs of the turned windrow and size reduction methods for yard and wood waste are substantially lower than for aerated static piling or in-vessel systems. In addition, these methods are faster and easier to implement, less subject to development cost overruns, more flexible, and simpler to manage, among other advantages.

Yard and wood wastes can be easily separated before entering the waste stream, and processed into marketable compost, mulch, and wood chips. In the short-term, approximately 9% of the waste stream is expected to be diverted via yard and wood waste processing; in the intermediate-term, approximately 11% is expected to be diverted. The facility will have the potential to incorporate additional compostable materials in the intermediate- or long-term planning periods.

In the intermediate-term, a portion of the food waste currently disposed may need to be diverted from the waste stream via source reduction and composting in order to reach the State's 50% diversion goal by 2000. Food waste constitutes approximately 9% of total disposed solid waste; nearly 19% of disposed commercial sector waste is food waste. Based on the large amount of food waste generated by the commercial sector, the City would target commercial sector food waste for diversion, if judged feasible.



SELECTED PROGRAM OVERVIEW

The selected composting program includes the following components:

Residential Curbside Collection--Source-separated yard waste (all types) will be collected weekly from residents who receive regular trash collection services. Curbside collection provides convenience to residents, and generally yields higher diversion rates.

Drop-Off Site--Residents and commercial businesses will be encouraged to haul yard and wood wastes to a composting facility or a transfer point. A drop-off program will complement the curbside collection program and, thus, help to maximize diversion rates and reduce collection costs.

Centralized Processing--Yard and wood wastes will be shredded and/or composted at a centralized processing facility, preferably the one described in the City's franchise agreement with its waste hauler. A central site, especially for shredding, is expected to be the most cost-effective approach, as well as the easiest to administer. Efforts will be taken to ensure that high-quality end products are generated.

Expansion Potential--The program will be designed such that additional materials could be composted or shredded. Collection and processing options for food waste will be evaluated in the medium-term.

Distribution of End Products--High-quality compost, mulch, and wood chips will be marketed as soil amendments. A certain amount of wood chips could also be marketed as a fuel.

Public Education and Publicity--The City, in cooperation with its hauler, will develop and disseminate public education and publicity materials regarding yard and wood waste drop-off and curbside collection programs, home composting, and other yard waste reduction strategies. A strong, sustained public education and publicity campaign is vital to program success.

Program Incentives and Requirements--The City will provide incentives or requirements for participation in the composting program. The City will encourage composting facilities to assess a lower tipping fee for yard waste than for trash, to en-



courage self-haulers to participate. A volume-based user fee for single-family residential trash collection will provide an incentive to compost materials at home or to source-separate yard waste. Regulatory measures, including requiring the source separation of yard waste and banning the disposal of yard waste at the City's solid waste disposal facility, may also be enacted once the yard waste collection and processing system is in place. These and other incentives and requirements could help to ensure program success.

GENERAL DESIGN & SITE LAYOUT

The major functional areas required at a composting site are: receiving; pre-processing; composting; post-processing; and storage. These areas are depicted in Figure 5-1 for a typical windrow composting operation.

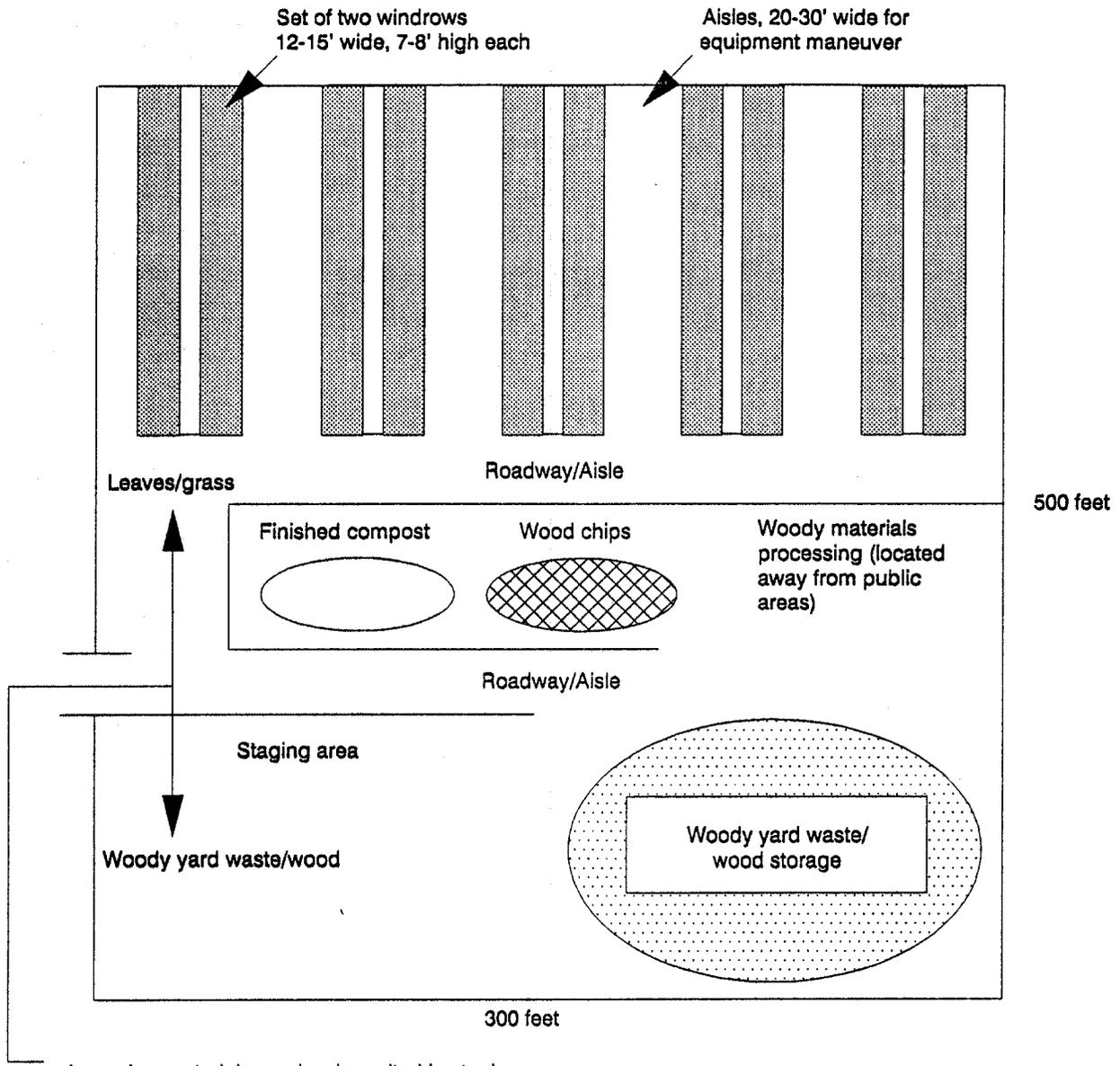
The site will be designed to compost source-separated leaves and grass clippings in windrows, and to shred brush and other woody yard waste. Clean wood waste will also be processed. A site of approximately 4 to 7 acres will be needed, depending on material feedstock composition and processing regime. End products may include compost, mulch, and wood chips, depending on market conditions, residence time at site, and material feedstock.

END USES

It is anticipated that the selected program's end products will, for the most part, include high-quality mulch and wood chips, with a smaller amount of compost. See "End Uses" in the Program Alternatives portion of this section for further discussion.

END USERS

Various departments in the City of Sunnyvale should absorb significant amounts of soil amendments made from organic materials collected from yards. The City will alter or develop specifications for using soil amendments, including yard waste compost, mulch, and wood chips. In addition, the City will agree to use a certain minimum amount of yard waste compost products from the processor. These actions will help to ensure adequate demand for the product.



Incoming materials can be deposited in staging areas.
 Large loads of grass clippings can be deposited directly in windrow areas.

Figure 5-1. Sample Yard Waste Management Site



It is anticipated that all the soil amendments generated from the City's yard waste collection program could be marketed, provided that product quality is maintained. Under the City's franchise agreement with its hauler, the City would receive all finished products for internal use or distribution. Landscapers are expected to represent a substantial part of the demand for high-quality compost. The City should be responsible for making sure that the yard waste feedstock that it collects is clean enough so that a high-quality product can be produced. Product quality will be tested regularly. Violations of an acceptable level of feedstock contamination could result in penalties being levied by the processor on the City's designated collector, or, in turn, on the generator by the City. In either case, the City would seek corrective actions to ensure that feedstock material is of high quality. An agreement with the yard waste processor also should be structured so that not more than a certain percentage (such as 10%) of the materials received for processing can be disposed.

Working together, the City and the processor that it selects are expected to be able to develop products whose quality meets market requirements. Markets for soil amendments can change rapidly, however; attention must be given to these changes, with adjustments made as needed in pricing and sales strategies. Even if compost products fail to maintain a positive market value, their beneficial use counts toward the waste diversion goals.

In the unlikely event that weak market demand results in a stockpile of the City's compost products, the City will consider measures to ensure that State requirements regarding material reuse and recycling are met. These measures include:

- requiring City departments to use or give preference to municipally-processed yard materials
- increased publicity regarding the availability of compost products
- steps to ensure that product quality is improved

PROGRAM IMPLEMENTATION

This section identifies main program responsibilities for the City, program tasks and timeline, and known program implementation costs. Primary responsibilities for the composting pro-



gram rest with the City (see Table 5-5). Table 5-6 shows the primary tasks and implementation timeline for the composting program.

Resources will be needed to cover the costs of capital equipment, labor, processing site improvements, administration and training, and public education and publicity.

Anticipated program costs are summarized in Table 5-7.

MONITORING & EVALUATION

To ensure that the composting program is meeting its goals and objectives, the program shall be monitored and evaluated on a regular basis. Monitoring shall include the following measures:

- recording at the processing site of the estimated volume or weight of materials originating in the City accepted for processing at the composting site, on a daily basis
- recording at the processing site of the estimated quantity of reject materials (Sunnyvale sources) that require disposal after pre- or post-processing
- recording by the City's hauler of the estimated cubic yards or tons of materials (Sunnyvale sources) collected and accepted at the composting site, on a daily basis
- monitoring of feedstock and end-product quality
- monitoring of end-product demand and other market conditions
- other supplementary measures as deemed necessary or desirable

A waste generation study shall be undertaken by the City at a time agreed upon by the State to evaluate changes in the disposal levels of materials targeted or that could be targeted by the composting program. Data gathered in the waste generation study will be compared with data gathered in a similar 1990 study for the City.



Table 5-5. City of Sunnyvale's Main Responsibilities for Composting Program

-
- Securing private processor and site
 - Designation of acceptable materials
 - Setting of incentives and requirements to participate in composting program
 - Development and distribution of public education and publicity materials
 - Collection of designated materials
 - Market evaluation
 - Development of procurement specifications and policies for compost products
 - Integration of municipal activities with County composting initiatives
 - Program monitoring and evaluation
 - Expansion of programs and services
-



Table 5-6. City of Sunnyvale Composting Program Implementation Timeline*

| Task | Date |
|--|--------------|
| Organization | |
| Assign personnel for program administration | 1-92 |
| Finalize program details | 1-92 |
| Set incentives and requirements for participation | 2-92 |
| Begin monitoring and evaluating programs | 7-92 |
| Expand programs and services (e.g., food waste, etc.) | 1995 |
| Collection | |
| Begin separate collection of yard waste for single-family residences, duplexes, triplexes, and mobile home parks | 7-92 |
| Encourage drop-off by commercial and industrial sectors, and by multi-family dwellings | 7-92 |
| Evaluate feasibility of establishing yard waste drop-off site at transfer station or other site within the City | 1992 - 1993 |
| Processing | |
| Begin processing | 7-92 |
| Marketing | |
| Evaluate markets | 7-91 - 11-91 |
| Develop procurement specifications and policies for compost products | 6-92 |
| Education and Public Information | |
| Develop education and public information materials | 2-92 |
| Begin distributing education and public information materials | 4-92 |

* Assumes that City elects to pursue collection and processing program described in detail in the City's existing franchise agreement with its waste hauler.



Table 5-7. City of Sunnyvale Composting Program Estimated Annual Costs (Short-term)

| | |
|--|--------------------------------|
| Collection (\$55-85/ton @ 15,000 tons/yr)* | \$825,000 - 1,275,000 |
| Processing (\$20/ton @ 15,000 tons/yr)* | \$300,000 |
| Administration, Training, and Monitoring (2,000 staff hours) | \$50,000 - \$100,000 |
| Public Education and Publicity* | \$50,000 |
| Revenues | N/A |
| TOTAL | \$1,225,000 - 1,725,000 |

* The City's franchise agreement with its waste hauler set the cost of yard waste collection, processing, and limited publicity at \$1,193,467 ± \$35,000. Execution of this agreement depends on City approval by January 1992.



The effectiveness of the composting program (including on-site composting and other organic waste reduction techniques) will be gauged as follows, subject to modification in accordance with State guidelines:

- 0% to 25% diversion of yard and wood waste, unsatisfactory
- 25% to 50% of yard and wood waste, needs improvement
- 50% to 66% of yard and wood waste, effective
- greater than 66% of yard and wood waste, very effective

Funding requirements for the monitoring program shall be minimal. Depending on the level of detail required by the State for the subsequent waste generation studies, funding requirements may be significant.

In the event that the composting program is deemed unsatisfactory or in need of improvement, based on the evaluation criteria above, the City will re-assess its strategy in meeting its solid waste diversion objectives. Possible remedial strategies that would be considered include:

- targeting additional materials for composting
- allocating greater resources, such as for administrative staff time and public education and publicity
- raising the user fee on the collection of trash to encourage participation in either municipal or home composting programs
- financial credits or rebates to those households that compost their yard waste at home rather than setting it out separately for transfer to the composting facility
- enforcing with fines and other penalties the source-separation of targeted materials, including yard waste

Solid Waste Disposal

Facility Capacity Component



SECTION 6

SOLID WASTE FACILITY CAPACITY COMPONENT

This component describes solid waste disposal facilities used by the City of Sunnyvale. This component also projects the City's future waste capacity needs, and describes how the City will satisfy future capacity demands.

OBJECTIVES

The objectives of this component are to:

- identify and describe all existing solid waste disposal facilities used by the City of Sunnyvale
- project the additional capacity that will be required for waste generation in a 15-year planning period
- identify and describe all facilities which may open or close in the short- to medium-term (one to ten years) future and their effect on disposal capacities in the jurisdiction

EXISTING FACILITIES

The City of Sunnyvale sends its municipal solid waste to the Sunnyvale Sanitary Landfill. The types and quantities of waste disposed are given in Section 2 (Waste Characterization).

The Sunnyvale Landfill, located at the northern extremity of Borregas Avenue in Sunnyvale, is owned by the City of Sunnyvale and operated by Oakland Scavenger Company, a subsidiary of Waste Management, Incorporated.

The landfill is located on a parcel of 112 acres that is shared with the Sunnyvale Water Pollution Control Plant. The landfill is approximately 93 acres and is permitted to receive 500 tons of



waste per day (Sunnyvale Public Works Department and Santa Clara Health Department, 1988).

Current disposal fees for self-hauled waste are:

| | |
|-----------------------------------|---------------|
| Regular Trash | \$ 5.17/cu yd |
| Construction and Demolition Waste | \$13.73/cu yd |
| Auto Tires | \$ 2.92/tire |
| Truck Tires | \$ 8.39/tire |

The landfill is open 361 days per year from 7:00 am to 5:00 pm.

The remaining capacity at the Sunnyvale Landfill was 1,573,000 cu yd as of January 1, 1990. The landfill is expected to reach 100% capacity by April 1994 (4.4 years from January 1, 1990) at current loading rates.

ADDITIONAL CAPACITY REQUIREMENTS

Additional capacity requirements for a 15-year planning period are calculated using the following formula from Chapter 9, Section 18744 of the Integrated Waste Management Board's planning guidelines and procedures for preparing, revising, and amending County-wide integrated waste management plans.

$$AC_n = [(G+I) - (D+TC+LF+E)]_n$$

where:

- AC = Additional Capacity required in year n.
- G = The amount of solid waste projected to be generated in the jurisdiction (from Waste Generation Study).
- I = The amount of solid waste which is expected to be imported to the jurisdiction for disposal in permitted solid waste disposal facilities through interjurisdictional agreement(s) with other cities or counties, or through agreements with solid waste enterprises, as defined in Section 40193 of the Public Resources Code.



- D = The amount diverted through successful implementation of proposed source reduction, recycling, and composting programs (from the Waste Generation Study and Integration Component).
- TC = The amount of volume reduction occurring through available, permitted transformation facilities.
- LF = The amount of permitted solid waste disposal capacity, which is available for disposal in the jurisdiction, of solid waste generated in the jurisdiction.
- E = The amount of solid waste generated in the jurisdiction that is exported to solid waste disposal facilities through interjurisdictional agreement(s) with other cities or counties, or through agreements with solid waste enterprises, as defined in Section 40193 of the Public Resources Code.
- n = Each year of a 15-year period commencing in 1991 (iterative in one-year increments).

The calculated volumes for additional capacity are presented in Table 6-1 for the diversion goals set by the City of Sunnyvale (40% by 1995, 50% by 2000, and 55% by 2005) and Table 6-2 for the diversion percentages mandated by the State (25% by 1995 and 50% by 2000). As in the AC column, additional diversion (above existing diversion) will extend the existing landfill's expected date of 100% capacity by approximately one year, from April 1994 to early 1995.

The input tonnage is converted to in-place cubic yards by a compaction factor of 1,456 pounds per cubic yard and a refuse to cover ratio of 1.87 (City conversion factors, 1990).

FUTURE SOLID WASTE FACILITIES

The Sunnyvale Landfill is expected to reach 100% capacity in early 1995, provided that the City's diversion goals (Table 6-1) are attained. The City is currently negotiating with Waste Management, Inc. to provide for disposal at the Kirby Canyon site. This site will provide Sunnyvale with at least 30 years of capacity.

The Kirby Canyon site would be a regional landfill for the Cities of Sunnyvale, Mountain View, Palo Alto, the unincorporated areas adjacent to the above mentioned cities, and possibly Stanford University. The tipping fee is expected to be approximately \$19.00 per ton (at least initially).



Table 6-1. Additional Capacity Calculations for City of Sunnyvale, City Goals

| Year | AC (yd ³) | G ¹ (yd ³) | I (cu yd) | D ² (%) | D (yd ³) | TC (yd ³) | LF (yd ³) | E (yd ³) |
|--------------|--------------------------|--------------------------------------|--------------|-----------------------|-------------------------|--------------------------|--------------------------|-------------------------|
| 1990 | 0 | 421,615 | 0 | 19 | 79,913 | 0 | 1,573,000 | 0 |
| 1991 | 0 | 425,059 | 0 | 22 | 93,513 | 0 | 1,231,298 | 0 |
| 1992 | 0 | 428,517 | 0 | 27 | 115,700 | 0 | 899,752 | 0 |
| 1993 | 0 | 431,879 | 0 | 33 | 142,520 | 0 | 586,935 | 0 |
| 1994 | 0 | 435,147 | 0 | 37 | 161,004 | 0 | 297,576 | 0 |
| 1995 | 209,947 | 438,320 | 0 | 40 | 175,329 | 0 | 53,044 | 0 |
| 1996 | 251,594 | 441,393 | 0 | 43 | 189,799 | 0 | 0 | 0 |
| 1997 | 240,008 | 444,457 | 0 | 46 | 204,449 | 0 | 0 | 0 |
| 1998 | 232,707 | 447,515 | 0 | 48 | 214,808 | 0 | 0 | 0 |
| 1999 | 229,788 | 450,564 | 0 | 49 | 220,776 | 0 | 0 | 0 |
| 2000 | 226,802 | 453,605 | 0 | 50 | 226,803 | 0 | 0 | 0 |
| 2001 | 222,916 | 454,932 | 0 | 51 | 232,016 | 0 | 0 | 0 |
| 2002 | 219,004 | 456,258 | 0 | 52 | 257,254 | 0 | 0 | 0 |
| 2003 | 215,065 | 457,587 | 0 | 53 | 242,522 | 0 | 0 | 0 |
| 2004 | 211,102 | 458,919 | 0 | 54 | 247,817 | 0 | 0 | 0 |
| 2005 | 207,115 | 460,252 | 0 | 55 | 253,137 | 0 | 0 | 0 |
| TOTAL | 2,466,048 | 7,084,078 | 0 | | 3,031,374 | 0 | 0 | 0 |

¹ Generation is based on a conversion factor of 1,456 lb/cu yd and a refuse to cover ratio of 1.87:1.

² Projected diversion percentages based on implementation of programs discussed in program selection portions of this document. The City's goals are 40% diversion by 1995, 50% by 2000, and 55% by 2005.



**Table 6-2. Additional Capacity Calculations for City of Sunnyvale,
State Requirements (2000)**

| Year | AC (yd ³) | G ¹ (yd ³) | I (cu yd) | D ² (%) | D (yd ³) | TC (yd ³) | LF (yd ³) | E (yd ³) |
|--------------|--------------------------|--------------------------------------|--------------|-----------------------|-------------------------|--------------------------|--------------------------|-------------------------|
| 1990 | 0 | 421,615 | 0 | 19 | 79,913 | 0 | 1,573,000 | 0 |
| 1991 | 0 | 425,059 | 0 | 22 | 93,513 | 0 | 1,213,298 | 0 |
| 1992 | 0 | 428,517 | 0 | 27 | 115,700 | 0 | 899,752 | 0 |
| 1993 | 0 | 431,879 | 0 | 33 | 142,520 | 0 | 586,933 | 0 |
| 1994 | 0 | 435,147 | 0 | 37 | 161,004 | 0 | 297,576 | 0 |
| 1995 | 209,947 | 438,320 | 0 | 40 | 175,329 | 0 | 53,044 | 0 |
| 1996 | 251,594 | 441,393 | 0 | 43 | 189,799 | 0 | 0 | 0 |
| 1997 | 240,008 | 447,457 | 0 | 46 | 204,449 | 0 | 0 | 0 |
| 1998 | 232,707 | 447,515 | 0 | 48 | 214,808 | 0 | 0 | 0 |
| 1999 | 229,788 | 450,564 | 0 | 49 | 220,776 | 0 | 0 | 0 |
| 2000 | 226,802 | 453,605 | 0 | 50 | 226,803 | 0 | 0 | 0 |
| 2001 | 227,466 | 454,932 | 0 | 50 | 227,466 | 0 | 0 | 0 |
| 2002 | 228,129 | 456,258 | 0 | 50 | 228,129 | 0 | 0 | 0 |
| 2003 | 228,793 | 457,587 | 0 | 50 | 228,794 | 0 | 0 | 0 |
| 2004 | 229,459 | 458,919 | 0 | 50 | 229,460 | 0 | 0 | 0 |
| 2005 | 230,126 | 460,252 | 0 | 50 | 230,126 | 0 | 0 | 0 |
| TOTAL | 2,534,819 | 7,084,078 | 0 | | 2,962,603 | | 0 | 0 |

¹ Generation is based on a conversion factor of 1,456 lb/cu yd and a refuse to cover ratio of 1.87:1.

² Projected diversion percentages as mandated by the State for the year 2000 and beyond.



In addition to the new landfill, several companies may be interested in obtaining chipped wood waste from the Sunnyvale waste stream. The City could conceivably count up to 10% of the required 50% diversion by 2000 if the wood is used as energy, and if all relevant stipulations in the AB 939 legislation are met.

**Education and Public
Information Component**



SECTION 7

EDUCATION & PUBLIC INFORMATION COMPONENT

INTRODUCTION

The key to a successful source reduction and recycling program is the active participation of an informed populace. A comprehensive education and public information component will help to ensure program effectiveness in waste reduction, reuse, composting, and recycling. The Education & Public Information Component is critical to the growth of participation in source reduction and recycling programs and to the long-term modification of public attitudes and behavior. Promoting source reduction and recycling in a city with a population of diverse demographics is a challenge that requires a significant and sustained dedication of resources, both financial and human. Each segment of the population must be addressed in terms that it finds understandable and relevant. Leadership shown by elected officials is of the highest importance.

A public education program should stress the benefits of participation in waste reduction, reuse, composting, and recycling. It should incorporate a well-designed logo and theme that is simple and memorable. The program should also clearly communicate how to accomplish what is asked of each citizen.

Individuals and groups need to know that their actions matter and that they are helping to conserve scarce natural resources and to preserve environmental quality. A positive theme should be used extensively and consistently to convey this message.

The City should make every reasonable effort to minimize the potential generation of additional waste in its education and public information campaign by encouraging residents to save, reuse, or recycle the information they receive. The City should develop informational materials in a way that reflects the source reduction and recycling principles the City seeks to convey.



GOALS & OBJECTIVES

GOALS

The following goals have been established for the short-term planning period (through the year 1995):

- create widespread awareness of environmental and solid waste issues
- create broad visibility for the recycling program
- familiarize consumers about recycling on an ongoing basis
- motivate increased participation by every sector in all available source reduction and recycling programs
- close the recycling loop by stressing the importance to all sectors of buying recycled and composted materials

SHORT-TERM OBJECTIVES

The following objectives have been established for the short-term planning period (through the year 1995):

- designate a staff member to be in charge of developing public education and publicity materials
- develop or expand public education and information programs to address source reduction, composting, recycling, and household hazardous waste, tailored to the residential, commercial, and industrial sectors
- inform at least 90% of Sunnyvale residents of the City's waste reduction and recycling programs by 1995
- promote an in-house source reduction and recycling program at all City employee work stations; promote a City-wide procurement policy of using recycled products



- create group involvement opportunities through recycling promotions and events
- provide residents with detailed instructions on yard debris collection
- educate the public about the uses of recycled and compost materials -- emphasize "closing the loop" through a "buy recycled" campaign
- cultivate additional support of solid waste management programs by publicizing and encouraging corporate involvement

MEDIUM-TERM OBJECTIVES

The medium-term objectives (through the year 2000) are:

- expand existing programs
- further develop new programs, to target information to specific sub-populations

EXISTING CONDITIONS

The City has developed some public information and promotion materials to support waste reduction and recycling, including door hangers and brochures. The biannual clean-up days and household hazardous waste collection days are publicized as well. The City also inserts promotional information on recycling in utility bills two or three times per year. In addition, the City produces quarterly reports for distribution to residents, with some aspect of recycling usually featured in each issue. The City also coordinates speakers for local civic and environmental organizations, and works with local schools to provide data and materials for classroom use.

The City's current source reduction and recycling education/public information budget (excluding staff time) is approximately \$5,000. The City's recycling staff currently allocates approximately 20% of one staff member's time for education and public information.

Some Sunnyvale schools conduct their own recycling programs. Education and information materials are developed and transmitted within each institution.



Some Sunnyvale businesses have developed in-house recycling programs for at least one major material (often high-grade office paper) in their solid waste. Each organization produces its own education and information materials regarding its specific program.

PROGRAM ALTERNATIVES

Education and public information materials will need to be geared to specific audiences so that the information is clearly and quickly understood. There are many different programs that the City can use, including public education, public information (advertising and other publicity, events, and promotions), community interaction and relations (meeting and organizational approaches), and youth education. Education and public information programs help to reinforce the importance of source reduction and recycling, and are critical to program success.

RESIDENTIAL ALTERNATIVES

The following public information and education approaches could be taken by the City, as appropriate, for each program component.

Public Education

The public education segment should be used to teach the public about facets of each program, especially those which require modification of residents' current solid waste generation and disposal routine. Public officials, teachers, engineers, and volunteers should be utilized to make the public aware of all the steps it can take to reduce, reuse, recycle, and compost. The following are some of the activities that the City could sponsor:

- community forums

- establishment of a speakers bureau of educators, industry and technical representatives, and governmental agencies to talk to professional organizations, the Chamber of Commerce, conservation groups and social clubs, and other groups



- development of a network of volunteers for activities such as promoting recycling, source reduction, and composting in their neighborhoods or multi-family complexes (also known as "block leaders")
- establishment of a telephone "hot line" and public newsletter for source reduction, composting, recycling, and household hazardous waste
- exhibitions of source reduction, recycling, and composting materials at county fairs, shopping centers, and other public locations
- public tours of recycling centers, and solid waste processing facilities
- publicity of successful government office and private business source reduction and recycling programs, with assistance from elected officials and community leaders
- master composter and home composting demonstration programs; see Section 3 (Source Reduction)

Public Information

Once the public is educated about the City's source reduction and recycling program, it must be reminded to participate. To have a strong, positive impact on the environmental and solid waste crisis, the methods of source reduction and recycling must be communicated to all residents and must be regularly reinforced. Public information includes the use of advertising and other forms of publicity, events, and promotions.

Advertising & Publicity

Advertising and publicity are excellent ways to inform the public of procedures to reduce, reuse, recycle, and compost. The following approaches can be taken or expanded upon by the City as part of its public information campaign:

- direct mail from the City to Sunnyvale residents, telling them about the importance of recycling and source reduction and informing them about how to take part in the program



- solid waste and recyclables collection vehicles -- logos should reflect the need for source reduction and recycling
- creative theme and slogan development; mascot; celebrity spokesperson
- print advertising: brochures; outdoor billboards; buses; benches; bus shelters; street litter receptacles; inserts in utility bills; door-knob hangers; newspaper articles; shopping bag messages; newspaper inserts; "avenue" banners; posters
- electronic media publicity: public service announcements; telephone survey/program evaluations; radio and cable television awareness shows; slide presentation or graphic displays; press releases; videos

Events & Promotions

The City can continue or begin to host or participate in the following public information events and promotions:

- City kick-off promotion of modifications to the existing source reduction and recycling program
- parades; festivals; special events (e.g., "Earth Day," "Recycling Week"); citizen reuse and recycling contests
- publicized recycling contests between elected officials and City departments
- recycling day with local or national sports teams, or other celebrities, at recycling centers, supermarkets, and other suitable locations; photo opportunities with recycling mascot
- City/County recycling awards to City departments, businesses, organizations, community groups, and others

Community Interaction & Relations

Community interaction and relations are other essential portions of the education and public information component. Community leaders and residents, businesses, and institutions must



work together to make the program succeed. The following are some of the activities in which the City can better communicate with residents, businesses, and institutions and clarify source reduction and recycling responsibilities and procedures in Sunnyvale.

Meetings

- large and small group meetings; public hearings; site visits to recycling operations; meetings of citizen advisory bodies and citizen task forces; workshops

Organizational Approaches

- establishment of a City "hot line" to answer public inquiries; citizen representation on policy bodies; public information centers
- encouragement or requirement of hospitals to distribute information pamphlets on reusable diapers to new parents

Youth Education

The City's youth constitute an important sub-population that can receive tailored source reduction education and public information materials. If source reduction and recycling habits are emphasized to children at an early age, then these habits are likely to be practiced when they are older. The following are some ways to specifically inform and educate the youth of Sunnyvale about source reduction, recycling, composting, and household hazardous waste:

- contests: school recycling decathlon (where contests are held to test and teach student knowledge of source reduction, recycling, composting, and household hazardous waste); poster contests
- special events: mobile unit and mascot visit to school; recycling day/week at school; student tours of landfill/recycling centers
- environmental leadership program, in which high school students can serve as interns for school credit



- in-school recycling programs; involvement of students in community recycling drives
- recycling included in school curriculum

COMMERCIAL ALTERNATIVES

See Section 4 (Recycling) for a discussion of the approaches the City could take in developing its commercial recycling education and outreach program.

HOUSEHOLD HAZARDOUS WASTE ALTERNATIVES

See Section 3 (Source Reduction) and the Household Hazardous Waste Element.

PROGRAM SELECTION

The City must help residents, businesses, and organizations become more aware of the City's source reduction and recycling program. The best overall strategy for the City is a comprehensive, segmented mix of communications techniques and a variety of activities to reach the City's diverse population.

A blend of all available resources and alternatives previously mentioned will be developed or expanded upon by the City. The key is to use various public education and public information opportunities in a consistent, repeated, and comprehensive manner. In this way, each selected alternative reinforces other selected alternatives for maximum effectiveness.

Implementation of all programs discussed in the Program Alternatives section would result in a comprehensive education and public information component that would help to ensure program effectiveness in waste reduction, reuse, composting, and recycling. Each segment of the population should be addressed in terms that it finds understandable and relevant.



PUBLIC EDUCATION

Public education (see Program Alternatives in this section) is paramount in helping Sunnyvale residents, businesses, and industries learn about ways to reduce, recycle, reuse, and compost. Once the public is educated about the City's program, the City can begin to utilize public information and other selected alternatives to remind the public about what it has learned and how to participate. The City will examine the feasibility of utilizing and expanding upon the alternatives listed in the "Public Education" portion of Program Alternatives.

In addition to the expansion of existing efforts to educate the public about the source separation of recyclables, the City will begin to stress the importance of waste reduction and composting throughout all of the program's written, visual, and oral communications. For example, residents will be educated and informed of ways to compost (both at home and through the City collection service), to minimize their use of excessive packaging, and to remove their names from zip code lists that result in excessive "junk mail" being directed to their homes. Further, residents will be encouraged to advocate the use of recyclable materials at their place of work, and to purchase goods containing recyclable materials content.

PUBLIC INFORMATION

Public information is a vital part of the source reduction and recycling program and requires a broad variety of targeted information, programs, and activities to reach Sunnyvale residents. By utilizing the suggestions made in this section, the City can inform large audiences about recycling, source reduction, and composting; thus further stimulating interest and participation in the program. Since it is necessary to inform as many residents as possible, all alternatives in the section will be implemented or expanded.

Advertising & Publicity

By using printed materials, press releases, articles, public service announcements, television and radio spots, and special reports, the City will be able to reach residents, businesses, and institutions. Because repeated thematic advertising and publicity remind the public of the steps it can take to follow the City's source reduction and recycling program, the following new or expanded programs will be implemented:



- direct mail from the City to Sunnyvale residents, reminding them of the importance of participating in the City's source reduction and recycling program
- solid waste and recyclables collection vehicles, as a visible component of the source reduction and recycling program, should have logos that remind residents to reduce, reuse, recycle, and compost
- a creative theme, slogan, and mascot should be adopted to serve as reminders to the public to participate in the program; celebrity spokespeople, if appropriate, can be utilized as well
- print advertising, as identified in Program Alternatives, should be used widely to publicize the City's source reduction and recycling program
- electronic media publicity, as identified in Program Alternative, could be used widely to publicize the City's source reduction and recycling program

Events & Promotions

Events and promotions can be utilized to create interest in the program and can also serve as reminders to the public about participating in the City's program. For these reasons, all the alternatives listed in the "Events & Promotions" portion of Program Alternatives will be implemented or expanded.

COMMUNITY INTERACTION & RELATIONS

Community interaction and relations encompass a number of alternatives, including meetings and other organizational approaches. The City will evaluate the feasibility of utilizing and expanding upon the alternatives listed in the "Community Interaction & Relations" portion of Program Alternatives. This portion is an important factor in enhancing public understanding of the City's program and encourages the community to function cohesively in achieving recycling and source reduction goals.



Meetings

Meetings can provide a flexible means for the exchange of ideas and for discussion. Public hearings allow the public to receive information, ask questions, and voice opinions. Site visits to waste management facilities furnish opportunities to clearly understand the many dimensions of the solid waste system based upon direct observation and discussion of specific conditions and needs. Citizen advisory bodies (formally appointed representative citizen groups) accommodate continuous two-way communications with a representative body. These bodies can help to build a well-informed group of citizens who understand problems, solutions, and the program. Citizen task forces supply in-depth information on issues and are often used to rise above agency jurisdictional boundaries where this is required for solutions. Workshops allow multi-level communication and are a good learning experience for both the public and government representatives. They provide a good format for the use of various techniques such as role playing, values clarification exercises, and small group discussion methods.

Organizational Approaches

Citizen representation on policy bodies permits citizens to participate in decision making and encourages commitment to implement a resulting plan. A City-run public information center and a telephone "hot line" on source reduction, composting, recycling, and household hazardous waste will assist residents in gaining access to relevant information. It could also serve as a basis for coordinating public involvement activities and for maintaining mailing lists, records of participation, and other activities.

The City will encourage or consider requiring hospitals to distribute informational pamphlets on reusable diapers to new parents. The pamphlet would include information on the benefits of reusable products, and the need to reduce the generation of solid waste and the flow of untreated feces and urine into the solid waste stream. The City and County of San Francisco, among others, have developed such a pamphlet for distribution through hospitals.

YOUTH EDUCATION

While extensive outreach, education, and promotion will be directed toward adults, a priority will be to educate the youth population. Educating youths about source reduction and recycling procedures and values will influence older members of the population. This will help



in achieving solid waste management goals over both the short- and long-term. Because emphasizing source reduction and recycling habits to children engenders good source reduction and recycling habits in them as adults, the alternatives listed in the "Youth Education" portion of Program Alternatives will be implemented or expanded.

COMMERCIAL SECTOR INFORMATION & TECHNICAL ASSISTANCE

See the Program Selection portion of Section 3 (Source Reduction) and Section 4 (Recycling) for a discussion of the approaches the City will take in developing its commercial source reduction and recycling education and outreach program.

PROGRAM IMPLEMENTATION

The education and public information program will seek to integrate and reinforce each individual component, whether it is source reduction, composting, recycling, or related.

Program costs (for staffing and program materials) are expected to be approximately \$200,000 annually, with slightly more funding for residential sector programs than for commercial sector programs. Of this amount, monitoring costs (mostly staff time) are expected to be 5% to 10% of the annual program cost. Approximately 2,000 to 3,000 hours per year of staff time is estimated to be needed to implement the education and public information program. Wherever possible, volunteers will be encouraged to assist in the education and public information outreach programs, with City guidance. Funding will be provided by the refuse collection and disposal budgets.

The Program implementation schedule for public education and publicity is shown in Table 7-1.

MONITORING & EVALUATION

The City will monitor and evaluate education and public information activities to determine their effectiveness in meeting overall program objectives. Data will be gathered by the City both



Table 7-1. City of Sunnyvale Education & Public Information Implementation Timeline

| Task | Date |
|---|-----------|
| General | |
| Adopt source reduction and recycling slogan and mascot | 4-92 |
| Launch publicity campaign | 6-92 |
| Consider establishing citizen-advisory group on source reduction and recycling education and public information | 7-92 |
| Source Reduction | |
| Begin developing residential/commercial source reduction and recycling materials | 1-92 |
| Begin distributing residential source reduction and recycling materials | 3-92 |
| Begin distributing commercial source reduction and recycling materials | 7-92 |
| Begin encouraging commercial sector to adopt source reduction as explicit goal | 2-92 |
| Begin encouraging manufacturers to participate in industrial waste exchanges | 7-92 |
| Assemble directory of local second-hand shops | 1-92 |
| Begin developing household hazardous waste reduction materials | 5-91 |
| Begin distributing household hazardous waste reduction materials | 9-91 |
| Begin developing home composting education and promotion program | 7-92 |
| Begin developing education and public information materials | 1-93 |
| Begin creating demonstration sites | 3-93 |
| Begin promotional campaign | 3-93 |
| Begin developing master composters program | 3-93 |
| Composting (If collection begins 7-92) | |
| Begin developing education and public information materials | 2-92 |
| Begin distributing education and public information materials | 5-92 |
| Recycling | |
| Begin distributing updated education and public information materials | 5-91 |
| Begin establishing Block Leader Program | 7-92 |
| Establish telephone hot line | 6-92 |
| Implement environmental leadership program at local high schools | 5-92 |
| Commercial Sector Recycling | |
| Begin developing education and public information materials | 2-92 |
| Begin distributing education and public information materials | 7-92 |
| Begin distributing commercial recycling manual | 1992-1993 |



**Table 7-1. City of Sunnyvale Education & Public Information Implementation Timeline
(Continued)**

| Task | Date |
|--|-------------|
| Special Waste | |
| Begin developing education and public information materials on batteries, construction and demolition debris, tires, and other special waste | 2-91 |
| Begin distributing education and public information materials | 4-91 |
| Household Hazardous Waste | |
| Expand education and public information programs | 9-91 |



regularly (e.g., charting the number of phone calls received by the "hot line" on various topics) and periodically (e.g., resident surveys, quality circles).

Criteria for evaluating the program include:

- Was the program established on time and within budget?
- Were personnel in place to ensure effective implementation of programs?
- Were activities developed to meet all pertinent environmental regulations?
- Are diversion goals being met?

Where appropriate, data will be gathered by the City to assist in determining program effectiveness. This data could include:

- number of volunteers in Block Leader and master composter programs
- number of schools and students exposed to various programs
- number of businesses taking part in programs
- number and size of pertinent community events
- number and frequency of media advertising events
- surveys conducted to determine awareness and participation levels for various components (e.g., percent of multi-family dwellings that recycle)
- number of requests for information

Education and public information programs are flexible, and therefore can be modified relatively quickly and easily. However, program details should not be changed unless absolutely necessary, for residents often react negatively to being asked to alter their behavior and patterns after they have recently habituated themselves to a new system. Should the program require changes based on a waste diversion shortfall, modifications to both the approach of the education and public information program and its content would be appropriate and necessary.

Funding Component



SECTION 8

FUNDING COMPONENT

The City's municipal code provides that rates for refuse collection shall be established by City Council resolution. The City has entered into a new collection agreement effective December 1, 1990 with Specialty Garbage and Refuse Service, Inc. The company pays an annual franchise fee (\$0.5 million) to the City, which in turn agrees to pay the company an annual fee (\$7.1 million) to cover collection of all refuse in the City.

Funding of solid waste collection and disposal comes directly from refuse collection customers to the City. Funds are accumulated in and paid from an Enterprise fund called the Solid Waste Fund. The solid waste fund pays for all solid waste-related programs, including refuse collection, refuse disposal, recycling collection from residences and small- to medium-size businesses, household hazardous waste events, and the planned yard waste collection and recycling program, as well as all costs associated with operation, closure, and post-closure maintenance of the Sunnyvale Landfill. The City operates under a ten-year budget designed to predict future costs and plan adequate funding well in advance of the need for funds. The current (1990-91) rate structure is attached as Appendix D. The residential refuse rate is a flat fee applied to individual residential units, whether the household participates in the service or not, and regardless of the amount of trash prepared for disposal by residents. The rate structure covers all services, including yard waste pick-up, curbside recycling, and household hazardous waste collection and disposal. A commercial refuse collection rate is applied not only to commercial businesses and industries, but also to multifamily units with a central collection area.

The following areas must be addressed regarding the overall source reduction and recycling program:

- evidence of sufficient funding for program planning, development, implementation, and monitoring
- cost estimates for programs scheduled for implementation by 1995
- revenue sources
- sources of contingency funding



FUNDING

While funding is not provided by AB 939, the regulations based on this law allow municipalities to levy fees (either directly on residents or passed through costs from the waste hauler) to pay all program costs. The City intends to make adjustments to its existing rate system to fund the implementation of the provisions of AB 939 and other applicable legislation. This approach can readily accommodate changing economic conditions, including unexpected developments.

The City's refuse collection rate structure must be re-evaluated so that residential users receive clear and substantial economic incentives to reduce and recycle their solid waste. The importance of structuring incentives for source reduction and recycling into the rate system cannot be overemphasized. Volume-based user fees for refuse collection, combined with relatively lower (or no) fees for collection of source-separated yard waste and recyclables, will provide a direct economic incentive to reduce the amount of waste generated and to reuse and recycle as much as possible.

The local jurisdictions of Santa Clara County, including the City of Sunnyvale, are discussing the advisability of a special fee to fund programs developed in response to AB 939. This fee would be charged on tons disposed at all landfills in the County and rebated to each local jurisdiction to pay for implementation of the Source Reduction and Recycling Element. The City will continue to examine the advisability of using such a funding source to supplement or replace funding for implementation of AB 939 from refuse rates.

PROGRAM COST ESTIMATES

Annual program cost estimates through 1995 are presented in Table 8-1.

REVENUE

Adjustments to the refuse collection and disposal rate structure will be made to offset increases in program costs associated with implementation of the Source Reduction and Recycling



Element. The City projects that it will need to raise an additional \$2,675,000 to \$3,275,000 per year in revenues from this source to cover these costs.

The City will encourage the commercial sector to recycle, whether through the City's hauler or a business' own contractor. The City understands that foregone gross revenues from solid waste fees for the collection and disposal of commercial sector solid waste may exceed the reduction in solid waste collection and disposal costs. The City will reconcile any of these potential differences in gross revenues and costs through adjustments in refuse collection rates.

CONTINGENCY FUNDING

Contingency funding must be available on short notice to meet unforeseen emergencies (such as sudden and excessive downtime at the City's Recycling Center or the Sunnyvale Materials Recovery and Transfer Station). Contingency funding will allow for the establishment of alternative collection strategies or processing arrangements with other communities. If contingency funding is necessary to preserve the health and welfare of the City, the City Council has the power to implement an emergency surcharge to existing rates. In addition, the City could capitalize a contingency fund as it constructs the materials recovery facility (MRF). The contingency fund would be used as a buffer in an emergency, and would be reflected in the capital costs of the MRF. Finally, the City could make an arrangement with a nearby jurisdiction or a merchant MRF to accept the City's recyclable's should the need for such a contingency arise.



Table 8-1. City of Sunnyvale Estimated Annual Program Costs, 1991-1995 ¹⁾

| Component | Estimated Annual Costs (Excluding Collection) | Estimated Annual Costs (Including Collection) |
|---------------------------|--|--|
| Source Reduction | \$100,000 | \$100,000 |
| Recycling ¹⁾ | \$500,000 - 750,000 | \$850,000 - 1,200,000 |
| Composting | \$400,000 - 450,000 | \$1,225,000 - 1,725,000 |
| Education | \$200,000 | \$200,000 |
| Household Hazardous Waste | \$200,000 - 400,000 | \$200,000 - 400,000 |
| Special Waste | \$100,000 | \$100,000 |
| TOTAL | \$1,500,000-\$2,000,000 | \$2,675,000 - \$3,275,000 |

¹⁾ Excludes commercial collection costs, which cannot be estimated at this time.

Special Waste Component



SECTION 9

SPECIAL WASTE COMPONENT

Special wastes are wastes which require special collection, processing, and disposal procedures due to their physical, chemical, or biological characteristics. The Special Waste Component addresses the proper handling, reuse, and long-term disposal practices for special wastes.

According to State regulations, the focus of the Special Waste Component is not necessarily to institute any type of recycling mechanism for special wastes, but rather to reduce the "hazard" posed by these wastes. If current management practices and facilities for certain special wastes are in compliance with applicable regulations, then no new management programs need to be developed. Conversely, if current management practices are inadequate, the component must contain a plan for developing an appropriate special waste management program.

OBJECTIVES

SHORT-TERM PLANNING PERIOD

During the short-term planning period (through the year 1995), the main objective is to promote and refine existing programs, to implement a salvaging program at the landfill and SMaRT station for tires and white goods, and to evaluate the feasibility of diverting construction and demolition debris at the SMaRT station. This program will result in an overall diversion of approximately 8% of the City's generated municipal solid waste in 1995.

MEDIUM-TERM PLANNING PERIOD

During the medium-term planning period (through the year 2000), the main objective is to reevaluate the programs in place and add construction and demolition debris to the salvaging operations at the SMaRT station in order to reach the diversion of 9% of the waste generated by the City of Sunnyvale.



TARGETED MATERIALS

Article 6.1 of the Emergency Regulations defines special wastes as:

- ash
- nonhazardous sewage sludge
- nonhazardous industrial sludge
- asbestos
- auto shredder waste
- auto bodies

Other special wastes in the City of Sunnyvale's waste stream include:

- white goods
- tire waste
- used batteries
- oil
- construction and demolition debris
- infectious wastes

A description of targeted materials identified as special wastes follows:

Ash -- Ash or ashes refer to the residue from the combustion of any solid or liquid material.

Sewage Sludge -- Sewage sludge is the waste derived from the treatment of wastewater by water pollution control plants. Depending on its content, sewage sludge may be classified as nonhazardous; if dewatered sewage sludge meets the criteria of the State Water Resources Control Board, it may be disposed of in a municipal landfill. If the sewage sludge contains significant levels of "heavy metals" (i.e., copper, cadmium, chromium, lead, nickel, mercury or zinc) it is considered to be hazardous.



Industrial Sludge -- Industrial sludge is generated by industries which operate pre-treatment plants for industrial wastewaters. Such pre-treatment is usually required when the industrial wastewater contains materials which can pose a hazard to the safe and effective operation of publicly owned treatment plants. Industrial sludges may contain constituents which require the sludge to be classified as a hazardous waste, thus requiring disposal at Class I landfills.

Asbestos -- Asbestos is a naturally-occurring, microscopic, fibrous mineral substance. It is frequently found in building insulation and ceiling decoration. When disturbed, asbestos fibers may become suspended in the air for many hours, exposing landfill operators to fibers through inhalation. It has been clinically proven that asbestos is a carcinogen which can cause lung cancer and other respiratory problems. Asbestos is only hazardous when airborne.

Auto Shredder Waste -- Auto shredder waste is generated from the shredding of automobiles, discarded household appliances such as white goods, and sheet metal. The resulting ferrous and non-ferrous metals are shredded, separated, and sold for resmelting. The remaining materials, consisting largely of upholstery, paint, plastics, and other non-metallic materials are referred to as "shredder" waste or "fluff." No auto shredder waste is disposed by the City of Sunnyvale.

Automobile Bodies -- Automobile bodies refer to the "dead" cars which are no longer useful for transportation. These have usually been stripped of all useable parts. A DMV Destruction Permit is required for landfill disposal.

White Goods -- White goods are large, worn-out, or broken household and industrial appliances such as stoves, refrigerators, and clothes washers and dryers. These present a significant volume/space landfill problem because they are difficult to compact. The Freon utilized in refrigerators is hazardous when it is released into the atmosphere. Also, a large release of Freon, which is possible if a loader/tractor were to crush a refrigerator, could injure the operator.

Tire Waste -- Used tires are an inert waste and may legally be disposed in any type of landfill. Landfilling tires presents some special difficulties because tires are resilient and have a tendency to "float" to the landfill surface where they can serve as a habitat for rats and mosquitos.

Used Batteries -- Automobile batteries contain lead suspended in liquid which can potentially contaminate the soil and groundwater. Non-automobile batteries contain mercury, nickel, cadmium, silver, manganese, zinc, and steel.



Used Oil -- Used oil in California is classified as a hazardous waste under California law (California Health & Safety Code #25250-25250.24, created in 1986 by the passage of State Bill 86). SB 86 requires DHS to manage used oil as a hazardous waste (California Health & Safety Code #252509.4), and requires generators, haulers, and recyclers to abide by various record-keeping and reporting requirements appropriate to hazardous waste management. In order to encourage recycling, however, small used oil deposit stations (i.e., service stations or recycling centers) are exempt from normal DHS hazardous waste facility permitting requirements when accepting and separately storing residential motor oil.

Used oil is basically refined crude oil which has become contaminated with various impurities and is no longer suitable for its original use. It may be defined as:

- Any oil that has been refined from crude oil and, as a result of use, has been contaminated with physical or chemical impurities.
- Any oil that has been refined from crude oil and, as a consequence of extended storage, spillage, or contamination with nonhazardous impurities such as dirt and water, is no longer useful to the original purchaser.
- Spent lubricating fluids which have been removed from an engine crankcase, transmission, gearbox, or differential of an automobile, bus, truck, vessel, plane, heavy equipment, or machinery powered by an internal combustion engine.
- Spent industrial oils, including compressor, turbine, and bearing oil, hydraulic oil, metal-working oil, refrigeration oil, and railroad drainings.
- Contaminated fuel oil with a flash point greater than 100°F.

Construction and Demolition Debris -- Construction and demolition debris consists of a variety of waste materials from the construction, repair, or demolition of buildings, bridges, pavements, and other structures. These materials include: steel, asphalt, concrete, brick, plaster, wallboard, piping, and wood. The City includes pallets in this category.



EXISTING PROGRAMS

PROGRAM DESCRIPTION

White Goods -- There are two existing collection programs for used white goods in the City of Sunnyvale:

- the City's "Spring and Fall Cleanup Programs"
- collection by two non-profit community organizations

The Spring and Fall Cleanup Program offers residents four days per year to dispose of bulky items for free. All white goods are collected, but the compressor units must be removed from refrigerators before they will be accepted. The City currently landfills the collected white goods.

Tires -- The Sunnyvale Landfill currently accepts used tires. The rate for disposal is high in order to discourage landfill disposal. Auto tires are \$2.92 per tire and truck tires are \$8.39 per tire. Landfill records indicate that a total of 515 tires were received during the two spring cleanup weekends and landfilled. The landfill will only accept small amounts of tire waste. A large or commercial truck load will be turned away at the gate. In many instances the tires are mixed with other loads.

Used Batteries -- The City of Sunnyvale Recycling Center, which is located at 1442 Borregas Avenue, accepts used automobile batteries. The batteries are temporarily stored on site until arrangements are made with San Jose Battery Exchange for delivery. The Battery Exchange pays the Sunnyvale Recycling Center \$1.00 per battery. In 1989, a total of 500 batteries were handled through the Recycling Center facility. The landfill does not accept used automobile batteries.

Non-automobile batteries are usually disposed at the landfill. An exception to this practice is the disposal of these materials on the City of Sunnyvale's biannual Household Hazardous Waste collection days.

Construction and Demolition Debris -- Some construction and demolition debris is stored in debris boxes which are picked up by Specialty Solid Waste and Recycling Company and disposed at the landfill. The Sunnyvale Landfill classifies pallets and tree stumps as construction



and demolition debris. Most construction/demolition debris is usually separated from other solid waste since its contents are relatively inert and the requirements for disposal of such waste are not as stringent as the requirements of municipal solid waste.

During the period January to September 1990, a total of 14,432 cubic yards of demolition material, 295 cubic yards of asphalt material, and 1,088 cubic yards of concrete were landfilled. These figures were compiled from the Sunnyvale Sanitary Landfill Daily Weights and Yards, January-September 1990.

The City of Sunnyvale Public Works Department, and many contractors within the City of Sunnyvale, deliver asphalt, concrete, and dirt to the Raisch Products Recycling Facility on Borregas Avenue. Raisch recycles the materials to produce asphalt and aggregate bases. In 1989, the City and various Sunnyvale contractors recycled 14,906 tons of materials at the Raisch Products Recycling Facility. The current cost to contractors for disposal of clean concrete, concrete with rebar, and asphalt at the Raisch Products Facility is as follows:

| Truck Size | Clean Concrete | Concrete w/Rebar | Asphalt |
|----------------------|----------------|------------------|---------|
| End Dump (21 tons) | \$85 | \$200 | \$30 |
| 10 Wheeler (12 tons) | \$60 | \$100 | \$20 |
| Bobtail (7 tons) | \$30 | \$ 50 | \$15 |

The Raisch Products Recycling Facility is regulated by the Bay Area Air Quality Management District (BAAQMD) as an Air Pollutant Emitting Source.

Infectious Waste -- Infectious (biomedical) wastes are generated at Idylwood Convalescent Hospital and Sunnyvale Convalescent Hospital. Idylwood Convalescent Hospital incinerates all infectious wastes on site. Sunnyvale Convalescent Hospital contracts with Browning-Ferris, Inc. to pick up and dispose of infectious wastes.

Sewage Sludge -- Municipal sewage sludge is currently stockpiled at the City of Sunnyvale Wastewater Treatment Plant and has been classified as a non-hazardous waste.



The Sunnyvale Water Pollution Control Plant is regulated by the State of California Water Resources Control Board which governs all waste applied to land under Subchapter 15. The local San Francisco Bay Regional Water Quality Control Board regulates the Sunnyvale Plant through the National Pollution Discharge Elimination System Permit (NPDES). The current Permit requires a Characterization Study of the two sludge lagoons and a Waste Minimization and Source Control Study of inflow into the sanitary sewer. The Bay Area Air Quality Management District regulates the Plant as an Air Pollutant Emitting Source. The areas regulated are: Pretreatment, Primary Treatment, Secondary Treatment, Disinfection, Tertiary Treatment, Sludge Handling, and the Anaerobic Digesters. The applicable permit information for the Sunnyvale Water Pollution Control Plant is as follows:

NPDES Permit Number CA0037621
BAAQMD Plant Number 733
Source #160 - Sludge Handling
Source #170 - Anaerobic Digesters

Industrial Sludge -- Industrial sludge from pretreatment processes is treated as a hazardous waste and disposed accordingly, as required by the Department of Health Services.

Asbestos -- There is currently no material specifically identified as asbestos being disposed at the Sunnyvale Landfill. However, it is possible that materials containing asbestos could be mixed within the construction and demolition debris disposed at the landfill.

Used Oil -- Single-family residences are each provided with a covered gallon plastic jug for used oil. This material is collected by the crew of the curbside recycling program; an empty container is left for future use. The waste oil jugs are delivered to the City of Sunnyvale Recycling Center where they are emptied and stored in a 2,000-gallon tank. Residents of apartments and condominiums are not provided with this curbside service. They are given plastic jugs for used oil, but must deliver these to the recycling center themselves. During 1989-90, approximately 34,000 gallons of used oil was recycled at the City's recycling center. This oil is periodically picked up by Refinery Services of Patterson, California. The City does not receive any financial compensation for the oil.

The City's SMaRT station will be regulated by the BAAQMD and the California State Integrated Waste Management Board (CIWMB). The City of Sunnyvale has approved a Conditional Use Permit for the SMaRT station. With the City's approval, application will then be submitted to both the BAAQMD and the CIWMB for permits.



QUANTITY OF WASTE DIVERTED

White Goods -- The current diversion of white goods from the solid waste stream consists of approximately 50 tons per year (TPY) by two private non-profit organizations. This is a 0.02% diversion of all solid waste generated by the City.

Used Batteries -- During 1989, 500 automobile batteries were diverted from the municipal solid waste stream. These were handled through the City of Sunnyvale Recycling Center. Because of limited recyclability, small household batteries are not currently diverted.

Construction and Demolition Debris -- During 1989-90, a total of 26,268 tons of used concrete, concrete with rebar, and asphalt were diverted from the solid waste stream and processed through the Raisch Products Recycle Facility. Assuming approximately 15,000 tons were recycled in 1990, 7.5% diversion of the total waste generated occurred through construction and demolition debris recycling.

Used Oil -- During 1989, a total of 34,000 gallons of used oil was processed through the City of Sunnyvale Recycling Center.

FUTURE STATUS OF PROGRAMS

Used Automobile Battery and Used Oil Collection -- These programs will remain in place, for they help to prevent toxic materials from entering the waste stream. Both material categories are hazardous wastes and unacceptable for disposal at a Class III landfill. Other batteries may be dropped off at household hazardous waste collection events.

Construction and Demolition Debris -- The City should evaluate the feasibility of continuing to lease property to Raisch Products Recycling in order to support the recycling of concrete and asphalt.

No existing programs will be decreased in scope, phased out, or closed during the short- and medium-term planning periods.



FACILITIES

The Sunnyvale Water Pollution Control Plant is regulated by the State of California Water Resources Control Board, which governs all waste applied to land under Subchapter 15. The local San Francisco Bay Regional Water Quality Control Board regulates the Sunnyvale Plant through the National Pollution Discharge Elimination System Permit. The current Permit requires a Characterization Study of the two sludge lagoons and a Waste Minimization and Source Control Study of inflow into the sanitary sewer.

The Bay Area Air Quality Management District regulates the Plant as an Air Pollutant Emitting Source. The areas regulated are: Pretreatment, Primary Treatment, Secondary Treatment, Disinfection, Tertiary Treatment, Sludge Handling, and the Anaerobic Digesters. The City is currently contracting with a company for analysis of sewage sludge disposal options. Sewage sludge diversion will not count toward AB 939 goals at this time.

The Sunnyvale Materials Recovery and Transfer Station (SMaRT station) will be regulated by the Bay Area Air Quality Management District and the California State Integrated Waste Management Board. The City of Sunnyvale has approved a Conditional Use Permit for the SMaRT station. With the City's approval, application will then be submitted to both the BAAQMD and the CIWMB for permits.

The Raisch Products Recycling Facility is regulated by the Bay Area Air Quality Management District as an Air Pollutant Emitting Source.

Applicable permits include:

Sunnyvale Water Pollution Control Plant

NPDES Permit Number CA0037621
BAAQMD Plant Number 733
Source #160 - Sludge Handling
Source #170 - Anaerobic Digesters

Raisch Products Recycling Facility

BAAQMD Plan Number 1994
Source #101 - Jaw Feeder/Crusher
Source #102 - Cone Crusher
Source #103 - 3-Deck Screen
Source #104 - Grizzly Feeder
Source #105 - Portable Crusher
Source #106 - 2-Deck Vibrating System
Source #107 - Conveyor System



Source #108 - Stockpile
Source #109 - Haul Roads
Source #110 - Diesel Generator

EVALUATION OF PROGRAM ALTERNATIVES

There are several alternatives for the diversion of special wastes from landfilling. The following alternatives are described and evaluated in this section:

- Salvaging at Solid Waste Disposal Facilities
- White Goods Collection Days
- Construction and Demolition Debris Recycling
- Landfill Ban on Whole Tires
- Continuation of Used Oil Collection

SALVAGING AT SOLID WASTE DISPOSAL FACILITIES

Salvaging operations manually recover reusable materials from mixed waste delivered to a landfill or transfer station. Salvaging can be relatively inexpensive in many instances because of the use of existing site staff, equipment, and available space for sorting and storing materials until they are transported to market. Materials generally diverted through salvaging operations include white goods, tires, and construction and demolition (concrete, wood, asphalt, etc.) debris.

A salvaging area must be sufficiently large enough to accommodate loading and unloading of materials, separation of materials, and storage of recovered materials. Site staff probably would be responsible for conducting the salvaging operations. Required equipment would likely include a forklift. Recovered materials would be stored until an adequate quantity is accumulated to make transportation to market economically feasible.



Effectiveness

Materials to be diverted through a salvaging program include white goods, tires, and construction and demolition debris. The quantities available for diversion (assuming continuation of existing diversion programs) are given in Table 9-1.

Hazards

Health and safety hazards associated with salvaging at solid waste disposal facilities include working in close proximity to large equipment and machinery and other hazards which typify regular work at such facilities. The hazards are known and controlled by implementing health and safety codes, which should already be in place at the solid waste disposal facility. The primary hazards of salvaging are related to moving heavy items. Site personnel must be trained in proper lifting and moving techniques, as well as forklift operation. In addition, special care must be exercised when handling refrigeration units that contain Freon, which is a health hazard when it vaporizes. Proper handling of construction and demolition debris would be required to prevent injury from jagged edges and protruding nails. Salvaging may also impact traffic flow at the disposal facility, requiring changes in traffic design.

Tires are combustible. When fires occur in large stockpiles of tires, they are difficult to extinguish, with potentially significant consequences in terms of air and water pollution. The risk can be significantly reduced by limiting the number of tires and the residence time, and by providing proper handling, storage, and fire control facilities. It is recommended that access to a dedicated tire storage area be restricted to avoid vandalism and that the number of tires and residence time be limited to the extent feasible.

It is estimated that less than 500 tires would be stockpiled at a time in order to avoid the need to change the Solid Waste Facilities permit for the landfill to allow more than 500 tires. A stockpile of 499 tires on the landfill could result in a stack that is about 100 ft wide and 10 ft high. It could cause a significant visual impact on recreationalists using the levees along the bay. The impact would be reduced to insignificant if substantially fewer tires are stored onsite at any one time, if tires are stored in a number of smaller stockpiles rather than one large stockpile, or if they are stored where topography blocks their visibility from recreationalists. The potential impact would be over the short-term. Storage of tires at the proposed SMaRT station would not significantly increase aesthetic impacts at the station.



Table 9-1. Potential Diversion by Salvaging (TPY)

| Material Type | Amount Available (1990) | Potential Diversion Rate (%) | Potential Amount Diverted |
|------------------------------------|-------------------------|------------------------------|---------------------------|
| White Goods | 142 | 90 | 128 |
| Tires | 1,563 | 90 | 1,407 |
| Construction and Demolition Debris | 15,126 | 70 | 10,588 |
| TOTAL | 16,831 | 72 | 12,123 |



Ability to Accommodate Change

Salvaging can be very adaptable to changing economic and technological conditions. For example, if certain materials become more or less valuable for recycling, the program can either add or delete these materials from the salvaging process.

Consequences on Waste Stream Composition

Salvaging could remove recyclable white goods, used tires, and construction and demolition debris from the waste stream. Landfilled materials would contain fewer potentially recyclable materials.

Ability to be Implemented

Salvaging potentially could be implemented at the landfill in the short-term planning period.

Need for Facilities

Salvaging uses existing facilities at the landfill and the planned SMaRT station. Some minor modifications of those facilities may be required.

Consistency with Local Policies, Plans, and Ordinances

Salvaging does not conflict with local policies, plans, or ordinances, although some modifications may be necessary.

Institutional Barriers to Implementation

There are no institutional barriers preventing implementation of this alternative.



Costs

Landfill salvaging requires some of the equipment already utilized at the landfill. Additional equipment, such as storage containers and vehicles, may be needed. The program may also require additional staff/management. The estimated annual cost of salvaging is \$50,000.

Market Availability

Markets are available for the materials recovered in this collection program. A sample of specific potential buyers is provided in Appendix B. Additional markets may be available.

WHITE GOODS COLLECTION DAYS

White Goods Collection Days are specified days throughout the year when residents can set out white goods for collection or take white goods to a designated location for recycling. Generally, this program is offered twice during the year: once during spring cleanup and again later in the year. The City may offer white goods collection days in conjunction with the current Spring and Fall Clean-up Days. Instead of the current policy of landfilling the white goods collected on collection days, these items would be recycled in the future.

If the quantity of white goods collected is sufficient and the distance to the market is considerable, one or several large trucks could transport materials collected to market at the end of the day. If the scrap metal dealer contracted to buy (or receive) the white goods is local, curbside collection vehicles could deliver the materials directly to the dealer and white goods which had been dropped off could be transported at the end of the day.

Curbside collection of white goods would require vehicles, staff, proper moving equipment or specialized vehicles, and an effective advertising campaign. Arrangements could be made to assist older or debilitated residents who are unable to move the appliances to the curbside.

Drop-off collection for white goods would require centralized collection points with adequate space for parking, loading and unloading, and holding accumulated white goods for transport to market at the end of the day. Convenient and accessible collection points include school yards, shopping center parking lots, and drive-in theaters. Drop-off collection would require staff, moving equipment such as a forklift, vehicles for transporting white goods to a scrap



metal dealer, and an effective advertising campaign. The City would consider requiring the removal of refrigerator and freezer doors to prevent possible entrapment.

Coordination and advertising are the key aspects of this alternative. The success of White Goods Collection Days depends on a thorough advertising campaign, which should be implemented two to three months before the event. Dates, times, and locations should be emphasized and consistent throughout the advertising campaign.

Effectiveness

The potential effectiveness of a white goods collection day is given in Table 9-2.

Hazards

This alternative poses hazards related to handling and transporting bulky items. Personnel must be trained in proper lifting and moving techniques and forklift operation, if applicable. Special care must be exercised when handling refrigerators, freezers, and air conditioners which contain Freon, which is hazardous if inhaled.

Ability to Accommodate Change

This alternative can easily accommodate change. Events can be held with greater or lesser frequency, depending upon the need. The locations of the program can be increased or decreased in number, and the items accepted for collection can be changed as necessary.

Consequences on Waste Stream Composition

This alternative will significantly reduce the amount of noncompactable inert items being landfilled. It will also reduce the amount of metal that is landfilled.

Ability to be Implemented

This alternative can be planned and implemented in the short-term planning period.



Table 9-2. Potential Effectiveness of White Good Collection Days

| Amount Available (TPY) | Potential Diversion Rate (%) | Potential Amount Diverted (TPY) |
|------------------------|------------------------------|---------------------------------|
| 142 | 25 | 35 |



Need for Facilities

This alternative does not require new facilities.

Consistency with Local Policies, Plans, and Ordinances

Drop-off locations must be chosen where they do not conflict with zoning ordinances.

Institutional Barriers to Implementation

There are no institutional barriers to implementation of this program.

Costs

Assuming two collection days per year, the annual program cost (including personnel, vehicles, and advertising) is approximately \$10,000.

Market Availability

A sample of potential local markets is listed in Appendix B. Other markets may be available.

CONSTRUCTION & DEMOLITION DEBRIS RECYCLING

Certain types of construction and demolition debris can be recycled if they are segregated by material type. Markets for these materials are available (see Appendix B).

An effective construction and demolition debris recycling program can be accomplished through an active education program that targets concrete, asphalt, and construction wood waste generators, as well as modification of the landfill rate structure for these materials which provides economic incentives for taking the material to a recycling operation. The generators would need to presort construction and demolition debris into four categories: clean concrete, concrete with rebar, asphalt, and wood waste. Wood waste with nails is generally accepted by



recyclers; however, all fittings must be removed. Also, wood (shingles) with petroleum based coatings are not recyclable.

Effectiveness

This alternative could result in a diversion (assuming continuation of existing diversion programs) of approximately 13,600 tons of bulky waste from the solid waste stream annually; see Table 9-3.

Hazards

In its current status, this alternative does not pose any hazards. Expansion of the operation could result in unstable slope conditions of the stockpiled materials and of the underlying landfill. It is recommended, as a mitigation, that any proposed expansion of stockpiling on top of the City of Sunnyvale Landfill undergo separate engineering review when specific details are known, to ensure that slope stability is maintained. Expansion of the operation could result in additional dust, noise, and visual impacts which could affect recreationalists using the proposed Baylands Park or on trails along the bay, and the Water Pollution Control Plant (WPCP). The predominant wind direction is from the north, which is away from the bay and the WPCP. If a specific proposal for expansion is made, additional review would be required. Significant dust impacts could be prevented through watering, use of a dust palliative, or enclosing the crushing equipment. Measures which may reduce noise impacts include shielding sensitive areas from equipment noise through an enclosure or berms, and restricting hours of operation to avoid times when background noise is low.

Ability to Accommodate Change

As markets change for recyclable materials, waste disposal fees can be changed to deter landfilling and promote recycling.



Table 9-3. Potential Effectiveness of Construction and Demolition Debris Recycling

| Amount Available (TPY) | Potential Diversion Rate (%) | Potential Amount Diverted (TPY) |
|-----------------------------------|---|--|
| 15,126 | 90 | 13,613 |



Consequences on Waste Stream Composition

This alternative reduces the amount of noncompactable inert items being landfilled, effectively increasing compactability and preserving space in the landfill.

Ability to be Implemented

This alternative can be planned and implemented in approximately four to eight months, within the short-term planning period.

Need for Facilities

Implementation of this alternative requires no new facilities by the City, but may include investment in new equipment by private recycling businesses.

Consistency with Local Policies, Plans, and Ordinances

This type of program does not conflict with local policies, plans, and ordinances.

Institutional Barriers to Implementation

There are no institutional barriers to the implementation of this alternative.

Costs

This type of program should not involve public investment since it relies on private business to actively implement the program. Estimated costs that the City may incur could be as high as \$5,000 annually, to cover program monitoring, administration, and public information.

Market Availability

A sample of potential local markets is listed in Appendix B. Other markets may be available.



LANDFILL BAN ON WHOLE TIRES

The City could implement a ban on whole tires at the landfill, effectively eliminating tires from the landfill; however, alternative means of handling these materials must be identified and brought to the attention of tire waste generators. Markets for waste tires are expected to grow as innovations in recycling technologies emerge over the short- and medium-term. In addition, the public should be notified of the ban well in advance of its implementation. Newspaper ads, flyers, and radio and television time could be used to ensure thorough information distribution. Local recycling options to landfilling tires must be provided with the information on the ban. Disposal services using the landfill will also require adequate time to notify their customers of the ban and to make arrangements to recycle rather than to landfill the tires.

Effectiveness

This alternative could result in the diversion of approximately 1,532 tons of tires per year from the landfill (Table 9-4). It is assumed that almost all of the tires can be diverted from the landfill due to their bulky and easy-to-identify nature.

Hazards

This alternative does not pose any hazards, as long as tires are properly stored and transported. Tires should not be stockpiled in large quantities since they can cause a significant fire hazard. A ban on landfilling tires may cause an increase in illegal dumping.

Ability to Accommodate Change

The landfill ban could be removed if necessary to accommodate changing market conditions.

Consequences on Waste Stream Composition

This alternative will reduce the amount of noncompactable inert waste entering the landfill. It will also remove potential vector habitats.



Table 9-4. Potential Effectiveness of Landfill Ban on Tires

| Amount Available (TPY) | Potential Diversion Rate (%) | Potential Amount Diverted (TPY) |
|------------------------|------------------------------|---------------------------------|
| 1,563 | 98 | 1,532 |



Ability to be Implemented

This alternative can be planned and implemented in the short-term planning period, provided adequate markets exist.

Need for Facilities

This alternative does not require new facilities.

Consistency with Local Policies, Plans, and Ordinances

This alternative is consistent with local policies, plans, and ordinances.

Institutional Barriers to Implementation

There are no institutional barriers to implementing this alternative.

Costs

Estimated costs for the implementation of this alternative could be as high as \$5,000 annually, to cover the costs of program monitoring, administration, and public information.

Market Availability

A sample of potential markets for recycling tires is listed in Appendix B. Other markets may be available now, and are expected to grow in the short- and medium-term.

CONTINUATION OF USED OIL COLLECTION

This alternative involves the continuation and possible expansion of the curbside used oil recycling program currently offered to City residents.



Effectiveness

Approximately 34,000 gallons of used oil per year are diverted by the City of Sunnyvale.

Hazards

An accidental spill of used oil may cause environmental damage if not controlled and cleaned up.

Ability to Accommodate Change

This program is readily adaptable to change.

Consequences on Waste Stream Composition

An expansion of this program may result in less household hazardous waste being disposed at the landfill.

Ability to be Implemented

This program currently exists. It can be expanded in the short-term.

Need for Facilities

No new facilities are required.

Consistency with Local Policies, Plans, and Ordinances

This program is consistent with all local policies, plans, and ordinances.



Institutional Barriers to Implementation

An expansion of the existing program to include multi-family residences is limited to drop-off.

Costs

Costs for this program are included in the costs for residential curbside collection.

Market Availability

The used oil is picked up and recycled by Refinery Services of Patterson, California. Other oil recyclers are available.

PROGRAM SELECTION

The following programs have been selected for implementation in the short-term by the City of Sunnyvale:

- Salvaging of tires and white goods at the landfill and SMaRT station
- Evaluation of feasibility of salvaging construction and demolition debris at the SMaRT station
- Continuation of existing curbside collection of used oil
- City encouragement of County and State activities in market development for recycling of various types of special wastes

Salvaging was chosen because of the low cost associated with the diversion. Continuation of the used oil recycling program was chosen because of the volume that has been historically diverted through this program and because the program is already in existence and is successful.

The used oil collection should continue to divert approximately 34,000 gallons per year.



The potential effectiveness of a salvaging program is given in Table 9-5.

White Goods -- White goods (appliances) will be delivered to the landfill by commercial haulers, appliance dealers, and individuals. The white goods will be stored and periodically delivered to, or picked up by, recyclers. Metal recovered from the white goods will be used to make new products. This system will be included in the operation of the SMaRT station, once it becomes operational.

Tires -- Tires are delivered to the landfill by commercial haulers and individuals. The tires will be stored and periodically either delivered to or picked up by recyclers. Recycled tires can be used for road base, fuel, or they can be recapped for reuse as a tire. This system will be included in the operation of the SMaRT system, once it becomes operational.

Construction and Demolition Debris -- Depending on its composition, loads of construction and demolition debris can be diverted for a variety of recycling purposes, including new construction and boiler fuel. Pre-sorting of construction and demolition debris will be strongly encouraged by the City to facilitate recycling of its constituent materials. Salvaging of recyclable materials from mixed construction and demolition debris at the SMaRT station may also occur.

PROGRAM IMPLEMENTATION

Table 9-6 shows the implementation schedule for the selected alternatives.

MONITORING & EVALUATION

Some of the targeted materials can be tallied by individual count. Records of existing programs present baseline data for evaluation purposes.

White goods are large items. The landfill daily gate tabulation will record receipt of each white good; the City will be presented with a monthly total. A record of the disposal fee received for each will appear on the computer tabulation which the landfill operations contractor forwards to the City on a monthly basis. All white goods can be diverted from landfilling. The receipt re



Table 9-5. Potential Short- and Medium-Term Diversion Rates by Salvaging

| Material | Percent of Total Waste Stream Diverted | |
|------------------------------------|--|-------------|
| | Short-Term | Medium-Term |
| Construction and Demolition Debris | --- | 5.3 |
| White Goods | 0.06 | 0.06 |
| Tires | 0.7 | 0.7 |
| TOTAL | 0.76 | 6.06 |



Table 9-6. City of Sunnyvale Special Waste Implementation Timeline

| Task | Date |
|---|---------|
| White Goods | |
| Identify site for stockpile | 10-91 |
| Modify permit | 10-91 |
| Contact private recycler and arrange for services | 1-92 |
| Incorporate disposal charge in gate fee schedule | 4-91 |
| Begin salvaging at landfill, if feasible | 1992 |
| Begin salvaging at SMaRT station | 1994 |
| Tires | |
| Identify site for stockpile | 10-91 |
| Modify permit | 10-91 |
| Contact private recycler and arrange for services | 10-91 |
| Continue market search | ongoing |
| Begin salvaging at landfill, if feasible | 1992 |
| Begin salvaging at SMaRT station | 1994 |
| Construction and Demolition Debris | |
| Evaluate feasibility of recovery at SMaRT station | 1992 |
| Design and print flyers describing recycling opportunities available and distribute to residents and targeted businesses | 1992 |
| Evaluate construction and demolition debris disposal rates vs. tipping fees at recycling facilities and develop rate structure that provides economic incentive for recycling | 4-92 |
| Implement construction and demolition debris salvaging program at SMaRT station, if feasible | 1995 |
| Used Oil | |
| Continue existing program | ongoing |
| Evaluate feasibility of increasing the number of drop-off sites | 1992 |



ceived from the salvage operation will reflect the gross weight. This represents a dual record -- an individual count and a total weight for diversion records.

Tires are individually counted and recorded in the landfill daily gate tabulation. A specific fee is charged per tire. The landfill operations contractor will forward monthly totals to the City.

Nearly all tires can be diverted from landfilling. The receipt received from the salvage operation and accompanying charge per tire will be a second reference.

The daily landfill gate tabulation designates cubic yards of construction and demolition material landfilled. This represents baseline data for evaluation purposes. A new tabulation covering cubic yards of clean construction and demolition debris that are diverted will be necessary. A record of this should appear on the computer tabulation which the landfill operations contractor forwards to the City on a monthly basis.

Clean, reusable pallets will be separated at the gate and stored in a dedicated area. They can be counted and logged at the gate, and incorporated into the monthly tally submitted to the City by the landfill operations contractor.

Used oil is processed through the City's Recycling Center and periodically picked up by a recycler. Baseline data are available for use as evaluation criteria for the increase in recycled oil realized through program expansion.

The monitoring will require additional recordkeeping by the Sunnyvale Landfill operators. It may be necessary to adjust the current computer program to incorporate the targeted items to be counted or measured and included in the monthly operations report submitted to the City of Sunnyvale.

The City of Sunnyvale can track the increase in diversion by transferring the existing data on the targeted items and updating this on a monthly basis upon receipt of the Monthly Operations Report submitted by the landfill operations contractor. This will facilitate a review of program effectiveness on a regular basis.

Initial adjustments to the recordkeeping program and training operations personnel may require one week of personnel time. Monthly tallies may require ten hours per month of City employee time.



If documentation shows that the materials targeted are not being diverted at a sufficiently high rate, then the following measures could be enacted:

- landfill ban on selected items (tires, white goods, pallets, and other construction and demolition debris)
- raise the fee for proper disposal of the items
- increase public education efforts



Table 9-6. City of Sunnyvale Special Waste Implementation Timeline

| Task | Date |
|---|-------|
| White Goods | |
| Identify site for stockpile | 10-91 |
| Contact private recycler and arrange for services | 1-92 |
| Incorporate disposal charge in gate fee schedule | 4-91 |
| Tires | |
| Identify site for stockpile | 10-91 |
| Contact private recycler and arrange for services | 10-91 |
| Continue market search | 10-91 |
| Batteries | |
| Design and print mailers informing residents of various recycling (drop-off) options for automobile batteries and advocate use of rechargeable household batteries | 7-91 |
| Construction and demolition debris | |
| Evaluate construction and demolition debris disposal rates vs. tipping fees at recycling facilities and develop rate structure that provides economic incentive for recycling | 8-91 |
| Design and print flyers describing recycling opportunities available and distribute to residents and targeted businesses | 10-91 |
| Establish a dedicated area for clean construction and demolition debris storage at the landfill. Determine markets for material and logistics for access | 10-91 |
| Used Oil | |
| Determine the type(s) of containers to be used for collection and purchase | 1-92 |
| Design and print flyers and mail to targeted residents informing them of the new collection service. The brochure can also stress the importance of recycling and the dangers of dumping oil in the storm drain/sewer system, and that there is also a drop-off location at the recycling center on borregas avenue. When appropriate expand the list of drop-off points. | 1-92 |
| Increase the number of drop-off facilities in the City by revising applicable City regulatory documents to require targeted businesses (gas stations, oil change stations, and similar businesses) to accept used oil from residents. | 7-91 |
| Wood Waste | |
| Identify site for pallet storage and site for wood chip source separation and storage | 1-92 |
| If applicable, set cost schedule for sale of pallets and wood chips | 1-92 |
| Coordinate program with pallet recycling firms | |

Integration Component



SECTION 10

INTEGRATION

The California Waste Management Act (AB 939) establishes a state-wide hierarchy for integrated waste management in the following order: 1) source reduction; 2) recycling and composting; and 3) environmentally safe land disposal and transformation. This component explains how source reduction, recycling, composting, and special waste components combine following this hierarchy to achieve the State's landfill diversion mandates of 25% by the year 1995 and 50% by the year 2000.

The City of Sunnyvale has developed a fully integrated program to achieve the requirements of AB 939. Integration involves all facets of the solid waste management system, including: materials storage and preparation; collection; treatment or processing; and end use or disposal. This program builds upon the existing solid waste management system by extending or developing methods that assist in meeting the AB 939 diversion goals.

As the first stage in solid waste management, materials to be diverted or disposed are stored and properly prepared for collection. For example, refuse is placed in City-approved refuse containers on a regular basis, to safeguard public health and safety. Likewise, residential sector materials that the City has targeted for recycling or composting are or will be placed in separate containers approved by the City. Residents will be expected to source-separate recyclables and compostables from refuse in a manner prescribed by the City.

In the second stage of the process, collection vehicles will pick up three general categories of designated materials. The general categories are refuse, recyclables, and compostables. These materials will be collected in an efficient and effective manner in order to maximize diversion while minimizing cost. The City intends to replace its existing fleet of recycling collection vehicles with more efficient vehicles that have greater capacity.

In the following stage, collected materials will be brought to an appropriate facility for treatment or processing. Refuse will be taken to the City's landfill, or, when operational, to the City's transfer station for subsequent transport to a landfill. Recyclable materials will initially be delivered to the City's Recycling Center and eventually to the City's materials recovery facility. Recyclables will be separated into material type and processed (via baling, crushing and other methods) into commodities which meet market specifications. Compostable material will be



taken to the City's composting site. At the composting site, designated organic materials will be composted or reduced in size.

Finally, materials which have been prepared for recycling and composting will be marketed. Depending on material type, recycled materials will be marketed to any of several brokers and end users. Compost products may include a variety of usable soil amendments, such as compost, mulch, and wood chips.

The City will take a balanced, mutually compatible approach to diversion of solid waste by relying on a combination of source reduction, composting, and recycling by the residential, commercial, industrial, and self-haul sectors. The composition of the current and anticipated waste streams has been carefully considered during the selection of the particular programs. A number of programs are to be continued, expanded, or implemented. A summary of implementation timelines by program component is presented in Table 10-1. As shown in Table 10-1, most of the expanded or new aspects of the programs will be implemented in the short-term.

The source reduction, recycling, composting, and special waste components have been integrated so that the programs selected for implementation achieve their maximum potential. The selected programs expand upon the City's existing diversion programs. This reference point simultaneously provides a basis for program continuity and transition, which are key factors in enabling the maximization of program potential. Each program either targets mutually exclusive materials, or, in the case of source reduction, reinforces each individual program by targeting several common materials. A comprehensive, multi-faceted education and public information program will be a crucial part of the Source Reduction and Recycling Element.

Priorities between components and programs within components were established based on several considerations, including:

- position in integrated waste management hierarchy
- effectiveness in reducing the weight, volume, or hazard of materials, or otherwise diverting materials from the landfill
- consistency with existing solid waste management practices
- cost effectiveness and ease of implementation



Table 10-1. Summary of Component Timelines

City of Sunnyvale Source Reduction Implementation Timeline

| Task | Date |
|--|-------|
| RESIDENTIAL | |
| Public Education & Publicity | |
| Begin developing source reduction education materials | 1-92 |
| Develop a publicity campaign to encourage residents and businesses to make environmentally-sound purchasing decisions, donate materials for reuse, reduce organic waste, and engage in related source reduction activities | 3-92 |
| Begin working with schools to integrate source reduction, reuse, recycling, and composting topics into school curricular activities | 10-92 |
| Economic Incentives & Disincentives | |
| Complete evaluation of volume-based user fee system for single-family dwelling trash collection | 4-92 |
| Regulation | |
| Examine feasibility of adopting and enacting policies, regulations, and legislation to promote source reduction | 12-92 |
| If feasible, begin such adoption and enactment | 3-93 |
| Study the feasibility of restricting access to local solid waste disposal facilities for certain types of recyclable and compostable materials | 12-92 |
| If feasible, enact such restrictions | 5-93 |
| Begin working with regional and State organizations and governments to lobby for and to coordinate greater product regulation | 8-91 |
| Home Composting | |
| Begin developing home composting education and promotion program | 7-92 |
| Reuse | |
| Study the feasibility of supporting reuse programs | 10-91 |
| If feasible, help non-profit organizations to locate material drop-off donation sites | 1-92 |



Table 10-1. Summary of Component Timelines (Continued)

City of Sunnyvale Source Reduction Implementation Timeline (Continued)

| Task | Date |
|---|---------|
| Reuse (Continued) | |
| Publicly endorse donation programs that assist in meeting people's basic needs | 3-92 |
| Sponsor periodic swap meets | 4-92 |
| Assemble a directory of local shops that purchase or sell used items | 1-92 |
| Provide assistance in developing appliance repair programs | 1-92 |
| Provide assistance to non-profit organizations that are primarily involved in enabling materials reuse | 1-92 |
| Household Hazardous Waste Reduction | |
| Develop and begin distributing household hazardous waste reduction materials | 9-91 |
| COMMERCIAL, INSTITUTIONAL, INDUSTRIAL | |
| Public Education & Publicity | |
| Serve as model of source reduction | |
| Begin institutionalizing source reduction as policy (such as office paper reduction and making items available for reuse) | 12-91 |
| Begin revising City policies and procurement specifications so that City purchases durable, reusable, recycled, recyclable products with a minimum of packaging | 12-91 |
| Begin developing and distributing education and information materials tailored to these sectors | 2-92 |
| Begin encouraging businesses and institutions to adopt source reduction as an explicit goal | 2-92 |
| Begin receiving commercial sector source reduction responses to City requests for detailed information from qualifying businesses | 1-94 |
| Economic Incentives & Disincentives | |
| Initiate or support regional or statewide efforts to promote source reduction by product and packaging manufacturers | ongoing |



Table 10-1. Summary of Component Timelines (Continued)

City of Sunnyvale Source Reduction Implementation Timeline (Continued)

| Task | Date |
|--|-------|
| Voluntary Measures | |
| Begin providing technical assistance on source reduction to industry and consumer organizations | 9-92 |
| Regulation | |
| Begin restricting the use of certain disposable, non-recyclable products or packaging in government-sponsored activities | 2-92 |
| Study the feasibility of restricting access to local solid waste disposal facilities for certain types of recyclable and compostable materials | 6-93 |
| If feasible, enact such restrictions | 1-94 |
| Reuse | |
| Begin encouraging local industries to participate in industrial waste exchanges | 7-92 |
| GENERAL | |
| Monitoring | |
| Develop source reduction survey methodology with the assistance of the CIWMB | 8-91 |
| Conduct baseline source reduction survey | 12-91 |



Table 10-1. Summary of Component Timelines (Continued)

City of Sunnyvale Recycling Implementation Timeline

| Task | Date |
|--|-------------|
| RESIDENTIAL SECTOR | |
| Award contract for single-family household recyclables collection | completed |
| Distribute single-family household recycling containers | 7-91 |
| Begin distributing updated education and public information materials | 5-91 |
| Establish volume-based user fees for single-family household refuse collection | 7-91 |
| Begin enhancing single-family household recycling collection program | 7-91 |
| Begin operating new materials recovery facility | 1993 - 1994 |
| Award contract for multi-family household recycling collection program | 9-91 |
| Expand recycling collection services to all multi-family households | 1992 |
| COMMERCIAL SECTOR | |
| Hire staff | 1992 |
| Distribute first newsletter | 1992 |
| Begin distributing commercial recycling manual | 1992 - 1993 |
| Begin developing other program materials | 1992 |
| Begin publicizing program | 1992 |
| Begin technical assistance | 1993 |
| Begin receiving commercial responses to City requests for information | 1994 |
| Seek State assistance in market development | ongoing |



Table 10-1. Summary of Component Timelines (Continued)

City of Sunnyvale Composting Program Implementation Timeline*

| Task | Date |
|--|--------------|
| Organization | |
| Assign personnel for program administration | 1-92 |
| Finalize program details | 1-92 |
| Set incentives and requirements for participation | 2-92 |
| Begin monitoring and evaluating programs | 7-92 |
| Expand programs and services (e.g., food waste, etc.) | 1995 |
| Collection | |
| Begin separate collection of yard waste for single-family residences, duplexes, triplexes, and mobile home parks | 7-92 |
| Encourage drop-off by commercial and industrial sectors, and by multi-family dwellings | 7-92 |
| Evaluate feasibility of establishing yard waste drop-off site at transfer station or other site within the City | 1992 - 1993 |
| Processing | |
| Begin processing | 7-92 |
| Marketing | |
| Evaluate markets | 7-91 - 11-91 |
| Develop procurement specifications and policies for compost products | 6-92 |
| Education and Public Information | |
| Develop education and public information materials | 2-92 |
| Begin distributing education and public information materials | 4-92 |

* Assumes that City elects to pursue collection and processing program described in detail in the City's existing franchise agreement with its waste hauler.



Table 10-11. Summary of Component Timelines (Continued)

City of Sunnyvale Special Waste Implementation Timeline

| Task | Date |
|---|-------|
| White Goods | |
| Identify site for stockpile | 10-91 |
| Contact private recycler and arrange for services | 1-92 |
| Incorporate disposal charge in gate fee schedule | 4-91 |
| Tires | |
| Identify site for stockpile | 10-91 |
| Contact private recycler and arrange for services | 10-91 |
| Continue market search | 10-91 |
| Batteries | |
| Design and print mailers informing residents of various recycling (drop-off) options for automobile batteries and advocate use of rechargeable household batteries | 7-91 |
| Construction and demolition debris | |
| Evaluate construction and demolition debris disposal rates vs. tipping fees at recycling facilities and develop rate structure that provides economic incentive for recycling | 8-91 |
| Design and print flyers describing recycling opportunities available and distribute to residents and targeted businesses | 10-91 |
| Establish a dedicated area for clean construction and demolition debris storage at the landfill. Determine markets for material and logistics for access | 10-91 |
| Used Oil | |
| Determine the type(s) of containers to be used for collection and purchase | 1-92 |
| Design and print flyers and mail to targeted residents informing them of the new collection service. The brochure can also stress the importance of recycling and the dangers of dumping oil in the storm drain/sewer system, and that there is also a drop-off location at the recycling center on borregas avenue. When appropriate expand the list of drop-off points. | 1-92 |
| Increase the number of drop-off facilities in the City by revising applicable City regulatory documents to require targeted businesses (gas stations, oil change stations, and similar businesses) to accept used oil from residents. | 7-91 |
| Wood Waste | |
| Identify site for pallet storage and site for wood chip source separation and storage | 1-92 |
| If applicable, set cost schedule for sale of pallets and wood chips | 1-92 |
| Coordinate program with pallet recycling firms | |



Table 10-1. Summary of Component Timelines (Continued)

City of Sunnyvale Household Hazardous Waste Implementation Timeline

| Task | Date |
|---|-------------|
| Enhancement of Existing HHW Drop-Off Days | |
| Secure recommendation of Staff | 1991 |
| Approve funding | 1991 |
| Negotiate contract | 1991 |
| Prepare publicity program | 1991 |
| Implement first quarterly event | 1992 |
| Permanent HHW Drop-Off Facility | |
| Evaluate feasibility of this approach | 1991 - 1992 |
| If feasible then: | |
| Begin permitting process | 1994 |
| Negotiate contract | 1994 - 1995 |
| Secure funding | 1996 |
| Construct facility | 1996 |
| Implement collection program | 1997 |
| Expansion of Client Base (if deemed feasible) | |
| Evaluate feasibility of this approach | 1991 - 1992 |
| If feasible then: | |
| Initiate quarterly collection of small quantity generator (SQG) hazardous waste | 1993 |
| Design SQG program for permanent facility | 1994 |
| Implement SQG collection program | 1997 |
| HHW Source Reduction | |
| Distribute source reduction materials | ongoing |
| Expand publicity program | ongoing |



Table 10-1. Summary of Component Timelines (Continued)

City of Sunnyvale Education & Public Information Implementation Timeline

| Task | Date |
|---|-----------|
| General | |
| Adopt source reduction and recycling slogan and mascot | 4-92 |
| Launch publicity campaign | 6-92 |
| Consider establishing citizen-advisory group on source reduction and recycling education and public information | 7-92 |
| Source Reduction | |
| Begin developing residential/commercial source reduction and recycling materials | 1-92 |
| Begin distributing residential source reduction and recycling materials | 3-92 |
| Begin distributing commercial source reduction and recycling materials | 7-92 |
| Begin encouraging commercial sector to adopt source reduction as explicit goal | 2-92 |
| Begin encouraging manufacturers to participate in industrial waste exchanges | 7-92 |
| Assemble directory of local second-hand shops | 1-92 |
| Begin developing household hazardous waste reduction materials | 5-91 |
| Begin distributing household hazardous waste reduction materials | 9-91 |
| Begin developing home composting education and promotion program | 7-92 |
| Begin developing education and public information materials | 1-93 |
| Begin creating demonstration sites | 3-93 |
| Begin promotional campaign | 3-93 |
| Begin developing master composters program | 3-93 |
| Composting (If collection begins 7-92) | |
| Begin developing education and public information materials | 2-92 |
| Begin distributing education and public information materials | 5-92 |
| Recycling | |
| Begin distributing updated education and public information materials | 5-91 |
| Begin establishing Block Leader Program | 7-92 |
| Establish telephone hot line | 6-92 |
| Implement environmental leadership program at local high schools | 5-92 |
| Commercial Sector Recycling | |
| Begin developing education and public information materials | 2-92 |
| Begin distributing education and public information materials | 7-92 |
| Begin distributing commercial recycling manual | 1992-1993 |



Table 10-1. Summary of Component Timelines (Continued)

City of Sunnyvale Education & Public Information Implementation Timeline (Continued)

| Task | Date |
|--|-------------|
| Special Waste | |
| Begin developing education and public information materials on batteries, construction and demolition debris, tires, and other special waste | 2-91 |
| Begin distributing education and public information materials | 4-91 |
| Household Hazardous Waste | |
| Expand education and public information programs | 9-91 |



The City will accord top priority to source reduction. Any amount of waste that can be reduced at the point of generation means that less waste will enter the solid waste management system. The result will be reduced need for: collection; treatment or processing; and recycling, composting, or disposal. Preventing the entry of materials into this system through source reduction is the most cost-effective and efficient waste management approach.

The source reduction program will be extensive, and will include a combination of education and public information, economic incentives, program development, and regulations. The concept of source reduction implicitly uses a baseline date after which reduction in waste can begin to be measured. In the short-term and medium-term planning periods, source reduction will be estimated using a baseline date of January 1991; changes made after this date in production and consumption patterns which contribute to source reduction will be counted toward diversion goals. The contribution of source reduction to diversion goals cannot be predicted with confidence at this time, since existing data are inconclusive or insufficient. It is anticipated that source reduction will result in only a small percentage of overall diversion. Nevertheless, the emergence of source reduction attitudes and behavioral changes will help to increase diversion that is attributed to recycling and composting, which rely on changes in citizen behavior.

The next priority for managing materials which remain in the solid waste stream despite source reduction efforts will be to recycle or compost certain items in an effective and efficient manner. Materials targeted for recycling or composting were selected based on: ease of recovery; degree of contamination; cost-effectiveness in collection, processing, and marketing; existence of markets; and level of contribution to diversion goals.

Recycling offers the opportunity to divert a large portion of the waste stream. Several materials which appear in large quantities in the waste stream can be diverted effectively and easily through source-separation, with subsequent collection, processing, and marketing. In the short-term, recycling by the commercial, industrial, and self-haul sectors is expected to result in the diversion of approximately 28% of the solid waste generated in the City; in the medium-term, that figure is expected to increase to approximately 34%. The recycling of special waste, including construction and demolition debris, white goods, and tires, is incorporated in these diversion rates. Thus, recycling is a key aspect of the integrated solid waste management system.



Residential recycling, in the short-term, will be expanded from the existing program, in which regular service is provided to single-family households. Recycling collection services will be provided to all residential households, including single- and multi-family dwellings. Curbside collection services will be enhanced. In the short-term, rigid containers will be distributed to single-family households, and recycling collection vehicles with greater capacity will be utilized. A volume-based user fee for residential refuse collection will be developed to encourage source reduction and recycling. A new materials recovery facility will become operational in the short-term. Education and public information programs also will be updated and expanded. Additional materials to be collected will be considered for both the short-term and the medium-term. In the short-term, the residential recycling program is expected to divert approximately 5% of the solid waste generated in the City; in the medium-term, that figure is expected to increase to approximately 7%.

The City will place particular emphasis on commercial recycling, because commercial solid waste (including the commercial, industrial, and self-haul sectors) constitutes nearly 70% of the solid waste generated in the City. Commercial recycling (including recycling of special waste) will continue to expand in the short- and medium-terms, with City assistance. For example, the City will provide technical assistance and information to businesses, industries and institutions. The City will require those businesses, industries and institutions which employ more than 250 people at a single site to respond to requests for detailed and extensive source reduction and recycling information, and to pro-actively plan to achieve goals set by the City on a site-specific or business category basis. The City will encourage a wide variety of independent commercial sector recycling efforts, as well as encourage the commercial sector to purchase products made from recycled materials.

Like recycling, composting will play an important role in the City's integrated solid waste management system. This is the case because composting offers the potential for significant levels of diversion of materials that can be easily separated. These materials can be collected, processed, and marketed efficiently and effectively. A residential yard waste collection and composting program will be instituted in the short-term, because yard waste is the largest category of residential waste. Approximately 60% of residential yard waste is expected to be composted in the short-term, and 70% in the medium-term. Including all sectors, approximately 6% of the solid waste generated in the City is expected to be composted in the short-term. In the medium-term, this figure is expected to rise to approximately 10%, based on additional recovery of yard waste and the inclusion of food waste from the commercial sector.



Household hazardous waste will continue to be diverted from the City's landfill. The City will develop additional opportunities for residents to dispose of household hazardous waste properly, and will utilize an extensive education and public information campaign to encourage residents to reduce their use of hazardous substances.

Remaining solid waste that is not recycled or composted or otherwise diverted in accordance with AB 939 will be landfilled. With the implementation of comprehensive, integrated source reduction, recycling, special waste, and composting programs, the remaining solid waste to be landfilled will be reduced significantly in weight, volume, and toxicity.

The quantities and percentages of materials to be diverted through implementation of programs described earlier in the Source Reduction and Recycling Element are listed in Tables 10-2 through 10-5. These figures are based on a combination of existing, expanded, and new diversion programs. Information presented in the tables is by material for each sector (Table 10-2 -- Residential; Table 10-3 -- Commercial; Table 10-4 -- Industrial; Table 10-5 -- Self-Haul). The information is presented for both the short-term and medium-term. A summary of existing conditions and short-term and medium-term goals for the integrated waste management system is presented in Figure 10-1.

The data in Table 10-2 show that the diversion of yard waste through composting will constitute a major part of the residential sector's contribution to the City's and State's diversion goals. Similarly, the data in Table 10-3 reveal that a large quantity of old corrugated cardboard (OCC) from the commercial sector is anticipated to be recycled in the short- and medium-term. Likewise, the data in Table 10-4 show that OCC and inerts (such as concrete and asphalt) generated by the industrial sector are expected to be the largest contributors to the diversion goals, based on expanded recycling of these materials. As indicated in Table 10-5, inerts are expected to be a significant part of what is diverted from the self-haul sector as well.

The total effect of the integration process is shown in Table 10-6. The City expects to meet or exceed the State's diversion goals by implementing extensive recycling and composting programs. The data show that recycling will result in the diversion of approximately 35% to 40% of the City's solid waste in the short- and medium-term, while composting will contribute another 6% to 10% to the diversion rate. Any source reduction or, secondarily, transformation that can be counted toward the State's diversion goals would raise the City's diversion rate still further. This approach is taken in order to ensure that the City, at very minimum, meets the State's diversion goals.



Table 10-2. City of Sunnyvale Materials to be Diverted by the Residential Sector, Short-term and Medium-term

| Material | Short-Term (1995) | | | Medium-Term (2000) | | |
|------------------|-------------------|-----------|---|--------------------|-----------|---|
| | Tons/Yr | Diversion | Diversion as a % of Total Generated Waste | Tons/Yr | Diversion | Diversion as a % of Total Generated Waste |
| Paper | | | | | | |
| OCC/Kraft | 1,695 | 50% | 0.8 | 2,115 | 60% | 1.0 |
| Mixed Paper | - | - | | 2,390 | 30% | 1.1 |
| Newsprint | 5,983 | 70% | 2.8 | 6,224 | 70% | 2.8 |
| High-Grade | - | - | | 155 | 30% | 0.1 |
| Magazines/Glossy | 687 | 50% | 0.3 | 1,000 | 70% | 0.5 |
| Plastic | | | | | | |
| PET | 52 | 20% | 0.0 | 162 | 60% | 0.1 |
| Yard Waste | 8,663 | 60% | 4.1 | 10,514 | 70% | 4.8 |
| Wood | 120 | 20% | 0.1 | 187 | 30% | 0.1 |
| Rubber/Tires | 752 | 90% | 0.4 | 782 | 90% | 0.4 |
| Textiles/Leather | - | - | | 87 | 10% | 0.0 |
| Metals | | | | | | |
| Tin Cans | 291 | 30% | 0.1 | 454 | 45% | 0.2 |
| Aluminum | 325 | 80% | 0.2 | 339 | 80% | 0.2 |
| Glass | | | | | | |
| Redeemable Bev. | 463 | 50% | 0.2 | 770 | 80% | 0.4 |
| Recyclable Glass | 1,196 | 50% | 0.6 | 1,338 | 55% | 0.6 |
| White Goods | 161 | 90% | 0.1 | 167 | 90% | 0.1 |
| HHW | 156 | 75% | 0.1 | 163 | 75% | 0.1 |
| TOTAL | 20,544 | | 9.8% | 26,847 | | 12.5% |

Totals may not sum due to rounding.



**Table 10-3. City of Sunnyvale Materials to be Diverted by the Commercial Sector,
Short-term and Medium-term**

| Material | Short-Term (1995) | | | Medium-Term (2000) | | |
|------------------|-------------------|-----------|--|--------------------|-----------|--|
| | Tons/Yr | Diversion | Diversion as a % of Total Generated Waste | Tons/Yr | Diversion | Diversion as a % of Total Generated Waste |
| Paper | | | | | | |
| OCC/Kraft | 8,437 | 70% | 4.0 | 9,404 | 75% | 4.3 |
| Mixed Paper | 328 | 5% | 0.2 | 3,068 | 45% | 1.4 |
| Newsprint | 922 | 40% | 0.4 | 1,079 | 45% | 0.4 |
| High-Grade | 675 | 50% | 0.3 | 983 | 70% | 0.4 |
| Magazines/Glossy | 242 | 40% | 0.1 | 284 | 45% | 0.1 |
| Plastic | | | | | | |
| Film | 103 | 5% | 0.0 | 107 | 5% | 0.0 |
| HDPE | 39 | 5% | 0.0 | 242 | 30% | 0.1 |
| PET | 18 | 30% | 0.0 | 24 | 40% | 0.0 |
| Food | - | - | - | 4,816 | 50% | 2.2 |
| Yard Waste | 739 | 30% | 0.4 | 1,794 | 70% | 0.8 |
| Wood | 136 | 70% | 0.1 | 182 | 90% | 0.1 |
| Rubber/Tires | 603 | 90% | 0.3 | 627 | 90% | 0.3 |
| Metals | | | | | | |
| Tins Cans | 246 | 30% | 0.1 | 512 | 60% | 0.2 |
| Other Ferrous | 59 | 5% | 0.0 | 306 | 25% | 0.1 |
| Aluminum | 120 | 70% | 0.1 | 143 | 80% | 0.1 |
| Glass | | | | | | |
| Redeemable | 390 | 50% | 0.2 | 609 | 75% | 0.3 |
| Recyclable Glass | 383 | 50% | 0.2 | 439 | 55% | 0.2 |
| Inerts | 33 | 20% | 0.0 | 52 | 30% | 0.0 |
| White Goods | 21 | 90% | 0.0 | 22 | 90% | 0.0 |
| HHW | - | - | - | 13 | 25% | 0.0 |
| TOTAL | 13,494 | | 6.4% | 24,706 | | 11.0% |

Totals may not sum due to rounding.



Table 10-4. City of Sunnyvale Materials to be Diverted by the Industrial Sector, Short-term and Medium-term

| Material | Short-Term (1995) | | | Medium-Term (2000) | | |
|------------------|-------------------|-----------|---|--------------------|-----------|---|
| | Tons/Yr | Diversion | Diversion as a % of Total Generated Waste | Tons/Yr | Diversion | Diversion as a % of Total Generated Waste |
| Paper | | | | | | |
| OCC/Kraft | 5,946 | 70% | 2.8 | 6,627 | 75% | 3.0 |
| Mixed Paper | 1,869 | 40% | 0.9 | 2,187 | 45% | 1.0 |
| Newsprint | 452 | 40% | 0.2 | 529 | 45% | 0.2 |
| High-Grade | 1,962 | 50% | 0.9 | 2,858 | 70% | 1.3 |
| Magazines/Glossy | 375 | 40% | 0.2 | 439 | 45% | 0.2 |
| Plastic | | | | | | |
| Film | 1,401 | 60% | 0.7 | 1,458 | 60% | 0.7 |
| HDPE | 1,467 | 80% | 0.7 | 1,526 | 80% | 0.7 |
| PET | - | - | - | 3 | 50% | 0.0 |
| Yard Waste | 491 | 30% | 0.2 | 1,193 | 70% | 0.5 |
| Wood | 3,464 | 70% | 1.6 | 4,633 | 90% | 2.2 |
| Textiles/Leather | - | - | - | 42 | 10% | 0.0 |
| Rubber/Tires | 121 | 90% | 0.6 | 126 | 90% | 0.6 |
| Metals | | | | | | |
| Tin Cans | 1,421 | 90% | 0.7 | 1,478 | 90% | 0.7 |
| Other Ferrous | 325 | 15% | 0.2 | 451 | 20% | 0.2 |
| Aluminum | 75 | 70% | 0.0 | 89 | 80% | 0.0 |
| Non-Ferrous | 157 | 60% | 0.1 | 163 | 60% | 0.1 |
| Glass | | | | | | |
| Redeemable Bev. | 64 | 40% | 0.0 | 116 | 70% | 0.0 |
| Other Recyclable | 718 | 60% | 0.3 | 747 | 60% | 0.3 |
| Inerts | 15,955 | 95% | 7.6 | 16,598 | 95% | 7.6 |
| HHW | - | - | - | 33 | 10% | 0.0 |
| TOTAL | 36,263 | | 17.4% | 41,296 | | 19.2% |

Totals may not sum due to rounding.



Table 10-5. City of Sunnyvale Materials to be Diverted by the Self-haul Sector, Short-term and Medium-term

| Material | Short-Term (1995) | | | Medium-Term (2000) | | |
|------------------|-------------------|-----------|---|--------------------|-----------|---|
| | Tons/Yr | Diversion | Diversion as a % of Total Generated Waste | Tons/Yr | Diversion | Diversion as a % of Total Generated Waste |
| Paper | | | | | | |
| OCC/Kraft | 760 | 70% | 0.4 | 791 | 70% | 0.4 |
| Newsprint | - | - | - | 13 | 30% | 0.0 |
| High-Grade | 156 | 30% | 0.1 | 325 | 60% | 0.1 |
| Yard Waste | 2,803 | 70% | 1.3 | 3,749 | 90% | 1.7 |
| Wood | 3,309 | 70% | 1.6 | 4,426 | 90% | 2.0 |
| Textiles/Leather | - | - | - | 107 | 10% | 0.0 |
| Metal | | | | | | |
| Other Ferrous | 167 | 10% | 0.1 | 347 | 20% | 0.2 |
| Glass | | | | | | |
| Recyclable Glass | - | - | - | 3 | 20% | 0.0 |
| Inerts | 7,074 | 50% | 3.4 | 8,095 | 55% | 3.7 |
| TOTAL | 14,269 | | 6.9% | 17,856 | | 8.1% |

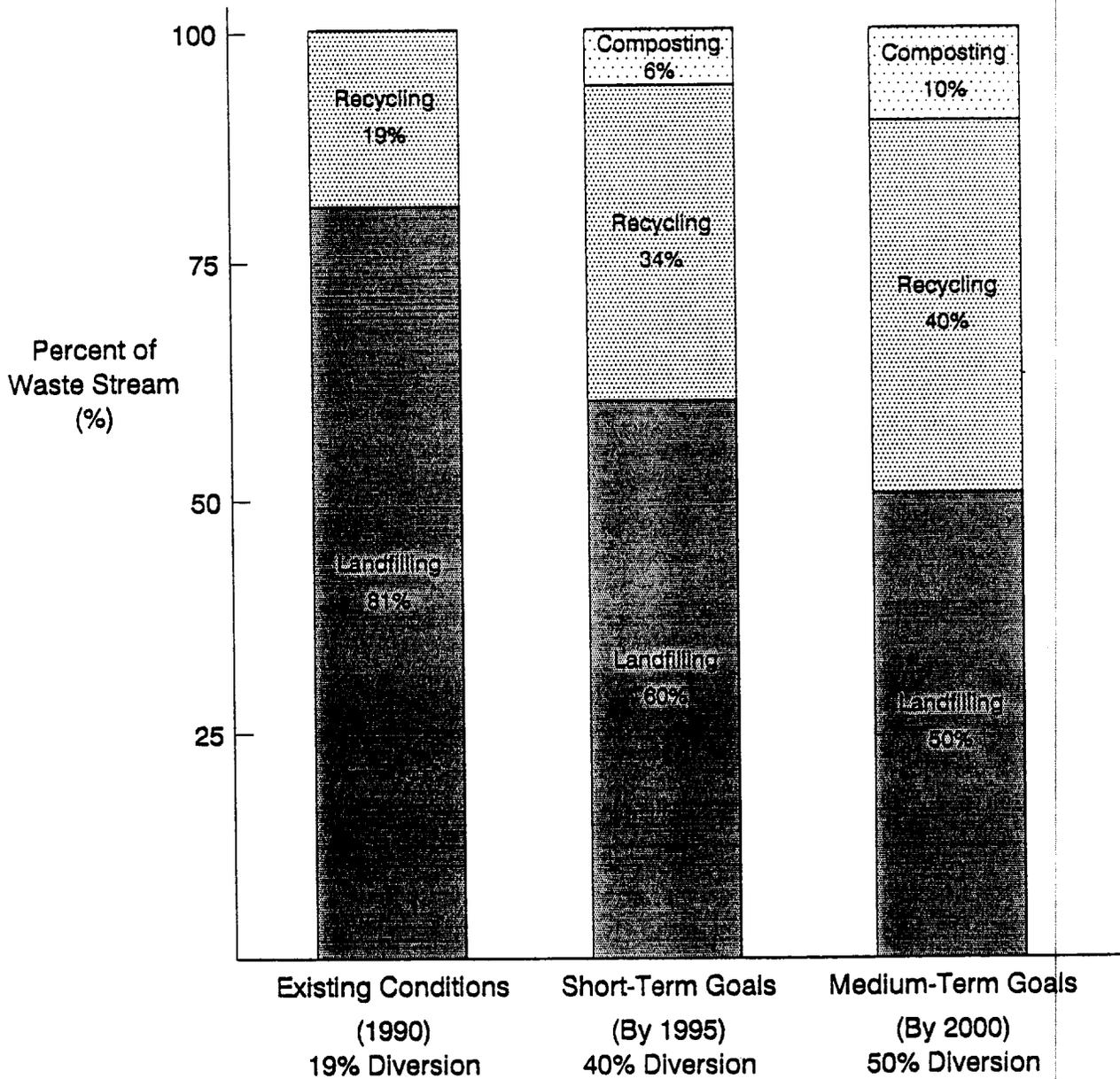
Totals may not sum due to rounding.



Table 10-6. City of Sunnyvale Materials Short-Term and Medium-Term Diversion Goals

| Component | Short-Term Goals | Medium-Term Goals |
|------------------|------------------|-------------------|
| Source Reduction | * | * |
| Recycling | 34.5% | 40.8% |
| Composting | 6.0% | 10.0% |
| Transformation | * | * |
| TOTAL | 40.5% | 50.8% |

* See text of this section for explanation of why no specific diversion goals have been set for these components.



Note: See text of this section for explanation of why no specific diversion goals have been set for source reduction and transformation concerning each component.

Figure 10-1. City of Sunnyvale Integrated Solid Waste Management System: Existing Conditions and Short-Term and Medium-Term Goals



Flexibility and contingencies have been built into the programs to the extent possible, because waste reduction, composting, and recycling strategies can change rapidly as a result of changes in market conditions, technological innovations, and other circumstances. The City will make every effort to assure that all parties involved in the City's source reduction and recycling program -- haulers, intermediate processors, residents, public agencies, building owners, end users, and others -- will be acting in a coordinated manner.

Mitigation measures have been recommended for all of the potentially significant impacts, and it is expected that all of the potentially significant environmental impacts can be reduced to non-significant through design and mitigation. Additional environmental review would be required for any new or expanded facilities which are proposed in the future in order to comply with this plan. This would include a permanent household hazardous waste drop-off facility at or near the proposed transfer station, may include expansion of the Raisch recycling operation at the Sunnyvale Landfill, and may include a centralized composting facility (if a new, rather than an existing, one is used). The potential environmental impacts of new facilities cannot be adequately assessed until specific proposals are made which delineate location and design.

Household Hazardous Waste Element



HOUSEHOLD HAZARDOUS WASTE ELEMENT

Adverse health effects and environmental damage resulting from unsafe toxic management practices have heightened community concerns regarding exposure to hazardous materials.

Consumers, often unaware that over-the-counter purchases of household products may contain toxic chemicals, have used and discarded such products in a potentially unsafe manner. When the products are no longer useable to the purchaser, they become a waste -- a household hazardous waste for purposes of this document. The problem then becomes one of disposal. Because household hazardous wastes are generated by many small, diverse sources rather than a few large, localized sources, they are difficult to control.

Proper disposal of household hazardous waste (HHW) is complicated by two factors: a) the public is often unaware of what is and is not hazardous; and b) a practical and economic method of collection and disposal for residentially generated hazardous waste is not usually available. Both of these factors have been taken into consideration in the development of household hazardous waste collection programs. The collection programs not only provide a safer alternative for disposing of household hazardous waste, but they also serve to increase community awareness of the potential dangers associated with improper use, as well as disposal, of household products containing toxic and dangerous chemicals.

Increased community awareness is often regarded as one of the most important features of a household hazardous waste collection program. The success of the collection program may be linked to a strong outreach effort that not only promotes the availability of the collection service but also explains why the service should be used. Improper disposal can result in injury to operators of solid waste management systems; contamination of soil, streams, sewer systems, and water tables; and can impair air quality.

OBJECTIVES

The purpose of the HHW Element is to identify, evaluate, and select for implementation programs which will:



1. Divert HHW from the City's landfill and ensure HHW's safe treatment, storage, and disposal.
2. Reduce the amount of HHW entering the waste stream through increased use by households of alternative, non-toxic products.
3. During the short-term planning period (1991-1995), the main objective will be to expand and enhance existing programs, with emphasis on increasing the level of participation in terms of the percentage of households participating in drop-off events. The success of this objective will be dependent on the following factors: increased community awareness; increased opportunity for drop-off; and increased convenience for the participants.
4. The objective of the medium-term planning period (1996-2000) will be construction of a permanent HHW drop-off facility at the Sunnyvale Materials Recovery and Transfer Station (SMaRT) that is being planned adjacent to the current municipal landfill. This facility, along with the programs encompassed in the Source Reduction Component of the Source Reduction and Recycling Element and implementation of other alternatives discussed later in this element, should increase the convenience of dropping off HHW, and help minimize the amount that remains in the municipal solid waste stream.
5. The California Integrated Waste Management Board (CIWMB) divides household hazardous waste into five categories with similar chemical properties:
 - Flammable wastes include fuels, oils, solvents, aerosols, and paints
 - Pesticides are toxic chemicals that include insecticides, herbicides and fungicides, etc.
 - Corrosives are acids and bases and include ammonia base cleaners, caustic sodas, oven cleaners, lye, and acids, both oxidizing and non-oxidizing
 - Oxidizers, including bleach, peroxides, and pool chlorine, but not including oxidizing acids
 - Miscellaneous: batteries (lead-acid and dry cell) and mercury



During the short-term planning period, particular emphasis will be placed on recyclable HHW materials: latex paints, solvents, lead-acid batteries, anti-freeze, and used motor oil. These wastes represent a major portion of HHW, and since they are handled by local recovery businesses, are less expensive to deal with than wastes that must be lab-packed and shipped to a Class I landfill. The medium-term planning period will emphasize all household hazardous wastes.

EXISTING CONDITIONS

EXISTING DIVERSION PROGRAMS

Used Motor Oil Included in Curbside Recycling Program

Diversion of used motor oil from the City of Sunnyvale's municipal waste stream was initiated in 1984 as a part of the City's curbside recycling program. Used motor oil is collected in a non-breakable, sealed container provided by the resident or a City-provided container which is set out with other recyclables for weekly pickup. Used motor oil is stored in a large tank at the Sunnyvale Recycling Center. It is collected periodically by Refinery Services of Patterson, California, and re-refined into various products.

Semi-Annual HHW Drop-Off Days

Semi-annual HHW drop-off days have been held since October 1985. These events have been held in cooperation with hazardous waste management and transportation firms approved by the California Department of Health Services (DHS). They have been held in the spring and in the fall, times normally associated with household cleanups.

Used motor oil, latex paint, and spent lead-acid batteries that are collected are recycled. In California, most used motor oil is re-refined into lubricating oil. The major components of spent lead-acid batteries, lead and lead components, are re-smelted for the manufacture of new batteries. The plastic cases are recycled for secondary uses and the acid neutralized. Used anti-



freeze is distilled for reuse as anti-freeze. Latex paint is reprocessed. Of materials that are disposed, oil-based paints and solvents often are shipped to fuel blending programs for incineration. Aerosols, oxidizers, and corrosives often are treated prior to disposal. Pesticides and other poisons are buried in Class I hazardous waste landfills.

Hazardous Waste Monitoring at Municipal Landfill

A hazardous waste monitoring program has been in place at the municipal landfill since December 1989. Twice a week, random loads are checked and when hazardous waste is discovered, the generators are given a warning. This includes self-haul household loads, as well as commercially and industrially generated waste. Since this program was instituted, there has been approximately a 60% drop in the number of loads containing hazardous waste. This monitoring is conducted by the operator of the landfill.

Source Reduction Pamphlets Distributed at HHW Drop-Off Days

Source reduction has been addressed to a limited degree as well. Pamphlets are handed out to HHW drop-off participants which outline non-toxic alternatives to some toxic household products. These pamphlets also indicate proper disposal procedures.

As many as 777 households have participated in a HHW drop-off day. The events are held at the Recycling Center located at the end of Borregas Avenue near the Sunnyvale Landfill. While this level of participation represents a solid accomplishment, the 777 households participating in the May 1990 event represent only 2.8% of the 28,000 single-family households in Sunnyvale, and only 1.9% of the 40,000 total number of households. Alternatives for improving these figures will be explored in the Evaluation of Alternatives portion that follows.

QUANTITY & TYPE OF HHW DIVERTED

In the HHW drop-off event held May 19, 1990, 777 households dropped off more than 1,900 gallons of paint, over 500 gallons of solvents, approximately 50 gallons and 450 pounds of corrosives, over 100 gallons and 330 pounds of pesticides, and more than 45 gallons and 1,200 pounds of other household hazardous waste.



Table 1 presents a summary of the total HHW collected by the City in 1990 from the periodic HHW collection days, the regular collection and drop-off of used motor oil, and the drop-off of lead-acid batteries. Approximately 500 spent lead-acid batteries per year are turned over to a San Jose battery recycler. Approximately 34,000 gallons of used motor oil were collected at curbside during fiscal year 1989-90.

Approximately 80% of the source-separated HHW collected by the City of Sunnyvale is recycled; 5% is reused. Among other recycled materials, used motor oil is marketed to Refinery Services of Patterson, California and latex paint is marketed to Roy Anderson Paint Company (Santa Rosa, CA). Of the remaining waste, 6% is incinerated and 9% is shipped to Class I landfills (see Table 2 and Figure 1).

PROGRAM COSTS

See Table 3 for a summary of the costs of the most recent HHW drop-off days. The contractor's fee schedule for both set-up and disposal increased approximately 20% to 30% in October 1990 in comparison to the prior drop-off.

EVALUATION OF ALTERNATIVES

ENHANCEMENT OF EXISTING HHW DROP-OFF DAYS

When combined with increased community awareness, the following improvements in the City of Sunnyvale's drop-off events will reduce the amount of HHW which enters the municipal waste stream. The flexibility inherent in drop-off events accommodates changing conditions and enables them to be an important part of the short-term planning period.

To increase community participation in Sunnyvale's HHW drop-off events, the following alternatives will be evaluated. As conditions change, several of these alternatives could be utilized on an evolving basis. Of primary importance is the need to increase the number of opportunities for the public to properly dispose of their HHW. A monthly opportunity to drop off HHW is a reasonable goal.



Table 1. City of Sunnyvale Total Household Hazardous Waste Collected, 1990*

| | Lb |
|--------------|------------|
| Flammables | 327,789 |
| Pesticides | 2,625 |
| Corrosives | 2,074 |
| Oxidizers | 348 |
| Non-RCRA HHW | 3,409 |
| Batteries | 19,000 |
| TOTAL | 355,245 |
| | 177.6 tons |

* Conversion factors: used motor oil, 7.5 lb/gal; latex paint, 11 lb/gal; oxidizers and other liquids (corrosives, etc), 9 lb/gal; lead acid batteries, 38 lb/battery.



Table 2. City of Sunnyvale Recovery/Disposal of Source Separated HHW, 1990*

| | In lb | Percent |
|--------------------------|----------------|-------------|
| Recycled | 284,774 | 80% |
| Used motor oil | 255,000 | |
| Used lead-acid batteries | 19,000 | |
| Bulked latex paint | 9,130 | |
| Aerosols | 1,644 | |
| Reused | 16,368 | 5% |
| Palletted latex paint | 16,368 | |
| Incinerated | 22,090 | 6% |
| Bulked oil paint | 13,970 | |
| Bulked solvents | 8,120 | |
| Landfilled | 32,013 | 9% |
| TOTAL | 355,245 | 100% |

Also see Figure 1.

* Conversion factors: used motor oil, 7.5 lb/gal; latex paint, 11 lb/gal; oxidizers and other liquids (corrosives, etc), 9 lb/gal; lead acid batteries, 38 lb/battery.

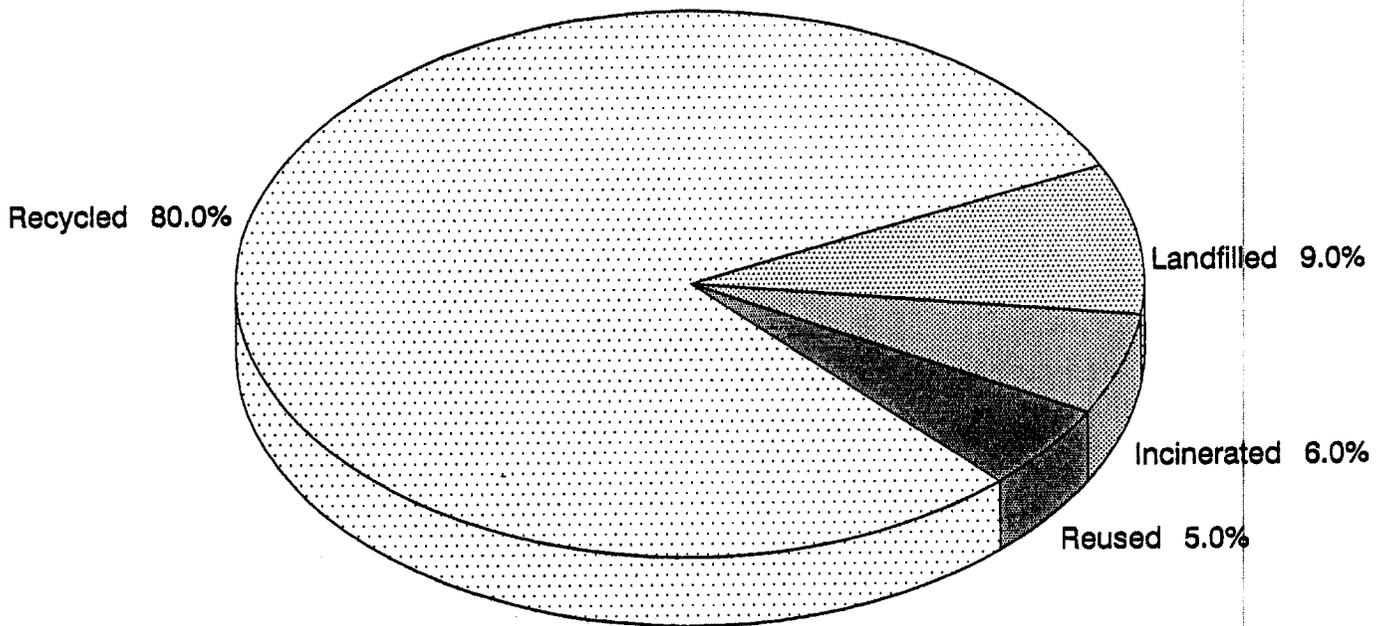


Figure 1. City of Sunnyvale
Recovery/Disposal Method of Source Separated HHW, 1990



**Table 3. City of Sunnyvale's Costs
Household Hazardous Waste
Drop-off Days, 1990**

| | Households Participating | Tons Collected | City's Total Cost | City's Cost per Household | City's Cost per Ton |
|--------------|-----------------------------|-------------------|----------------------|------------------------------|------------------------|
| May 19 | 777 | 23.2 | \$60,258 | \$78 | \$2,597 |
| Oct 20 | 758 | 17.4 | \$72,918 | \$96 | \$4,191 |
| TOTAL | 1535 | 40.6 | \$133,176 | \$87 | \$3,280 |



County-wide HHW Program

A County-wide HHW program, which has considerable merit, has been in the discussion stages. This program would utilize several drop-off sites operating around a central hub. The sites would be divided between the participating communities on a rotational basis, with approximately one drop-off per month available to County residents by appointment. The central hub would be a storage facility where the consolidating, lab-packing, manifesting, and loading would take place. The sites would be available to all County residents by appointment. Each household in the County then would have the choice of either the more convenient location or the most convenient date for participating in the drop-off program.

Regional Events

A regional event could be held to service, for instance, the five communities in the northern end of Santa Clara County. This alternative would require each community to hold an event two or three times each year in order to give their residents access to a drop-off event on a monthly basis. The advantage of this alternative would be that the communities involved are in a more concentrated area geographically and residents from other communities would not have to travel far.

The communities involved might want to consider contracting with the same hazardous waste management firm to coordinate all of the events. In such a case, the firm and the communities may want to consider assembling mobile facilities that could be moved from site to site on a rotating basis.

Increased Number of Drop-off Events

An overall increase in the number of events held in the City of Sunnyvale would represent a proportional increase in cost to the City. But with improved publicity, it will also provide a proportional increase in the amount of HHW collected by the drop-off program. The immediate goal is to improve participation.

The increase in the number of events may increase the chances that a spill of these materials would occur. Numerous measures which are taken to prevent such an occurrence and to handle an incident are required by the City, and the program is required to abide by State and



Federal regulations governing the handling of these wastes. The City requires that the wastes be removed from the site within 24 hours. With these precautions, the risk of significant impact caused by upset is considered to be very low.

Increased Duration of Events

Expanding a drop-off event by increasing its duration from one to two days could increase its effectiveness in collecting HHW. The increased duration gives more time to collect the wastes, and gives the participating household more scheduling flexibility. It is just as easy to publicize a two-day event as a one-day event. However, concerns would be raised about the safety of overnight storage of waste collected on the first day of a two-day event.

Special Events Limited to Locally Recyclable Materials

Sunnyvale's experience with drop-off events has shown large quantities of latex paint and used lead-acid batteries are dropped off. Both of these are recyclable at the local level and do not need transportation to Class I landfills. Therefore, events that collect only recyclables or locally treated wastes might be a very cost-effective way of removing HHW from the municipal solid waste stream.

Multiple Locations for Drop-offs

Expanding an event on a given weekend by increasing drop-off locations in the City would increase personnel requirements.

PERMANENT HHW DROP-OFF FACILITY

A permanent HHW drop-off facility on the site of the planned SMaRT station or the Sunnyvale Recycling Center is being considered by the City. Such a facility would require permitting and additional environmental review once a specific design and operations proposal is made. A permanent HHW drop-off facility would be part of the medium-term planning period. Construction of a new facility would be required, as would staffing by trained personnel. Implementation of this alternative would be effective in diverting HHW from the municipal waste



stream, in part due to its proximity to the transfer station; it would allow participants to dump their pre-sorted HHW and other refuse on the same trip. It would also increase safety because of improved facilities and procedures for the task.

A permanent facility would increase the convenience with which participants could drop off their hazardous waste in other ways as well. Regular hours would simplify scheduling for the participants. Waiting lines and confusion would be minimized and repeat trips would be encouraged due to familiarity. Some of the cost could be absorbed through participation of adjacent communities, which would also benefit through increased public participation and hazardous waste diversion from their waste stream.

Other communities have found this a cost-effective way of operating a HHW collection program. After a capital investment of approximately \$300,000 for collection and a storage facility, NorCal Waste Systems operates such a program for the City and County of San Francisco with an annual budget of approximately \$500,000 per year. With approximately 7,500 households participating each year, the resultant operating cost is \$66 per participating household. The facility is operated by four full-time employees, and because its storage capability allows more time for consolidation of recoverable materials, only a small percentage of its waste is shipped to Class I landfills.

MOBILE HHW COLLECTION

Two variations of this type of collection could be considered:

- fee for service
- limited free door-to-door collection for the homebound

Fee for Service

Charging a fee would discourage participation by those who could participate in a drop-off program.



Limited Free Door-to-Door Collection for the Homebound

Collection of HHW could be provided at no cost to the homebound. To limit potential abuse of this program, those eligible could be informed of its existence through a support group or social worker.

Door-to-door collection would be the most expensive per household alternative for the City, yet this alternative in some instances may be the only practical method to improper disposal or unsafe extended storage. This type of pick-up would involve a registered hazardous waste transporter stopping at the homes of people who had phoned in their request for the service in advance. Ideally, it would be coordinated with other program aspects (such as drop-off days) so that extended storage of the wastes would not be a factor, and so that multiple pick-ups could be handled by the same crew. This system would likely reduce the risk of significant impact caused by upset because more control of the materials is provided.

This type of service is being considered by other communities and is being investigated by some hazardous waste management firms which participate in HHW programs. The City of Los Angeles is initiating this type of service by utilizing specially trained City employees and a City-owned, Department of Health Services approved vehicle. A spokesperson from Safety Specialists of Santa Clara estimated that a two-person crew and vehicle, spending approximately one half hour per home, could loose-pack the hazardous waste and return it to a drop-off site at a cost of \$150 to \$175 per pick-up.

Very likely this program would be most applicable for the medium-term period. More cost-effective alternatives should be given priority. But eventually door-to-door collection could be the most effective method for collecting waste that would otherwise no be collected.

HHW DROP-OFF ALTERNATIVE BETWEEN SCHEDULED EVENTS

The need currently exists for an HHW drop-off alternative between scheduled HHW drop-off days. People moving out of their homes have a need to dispose of HHW, and if a commercial alternative is available at all, it is almost always prohibitively expensive.

Until a County-wide program with monthly drop-offs can be implemented, an arrangement might be made with adjacent communities who hold more frequent events, or who have a permanent facility, to take pre-arranged drop-offs from Sunnyvale. A fee may be charged to the



City or the household, based on the average cost of collection per household from previous drop-off events. This service could be coordinated through information provided by the Sunnyvale Recycling Center.

The following is an example of how this alternative might function: An elderly couple who have not had children around the house for some time welcomes a visit from their out-of-town grandchild. But the spare bedroom has been used as a studio for the grandfather's hobbies, and he has accumulated shelves full of toxic products. He calls the community HHW hotline, and finds out that although the next drop-off day will not occur until after the planned visit, a nearby community will be having a drop-off event before then. Arrangements are then made for that community to accept his unwanted toxic materials that he will deliver to the drop-off event.

This could be an interim program for the short-term, until either an expanded HHW drop-off schedule is adopted, or the permanent facility is opened.

EXPANSION OF CLIENT BASE

A large portion of hazardous waste could be diverted from the municipal waste stream by including small business participation in the program.

A Small Quantity Generator (SQG) is a business that generates 100 kg a month or less of hazardous waste. Although they are exempt from some regulations, they still must test, properly store, treat, and manifest their waste. In lieu of the expense of dealing with a registered hazardous waste management firm, many SQGs may be disposing of their waste improperly.

In the past, small business participation in community HHW programs was expressly forbidden by law. The recent passage of AB 2641 now gives the municipality the option of accepting such hazardous wastes. If the City of Sunnyvale were to accept such small business wastes, a fee probably should be charged since it is viewed as a business expense for the participant. But a relatively low cost and increased convenience for the SQG would help keep hazardous waste out of the solid waste stream, or avoid other illegal dumping.

The upper limit in terms of hazardous waste generation for an SQG (100 kg per month) probably would place too large a burden on an HHW drop-off day as it is currently being conducted. But a limiting factor does exist: State law limits non-manifested transport of hazardous waste to



five gallons of a liquid or 50 pounds of a solid. Even two or three trips on a given drop-off day would be much less hazardous waste than a small quantity generator could generate at the upper limits of the definition of SQG. This would provide controls during the short-term planning period to keep small businesses from putting undue demands on the current system.

Another means of increasing small business compliance with hazardous waste regulations may be to encourage formation of cooperatives. Several painting contractors who drop off paint to be recycled or treated locally may find it easier to deal with the task as a shared responsibility, for instance.

HHW SOURCE REDUCTION

Source reduction of HHW emphasizes the substitution of non-toxic products for toxic ones and reduced use of toxic products. A significant change in public attitude will be necessary to make a noticeable difference in the amount of HHW that is disposed. For this reason, it may be worth considering the services of a publicist or public relations firm to help coordinate the City's efforts in this area, as well as publicizing its programs such as drop-off events.

The City has distributed brochures and charts to the participants of HHW drop-off days outlining non-toxic substitutes for toxic household products, as well as proper disposal for their HHW. Attractive and accessible charts and brochures will be utilized by the public and improve the effectiveness of HHW diversion programs. The City should make this information widely available to the public.

The public's resistance to HHW reduction arises because several of the non-toxic alternatives, while equally effective, are less convenient. It is important that the public understand that changes in cleaning and maintenance techniques are important.

A public awareness campaign requires a coordinated, multi-faceted approach. Information will have to be distributed to all of the various media. Radio talk shows will have to be organized, community groups will have to be mobilized, and brochures and charts must be distributed widely. Only when the majority of households are aware of the problem and the methods for proper disposal of HHW will the programs developed by the City reach their full potential.



SELECTION OF PROGRAMS

The following alternatives for HHW collection have been selected for implementation, both for their estimated effectiveness in removing HHW from the municipal waste stream, and for the feasibility of implementing them in a timely fashion. A major challenge in making these programs a success is public education, which is needed to help establish a demand for these alternatives.

ENHANCEMENT OF EXISTING HHW DROP-OFF DAYS

The City of Sunnyvale has selected to continue at the Sunnyvale Recycling Center its two HHW drop-off events per year for City residents, and to augment them in the short-term with two additional HHW drop-off events per year. These additional events would be open to all residents of Santa Clara County, and would be coordinated in conjunction with other HHW collection events held in the County. Non-Sunnyvale residents of the County would be able to participate in these events by appointment only.

Essentially, the City's HHW drop-off program would become a quarterly event for Sunnyvale residents, and a semiannual option for other residents of the County. Costs for the two additional events would be shared on a pro-rated basis depending on the number of households from each community that participated in the events. For example, if a neighboring City's residents comprised 10% of all participants in a City of Sunnyvale-sponsored event open to all County residents, then that neighboring City would pay 10% of the cost of the event, or would be assessed a fee based on a similarly equitable formula.

The City views this program as the first phase of a County-wide HHW collection program. Until a County-wide program with rotating monthly drop-offs is organized, an increase to four events per year should be adopted as an interim measure.

The City has indicated to the County its willingness to hold two County-wide events per year (initially) at the Sunnyvale Recycling Center in conjunction with the County-wide HHW program. These events would supplement the twice yearly Sunnyvale-only events already planned at the Sunnyvale Recycling Center. The City has asked the County to be prepared to serve up to 600 carloads from the City of Sunnyvale beginning in fiscal year 1991-1992. The estimated cost in



fiscal year 1991-1992 of including approximately 600 vehicles in the County-wide HHW program is approximately \$60,000.

This alternative was selected because the current drop-off events are operating at near-capacity. Late arrivals are turned away and personnel at the events work into the morning hours consolidating, identifying, lab-packing, and manifesting the wastes collected during the day. In order to increase the percentage of Sunnyvale households participating in these events, more opportunity for drop-offs must be made available. The City and its contractor, Safety Specialists, have gained sufficient experience running these events to be able to smoothly gear up for more frequent events, and thereby diverting a larger percentage of HHW from the landfill.

It seems reasonable that the current 40 tons per year of HHW collected could be increased to over 60 tons as soon as the quarterly program is implemented and, with increased public acceptance, it could soon increase to 75 tons of HHW diverted from the City of Sunnyvale's waste stream (not counting used motor oil and spent lead-acid batteries). No new methods of handling the wastes will be necessary, although the start-up of recycling anti-freeze seems a logical next step. No new facilities will be necessary for this alternative to be implemented.

One potential problem that merits attention as drop-off events become more frequent is inclement weather. In the location where the events are held now, the lab-packing takes place under an existing roof and the paint consolidation operation takes place under an awning that Safety Specialists erects for the day. The event could take place in the rain, but public participation would probably be reduced.

PERMANENT HHW DROP-OFF FACILITY

The City will examine the feasibility of developing a permanent HHW drop-off facility because it offers maximum potential for removing HHW from the municipal waste stream. The facility could be used as the hub for the County-wide HHW drop-off program. This permanent facility would be used for storage of materials collected at satellite facilities from throughout the County. The facility site could potentially be located at the site of the SMaRT station.

A permanent County-wide HHW facility minimizes the amount of waste being shipped to Class I landfills because its storage capabilities allow for more efficient consolidation and bulking prior to disposal. These efficiencies can also result in a lower cost per unit of waste being dropped off.



Within the context of developing a permanent facility, the City will consider implementing a Small Quantity Generator program and a house-to-house HHW collection service. By dedicating a specific day or time of the week to SQG participants who would be charged for the service, the administrative aspects of an SQG program could be simplified because residentially-generated waste would be kept separate from SQG waste. A permanent HHW facility could simplify implementation of a house-to-house pick-up service because it could provide storage and consolidation facilities for the waste.

The facility would be built to the specific safety and operating standards of a Treatment, Storage, and Disposal Facility (TSDF). It should have separated storage bays to allow segregation of incompatible chemical groups. Secondary containment would be provided. A consolidation area for bulking paints and solvents would have a catchment hood, lights would be explosion proof, safety washes would be available, and fire protection would be included. An area for categorizing "unknowns" and for conducting administrative business would also be a portion of the facility.

EXPANSION OF CLIENT BASE

The City will evaluate the feasibility of including small quantity generators in the HHW program. A unit fee for each gallon of liquid and another for each pound of solid could be charged. Although the number of participants probably would be small compared to the number of households utilizing the service, the amount of hazardous waste diverted could be substantial. It is possible that some Small Quantity Generators (SQGs) are currently using the HHW drop-off days; if it can be determined that the waste is generated by businesses, they would be transferred to the SQG program. In this way, hazardous waste could be diverted from the landfill at little or no cost to the community.

DOOR-TO-DOOR HHW COLLECTION

Door-to-door HHW collection deserves consideration because it fills a need that is not otherwise addressed by drop-off programs. The amount of diversion likely would not be substantial. Compared to a drop-off day that could handle over 800 households, this pick-up program would probably service only 30 households handled by two crews (on a pilot basis). Whether



or not the program would be continued would be determined based upon the success and the need for the program.

HHW SOURCE REDUCTION

A vigorous source reduction campaign will be undertaken to inform the public of alternatives to toxic household products. This campaign will be an integral part of the City's source reduction and recycling education and public information program (see Source Reduction and Recycling Element, Section 7).

PROGRAM IMPLEMENTATION

ENHANCEMENT OF EXISTING DROP-OFF DAYS

The City views this program as the first phase of a County-wide HHW collection program. Approval of this program requires a Recommendation of Staff (from the Solid Waste Program) supported by the Director of Public Works and City Manager in a Report to Council (Sunnyvale City Council). The report discusses the program and its fiscal impact and must be approved by the City Council. The State Department of Health Services (DHS) must be notified, and records kept to satisfy the Permit-by-Rule requirements of HHW drop-off events.

To implement this program, discussions must be initiated with the hazardous waste management contractor, and publicity program will have to be arranged. An agreement with the County and participating jurisdictions would be required concerning scheduling, eligibility for participation by individuals, funding, and other issues. Implementation could proceed upon Council approval.

Program costs by the hazardous waste contractor include a flat fee for labor plus a per drum cost, so that total costs are largely dependent on the amount of waste collected. The cost could range from \$50,000 to \$100,000 per event. Public costs include the cost of publicity and the salaries of City staff. The fees necessary for this program would come from refuse collection fees.



PERMANENT HHW DROP-OFF FACILITY

Terms for the inclusion of an HHW permanent facility at the SMaRT station would be negotiated with the operator of the transfer station (or else would be developed at the Sunnyvale Recycling Center, if feasible). The City would work with adjacent communities and the County to secure necessary approval of a permanent HHW facility.

The tasks involved include negotiating with the transfer station operator (or other potential HHW facility operators), creating plans, receiving bids from contractors, gaining approval from the various city and county agencies involved, informing the California DHS of progress, keeping records necessary for Permit-by-Rule, and educating the public about the need for and how to take advantage of the facilities.

This process cannot commence until the SMaRT station has received the necessary permits and construction has started, thereby making it a part of the medium-term planning process.

Depending on the size and staffing levels, capital and operating costs for permanent facilities can vary a great deal. In San Francisco, the cost for retrofitting an existing 30' x 80' steel building for use as a permanent facility was more than \$300,000. In 1990, the operating budget was \$600,000, which included capital depreciation. In Yuba County, where a much smaller facility is scheduled to open shortly, the operating budget is \$176,000 per year, including amortized capital costs. The cost of a permanent facility for the City of Sunnyvale is estimated to be between these two cost figures, with the expected cost being closer to San Francisco's than Yuba County's. Though a final budget will require a more thorough analysis, a budget of \$420,000 per year for a facility open a few days every week will be used for comparative purposes. This is determined by estimating \$60,000 for pro-rated capital costs, \$120,000 in compensation for a three-person staff, and \$240,000 for disposal and operating expenses. The permanent HHW facility will provide the potential for significant improvements over existing HHW programs with respect to convenience to the public and diversion of HHW from the waste stream.

EXPANSION OF CLIENT BASE

A determination must be made as to whether Small Quantity Generator (SQG) participation will be a part of this program. If it is, one of the quarterly drop-off days (such as one reserved for City residents only) should be dedicated to SQGs to prevent commingling residential and



commercial waste streams, which would negate the regulatory advantages of a HHW collection program. If it is determined that an SQG collection program is desirable, a feasibility study should be conducted to determine an appropriate rate structure, and the level of participation that could be expected with that rate structure in effect. The fees charged should reflect the varying disposal costs for differing types of hazardous waste. The City's actual disposal costs for differing types of liquid waste vary from about \$3 per gallon for nearly full cans of latex paint, to about \$10 per gallon for solvents and oil-based paints, to as much as \$40 per gallon for some pesticides.

DOOR-TO-DOOR HHW COLLECTION

This alternative could be part of the medium-term planning process. A relatively small amount of waste is likely to be diverted, and by incorporating it as a part of the permanent HHW facility, the alternative could be cost-effective.

HHW SOURCE REDUCTION

Public education regarding HHW source reduction will include: informing the public of the need for proper disposal of HHW and the programs that are available, and distributing booklets and brochures informing the public of safe disposal alternatives for household hazardous wastes.

Source reduction brochures are sometimes available in limited quantities from state agencies free of charge. Recently the CIWMB was offering up to 5,000 free brochures for community HHW programs. The City will take advantage of such opportunities to extend the effectiveness of the available program budget.

IMPLEMENTATION TIMELINE

A timeline for implementation of the HHW program appears in Table 4. The City, working closely with the County and State, private firms, and citizens groups, will be responsible for ensuring that the program is implemented successfully.



Table 4. City of Sunnyvale Household Hazardous Waste Implementation Timeline

| Task | Date |
|---|-------------|
| Enhancement of Existing HHW Drop-Off Days | |
| Secure recommendation of Staff | 1991 |
| Approve funding | 1991 |
| Negotiate contract | 1991 |
| Prepare publicity program | 1991 |
| Implement first quarterly event | 1992 |
| Permanent HHW Drop-Off Facility | |
| Evaluate feasibility of this approach | 1991 - 1992 |
| If feasible then: | |
| Begin permitting process | 1994 |
| Negotiate contract | 1994 - 1995 |
| Secure funding | 1996 |
| Construct facility | 1996 |
| Implement collection program | 1997 |
| Expansion of Client Base (if deemed feasible) | |
| Evaluate feasibility of this approach | 1991 - 1992 |
| If feasible then: | |
| Initiate quarterly collection of small quantity generator (SQG) hazardous waste | 1993 |
| Design SQG program for permanent facility | 1994 |
| Implement SQG collection program | 1997 |
| HHW Source Reduction | |
| Distribute source reduction materials | ongoing |
| Expand publicity program | ongoing |



MONITORING & EVALUATION

Various criteria can be used to evaluate the effectiveness of this program. One criterion is the total amount of hazardous waste collected; another is the percentage of households participating. There are some reasons why the total of waste collected can be misleading. One reason is that once HHW source reduction efforts become effective and public attitudes and awareness begin to favor less toxic alternatives to the products that are currently being used, the amount dropped off per household should decrease. Likewise, the quantity of HHW dropped off by a household at its first participation is likely to be larger than quantities dropped by the same household at subsequent drop-off events. The reason is that the items that have been stored for a long period of time. This effect should be particularly noticeable during the medium-term planning period after levels of participation begin to reach the saturation point. Nonetheless, net diversion is an important aspect of measuring the success of the program and should be a part of the monitoring process.

Because of potential seasonal variations in HHW generation and the fact that the management programs are in a process of evolution, evaluation should take place on a yearly basis. While it is possible to compare the number of drums collected from year to year and measure percentage of improvement, comparing the percentage of households participating is more problematic. The number of households participating in each event is known, but it is unclear whether any had participated in the other event(s) for a given year. Therefore, in the survey that is filled out by each participant, the participants should be asked how many other events they took part in during a given evaluation period. That way, total waste diverted and total percentage of household participation in a given year can be measured. Depending on a household's capability for safely storing household hazardous products and waste, and depending on their level of usage of such products, yearly participation in the program may not be necessary for them to be considered conscientious about keeping HHW out of the waste stream. Therefore, a 40% to 50% level of participation in a given year may in fact represent complete cooperation by a community's households.

Because of varying degrees of hazards associated with shipping different types of HHW, and because of the paramount importance of safety in their handling and shipping, the number of drums shipped is not always indicative of the net amount of waste collected. Trying to determine the net quantities is subject to individual interpretation, even when shipping manifests and their inventory sheets are scrutinized. For comparative purposes only, the number of drums shipped should be adequate. To meet CIWMB guidelines for categorizing HHW, however, the



contractor should break down the numbers of drums into the following categories: flammables, pesticides, corrosives, oxidizers, and miscellaneous; subcategories such as types of paints and solvents in flammables or acids vs. bases in corrosives would also prove helpful.

The City of Sunnyvale Recycling Coordinator will prepare an annual report to the Sunnyvale Solid Waste Program Manager indicating numbers of drums of HHW collected and percentages of households participating in the program. The level of improvement or lack of improvement will be used as a basis by which to modify the Household Hazardous Waste collection program.

Appendix A



Final

**CITY OF SUNNYVALE
DISPOSED WASTE FIELD ANALYSIS PLAN**

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October 1990



DISPOSED WASTE FIELD ANALYSIS PLAN

INTRODUCTION

This test plan presents the methodology for estimating the composition of solid waste generated within the City of Sunnyvale. The field analyses will be conducted at the City of Sunnyvale Sanitary Landfill during October 8-12 (Monday through Friday), 1990.

SAMPLE COLLECTION AND SORTING METHODS

The methods of sample collection and of sorting will be those of the ASTM Draft "Method for Determination of the Composition of Unprocessed Municipal Solid Waste." Loads of waste will be diverted at the landfill to the load sampling and sorting location. Waste categories and types for the field analyses will be those specified in Section 18722 (j) of the Emergency Regulations. A listing of the waste categories and types is presented in Table 1.

Residential waste collection vehicles (rear loaders) will be selected to be representative of waste from within the city. Commercial waste collection vehicles (front loaders and/or rear loaders) will be selected to be representative of commercial generators within the city. Sub-populations (such as restaurants) will be targeted for sampling to the degree that waste from these sub-populations is available and representative during the one-week field sampling period. The selection of representative loads of waste will be based on discussions with the haulers and CRS's knowledge of the residential and commercial waste sources within the jurisdiction.

Industrial waste collection vehicles (primarily containers) from the city will be selected at random at the landfill during the course of the one-week field study.

The sorting and characterization of commercial and industrial waste hauled in containers will be supplemented by visual survey by trained personnel as required to obtain representative data.

Special wastes (such as tires, appliances, etc.) will be sorted to the extent they are present in loads designated for sampling, and will be visually surveyed among the self-hauled wastes. Additionally, records kept of special waste by haulers and disposers will be analyzed as part of the study.

No sources of marine waste were identified during the planning process for the field analysis program. However, while conducting the field study, such wastes will be noted if they are observed.

Seasonal variations in the waste composition will be estimated based upon waste characterization studies performed by CRS in Berkeley, California (1988-89), for the North Santa Clara County JPA (1982-83), for the City and County of San Francisco (1985-86), and for the City of Sunnyvale (1988).



Table 1. Refuse Components for Sorting Study

- PAPER**
 - 1 Corrugated/kraft paper
 - 2 Mixed paper
 - 3 Newspaper
 - 4 High grade/office
 - 5 Magazines/glossy
 - 6 Other paper

- PLASTICS**
 - 7 LDPE Film
 - 8 PET
 - 9 HDPE
 - 10 Polystyrene foam
 - 11 Other

- 12 FOOD
- 13 YARD WASTE
- 14 WOOD
- 15 TEXTILES/LEATHER
- 16 RUBBER
- 17 AGRI. CROP RESIDUE
- 18 MANURE
- 19 OTHER ORGANICS

- METALS**
 - 20 Steel food and beverage containers
 - 21 Other ferrous
 - 22 Bi-metal cans
 - 23 Aluminum cans
 - 24 Other aluminum
 - 25 Other non-ferrous

- GLASS**
 - 26 Redeemable beverage containers
 - 27 Non-redeemable beverage containers
 - 28 Other recy. glass
 - 29 Other non-recy. glass

- 30 OTHER INORGANICS

- 31 WHITE GOODS

- 32 HOUSEHOLD HAZARDOUS WASTE



WASTE SAMPLING PLAN

The waste sampling plan for each waste source is delineated in Table 2. In addition to the field sorting program for waste delivered to the City of Sunnyvale landfill by collection vehicles, self-haul wastes and wastes delivered by small haulers will be visually surveyed to establish an estimation of the quantity, composition, and source of this waste including jurisdiction of generation. The objective will be to survey visually at least 50% of the self-haul wastes brought to the facility during the one-week field study.

The sampling plan is structured to achieve the following objectives:

- Provide an accurate accounting of waste materials by geographical neighborhoods for residential waste sources and by waste source for commercial, industrial, and self-haul generators.
- An estimated composition measurement accuracy for the primary recyclable waste categories in the range of 2 to 10 of the population mean for each jurisdiction at the 90% confidence level.

The plan assumes a ratio of standard deviation to mean value (coefficient of variation) of 0.3, based on information obtained from previous waste characterizations. For this value, using approximately forty samples yields an estimated error band of 5% at the 90% confidence level.

WASTE QUANTITIES

Total waste quantities will be accounted for by separately recording the weight (estimated or actual) of each residential, commercial, and industrial load originating from within the city. The accounting period will be one week or longer. The data will be tabulated similarly to the format illustrated in Table 3.

ANCILLARY DATA COLLECTION

Ancillary data collection activities before, during and after the field analyses will include where possible the following for each vehicle load:

Residential

- Collection company and route number
- Estimated number of corresponding households
- Net weight of vehicle load
- Demographic characteristics by route

Commercial

- Collection company and route number
- Type of generator
- Net weight and volume of vehicle load
- Estimated residential/commercial split collected by each vehicle



Table 2. City of Sunnyvale Sampling Plan^{a, b)}

| Waste Source | Total |
|--------------------------|-----------|
| Residential | 10 |
| Commercial ^{c)} | 15 |
| Industrial | <u>15</u> |
| TOTAL | 40 |

- a) Slight adjustments may be made to the distribution of samples among residential, commercial, and industrial waste sources based on information collected during the field analysis program.
- b) Small hauler and self-haul components will be determined through a visual survey.
- c) Multi-family waste collected in front-end commercial loaders will be isolated for sampling to the extent feasible.



Table 3. Waste Quantities Delivered to the City of Sunnyvale Landfill

| Waste Source | Vehicle Type | Quantity (tons) | | | | |
|--------------------|---|-------------------|--|-------------------|---|--|
| Residential | Rear Loader _____ _____ _____ _____ | | | | | |
| | | Commercial | Front Loader or Rear Loader _____ _____ _____ _____ | | | |
| | | | | Industrial | Container _____ _____ _____ _____ | |
| | | | | | | |



Industrial

- Collection company
- Type of container (open top or compactor)
- Type of generator
- Net weight of vehicle load

Appendix B



SAMPLE OF MARKETS FOR RECYCLABLE MATERIALS

| | |
|----------------|--|
| Newspaper | Container Corporation of America 2600 De La Cruz Boulevard Santa Clara, CA (408) 727-7576 |
| Office Paper | Secondary Fiber 33379 Railroad Avenue Union City, CA (415) 487-4995 |
| Aluminum Cans | Reynolds Aluminum 40595 Albrae Street Fremont, CA (415) 651-1541 |
| Tin Cans | Markovitz and Fox 1633 Old Oakland Road San Jose, CA 95131 (408) 295-3663 |
| Glass | Owens-Brockway Tracy, CA (MCOB in San Leandro, CA) |
| PET | Smurfit Recycling 201 Bassett Street San Jose, CA (408) 292-6552 |
| Batteries | San Jose Battery Exchange 193 Barnard #3 San Jose, CA |
| Used Motor Oil | Refinery Services Patterson, CA (800) 874-4444 |
| Tires | Zanker Resource Recovery Facility Los Esteros Road San Jose, CA 95134 (408) 263-2385 |
| White Goods | LMC Metals, Inc. 1800 Monterey Highway San Jose, CA 95112-6184 (408) 294-8443 |

Appendix C

City of Sunnyvale
REFUSE COLLECTION AND DISPOSAL RATES
Effective May 15, 1990

Section 6.22 Collection and Disposal of Garbage, Waste and Refuse Within the City Limits. Pursuant to Section 8.16.080 of the Sunnyvale Municipal Code a schedule of fees is hereby fixed for the collection and disposal of garbage, waste, and refuse as follows:

| | | Monthly |
|----|--|---------|
| A. | Single, Two- and Three-family Living Units. The Monthly rate for single, two- and three-family living units for one day a week collection service shall be as follows: | |
| 1. | Street curb line collection station. No limit on number of containers. Fee per living unit | \$ 9.79 |
| 2. | Rear yard collection station (maximum walk-in of 50 feet): | |
| a. | Minimum fee per living unit for three standard containers | 11.44 |
| b. | Fee for each additional standard container | 5.46 |
| B. | Apartments, Mobile Homes, Four or More Living Units per Dwelling. The monthly rate for apartments, mobile homes and all other types of dwellings with four or more living units for one day a week collection service shall be as follows: | |
| 1. | Three standard containers per living unit: | |
| a. | Fee for each living unit for one collection per week | 5.71 |
| b. | Additional fee per living unit for each additional pickup per week | 5.71 |
| 2. | Additional fee for each additional standard container per living unit for one collection per week. | 2.75 |
| 3. | Collection from containers supplied by Franchise Holder: | |
| a. | Minimum fee per living unit for collection service once a week | 5.71 |
| b. | Additional fee per living unit for collection service for additional pickup per week | 5.71 |

4. Bin delivery and rental fee:

| | |
|-----------------|----------|
| 1 cubic yard | \$ 26.94 |
| 1.5 cubic yards | 29.59 |
| 2 cubic yards | 32.26 |
| 3 cubic yards | 37.70 |
| 4 cubic yards | 40.28 |
| 6 cubic yards | 45.42 |
| 15 cubic yards | 114.09 |
| 20 cubic yards | 147.69 |
| 30 cubic yards | 220.33 |

C. Commercial Rates. The monthly rate for collection services at a collection station utilizing maximum 32 gallon containers supplied by the user shall be as follows:

| Standard Containers per Collection Station | Monthly Fee Collections per Week | | | | | |
|--|----------------------------------|----------|----------|----------|----------|----------|
| | One | Two | Three | Four | Five | Six |
| One | \$ 6.66 | \$ 13.26 | \$ 19.91 | \$ 26.50 | \$ 35.81 | \$ 38.45 |
| Each Additional | 2.54 | 5.08 | 7.62 | 10.14 | 12.69 | 15.27 |

D. Standard Containers Supplied by Franchise Holder. The monthly rate for collection service at a collection station utilizing standard containers supplied by the Franchise Holder shall be as follows:

| Container Size | Monthly Fee Collections per Week | | | | | |
|-------------------|----------------------------------|----------|-----------|-----------|-----------|-----------|
| | One | Two | Three | Four | Five | Six |
| 1 cubic yard | \$ 53.50 | \$ 93.61 | \$ 123.63 | \$ 149.05 | \$ 184.11 | \$ 220.94 |
| 1.5 cubic yards | 80.22 | 140.46 | 185.44 | 223.56 | 276.17 | 331.40 |
| 2 cubic yards | 85.46 | 150.44 | 215.70 | 245.04 | 298.24 | 385.76 |
| 3 cubic yards | 117.61 | 220.94 | 277.46 | 357.38 | 437.32 | 530.44 |
| 4 cubic yards | 146.80 | 268.94 | 359.84 | 466.37 | 572.90 | 688.25 |
| 6 cubic yards | 205.16 | 364.93 | 524.60 | 684.35 | 844.10 | 1,003.84 |
| 15 cubic yards | 591.80 | 1,117.86 | 1,578.13 | 1,972.66 | 2,301.44 | 2,825.76 |
| 20 cubic yards | 724.20 | 1,367.69 | 1,972.66 | 2,384.76 | 2,761.72 | 3,156.27 |
| 30 cubic yards | 1,052.10 | 1,956.04 | 2,817.80 | 3,683.68 | 4,549.48 | 5,415.32 |

Minimum rental period for containers is one month. For periods in excess of one month, rental charges shall be prorated on the daily equivalent of a 30-day month.

Standard Containers Supplied by Customer. The monthly rate for collection service at a collection station utilizing standard containers supplied by the customer shall be as follows:

| Container Size | Monthly Fee Collections per Week | | | | | |
|-----------------|----------------------------------|----------|-----------|-----------|-----------|-----------|
| | One | Two | Three | Four | Five | Six |
| 1 cubic yard | \$ 33.67 | \$ 73.78 | \$ 103.80 | \$ 130.17 | \$ 164.27 | \$ 201.11 |
| 1.5 cubic yards | 56.21 | 116.44 | 161.43 | 199.55 | 252.16 | 307.41 |
| 2 cubic yards | 59.33 | 124.31 | 189.53 | 218.91 | 272.10 | 337.56 |
| 3 cubic yards | 84.90 | 188.20 | 244.75 | 324.64 | 404.60 | 501.50 |
| 4 cubic yards | 106.51 | 228.66 | 319.56 | 426.09 | 532.62 | 647.97 |
| 6 cubic yards | 165.59 | 325.34 | 485.05 | 644.79 | 804.53 | 963.33 |
| 15 cubic yards | 526.90 | 1,052.94 | 1,513.22 | 1,907.76 | 2,236.69 | 2,700.38 |
| 20 cubic yards | 625.93 | 1,269.46 | 1,874.42 | 2,286.49 | 2,808.54 | 3,058.01 |
| 30 cubic yards | 897.19 | 1,801.13 | 2,662.91 | 3,528.77 | 4,394.58 | 5,260.40 |

E. Regular On-Call Service. Regular on-call service shall be available only to customers utilizing standard containers supplied by the Franchise Holder. The rate for this service shall be as follows:

| | Delivery and Rental | Per Pick Up |
|----------------|---------------------|-------------|
| 15 cubic yards | \$ 114.09 | \$ 97.37 |
| 20 cubic yards | 147.69 | 129.82 |
| 30 cubic yards | 220.33 | 194.73 |

F. Special On-Call Service. Special on-call service shall be available to any customer utilizing standard containers supplied by the user or the Franchise Holder. The rate charged for this service shall be as follows:

| Personnel and Equipment (based on rated gross vehicle weight and driver) | Rate per Quarter Hour on Job Site |
|--|---|
| GVW to 7,600 pounds | \$ 17.83 |
| GVW 7,601 to 15,000 pounds | 20.19 |
| GVW 15,001 to 25,000 pounds | 22.54 |
| GVW 25,001 pounds and over | 24.94 |
| Each additional personnel unit required | 8.78 |

In addition, a fee of \$6.66 per cubic yard or fraction thereof shall be charged for the amount of refuse collected.

G. Maintenance of Containers Supplied by Franchise Holder. Standard containers supplied by the Franchise Holder may require cleaning and/or painting due to the following:

1. Ordered by user or required by Health Department.
2. Ordered or required due to fire or materials being placed in containers causing substantial damage to the extent that sandblasting is necessary before repainting; and exclusive of the regular cleaning/painting service.

In such event, fees will be charged according to the following schedule:

| Container Size | Cleaning Only Fee | Cleaning and Painting Rate per Quarter Hour on Job Site |
|---|----------------------|---|
| First cleaning/painting each 12-month period | None | None |
| 1 cubic yard | \$ 25.89 | \$118.73 |
| 1.5 cubic yards | 29.25 | 122.13 |
| 2 cubic yards | 30.62 | 169.95 |
| 3 cubic yards | 35.70 | 174.89 |
| 6 cubic yards | 65.66 | 251.31 |
| 15 cubic yards | 109.35 | 387.89 |
| 20 cubic yards | 109.35 | 387.89 |
| 30 cubic yards | 143.02 | 455.17 |
| | | Monthly |

H. Miscellaneous Provisions. Security of Containers Supplied by Franchise Holder. The fee for providing locks on standard containers supplied by the Franchise Holder shall be as follows:

| | |
|--|----------|
| Installation of hasp, furnishing of lock and two keys | \$ 72.35 |
| Each additional key required | 3.71 |
| Additional collection charge for each pickup from locked container | .39 |

I. Rear Yard Pickup. The rate for rear yard pickup service based on standard container supplied by the customer shall be as follows:

| | |
|---------------------|---------|
| Apartment buildings | \$ 2.52 |
| Mobile homes | 1.43 |

- J. Container Move-Out. The rate for moving out one to 30-cubic yard containers supplied by the customer or Franchise Holder shall be as follows:

| Truck to Container Station | Per Container per Pickup |
|----------------------------------|-----------------------------------|
| 10 to 75 feet | \$ 3.71 |
| 76 to 150 feet | 7.41 |
| 151 to 200 feet | 14.83 |

- K. Compacted Material. The rate for the removal of compacted material shall be \$22.23 per cubic yard.

- L. Disposal Fees. The fees charged for disposal of refuse transported by the customer to the disposal site shall be as follows:

| | |
|--|---------|
| Each cubic yard of regular refuse | \$ 5.17 |
| Rubber tires: | |
| Each automobile tire | 2.92 |
| Each truck tire | 8.36 |
| Each cubic yard of demolition material | 13.53 |
| Minimum charge per load | 1.10 |

