

SECTION 3

STUDY ASSUMPTIONS AND BASIS

3.1 GENERAL

The City's refuse management system is summarized in this section.

3.2 REFUSE MANAGEMENT SYSTEM

The refuse system model presented below is based on conditions that existed as of September 1998. The model covers the existing system only to the extent that it is related to the performance of the NSR task. A more detailed presentation of the overall refuse system is included in other reports produced for the Oahu Municipal Refuse Disposal Alternatives Study. A conceptual diagram of the model is shown in Figure 3-1.

3.2.1 Collection System

The City is divided into seven collection districts. Waste from the districts is either sent through one of three transfer stations or hauled directly to the disposal site, depending on distance from the route to the disposal point.

The City's Refuse Division collects waste from single-family dwellings and from some apartment buildings and small commercial facilities. Refuse from most commercial facilities and apartments are collected by private waste haulers.

Refuse from residential units is collected twice per week. Green waste is collected separately twice per month in areas with automated refuse collection. In areas with manual collection, green waste is collected with the rubbish.

Both automated side-loading and manual rear-loading trucks are used for waste collection. The Refuse Division staff anticipates converting a total of about 89 percent of the routes to automated collection over the next several years. In the automated areas, green waste is collected with manual rear-loading trucks.

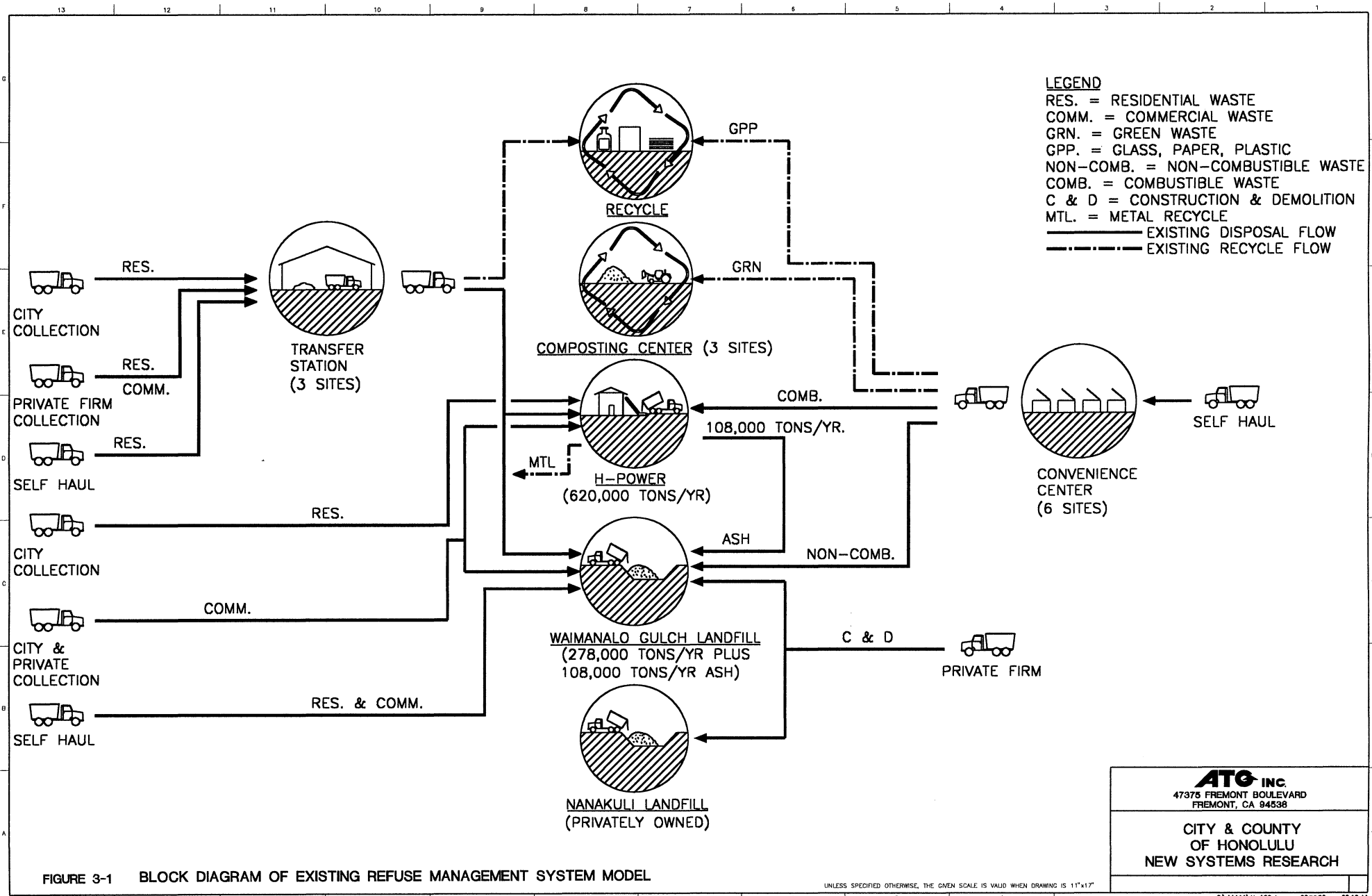


FIGURE 3-1 BLOCK DIAGRAM OF EXISTING REFUSE MANAGEMENT SYSTEM MODEL

UNLESS SPECIFIED OTHERWISE, THE GIVEN SCALE IS VALID WHEN DRAWING IS 11"x17"

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3.2.2 Convenience Centers

The City operates a system of six convenience centers where householders can drop off waste. The centers have bins designated for recycling, H-POWER, and landfill. The customer places the waste in the proper bin.

3.2.3 Transfer Stations

The City owns and operates three transfer stations to optimize the transport of collected refuse to the disposal facilities.

- **Keehi Refuse Transfer Station.** The Keehi Refuse Transfer Station is located on a 5-acre site in Honolulu. The facility serves the most populous area of Oahu and has been operational since 1977. The facility contains a 12-bay depressed tipping floor with a 1,000-ton storage capacity, four compactors and a maintenance shop. Operating equipment includes wheel loaders, backhoes, sweepers, truck tractors, transfer trailers and pickup trucks.
- **Kapaa Refuse Transfer Station.** Kapaa Refuse Transfer Station is located on a site formerly mined as a rock quarry by Ameron HC&D. This transfer station began operation in 1989. The facility contains an 8-bay depressed tipping floor with an 800-ton storage capacity, two trailer load-out bays and maintenance and storage rooms. Operating equipment includes wheel loaders, knuckle-boom loaders, backhoes, sweepers, truck tractors, transfer trailers and pickup trucks.
- **Kawailoa Refuse Transfer Station.** Kawailoa Refuse Transfer Station is located next to the closed Kawailoa Sanitary Landfill. This transfer station began operation in 1987. The facility is an open-air facility in which smaller collection trucks dump directly into a transfer trailer, after which the refuse is redistributed and tamped with a knuckle-boom loader. The station also serves as a convenience center. Operating equipment includes open top transfer trailers, truck tractors, one knuckle-boom loader, one backhoe and one pickup truck.

3.2.4 Waste Recycling

The City's waste recycling programs include the following components:

- **Recycling Drop-Off Centers:** A drop-off system is currently located at schools around the island. Materials collected include paper, plastic, aluminum and steel cans, and glass. The drop-off system is being expanded to some commercial facilities, such as shopping centers.
- **Green Waste Drop-Off Centers:** Green waste processing is done at three locations, two private operations and one operated by the Refuse Division (located at the former Kapaa Landfill). The private operations produce both mulch and compost. The finished products are marketed in retail stores and in wholesale bulk. The Refuse Division operation produces mulch, which is provided to the City parks and other departments and to the public.
- **Citizen Sponsored Recycling.** The Partnership for the Environment is a City-coordinated organization comprised of representatives of companies that have extensive commercial recycling activities. The Partnership acts as an information source for expanding commercial recycling.
- **Restaurant Glass Recycling.** The City requires recycling of glass containers from larger bars and restaurants.
- **Restaurant Food Waste Recycling.** Restaurants and other facilities that generate pre-consumer food waste are required to recycle that material.
- **Office Paper Waste Recycling.** The City has a program to recycle materials from its offices. It also requires office buildings greater than 20,000 square feet in size to recycle office paper, newspaper, and cardboard.
- **Construction Debris Recycling.** While not City sponsored, there are programs to recycle construction and demolition waste.

- **Incentive-Induced Glass Recycling.** A statewide advance disposal fee for glass provides an incentive for recycling that material. A fee of 1.5 cents is collected for each glass container entering the state. The processor is paid six cents per pound for the recycled glass.
- **Ferrous and Non-Ferrous Metal Recycling.** The City's H-POWER, which is a waste-to-energy plant, recycles ferrous metals from the front end processing equipment and ferrous and nonferrous metals from the ash.

3.2.5 Disposal

The City operates two disposal facilities, and a third is privately operated. These facilities are:

- **Waimanalo Gulch Landfill.** This landfill is located at Waimanalo Gulch in Kapolei, Oahu. It is owned by the City and operated by a private contractor.
- **Waste-to-Energy Plant (H-POWER).** The City's H-POWER facility located in Campbell Industrial Park is a refuse-derived fuel plant that produces energy from combusted solid waste.
- **PVT Landfill.** The PVT Landfill is located in Nanakuli, Oahu. It is owned and operated by the PVT Land Company and accepts refuse from construction and demolition activities.

3.3 REFUSE COMPOSITION AND DISPOSAL RATES

Table 3-1 provides 1998 waste composition data for the Waimanalo Gulch Landfill waste stream. These data were obtained from the Waste Composition Study, conducted as part of the overall project.

- **H-POWER.** The most recent data indicate that the City's H-POWER facility processes over 620,000 tons of waste per year (about 2,000 tons per day).
- **Waimanalo Gulch Landfill.** The amount of waste disposed of at the Waimanalo Gulch Landfill in 1998 was 192,099 tons. For the NSR study, it is assumed that this waste is processible.

Table 3-1. Composition of Refuse Received at Waimanalo Gulch Landfill in 1998.

COMPOSITION		
MATERIAL	(mean %)	TONS
Paper	8.9%	17,097
Newspaper	0.2%	384
Cardboard	5.2%	9,989
High Grade	0.5%	960
Low Grade	2.2%	4,226
Compostable	0.3%	576
Non-Recyclable Paper	0.5%	960
Plastics	5.0%	9,605
PET #1	0.0%	0
HDPE #2	0.0%	0
Other Bottles	0.0%	0
Rigid Plastic	1.4%	2,689
Film Plastic	2.5%	4,802
Other Plastic	1.0%	1,921
Wood	31.2%	59,935
Treated Wood	13.9%	26,702
Pallets/Crates	7.6%	14,600
Untreated Lumber	5.8%	11,142
Untreated Plywood	2.6%	4,995
Stumps	1.3%	2,497
Metal	12.3%	23,628
Aluminum Cans	0.2%	384
Tin Cans	0.2%	384
Ferrous	6.7%	12,871
Non-ferrous	0.4%	768
Mixed/Other	4.8%	9,221
Glass	0.5%	960
Yard Waste	6.0%	11,526
Other Inorganics	20.0%	38,420
Wallboard	7.0%	13,447
Asphalt Roofing	1.4%	2,689
Asphalt Paving	1.9%	3,650
Concrete	2.9%	5,571
Other	6.8%	13,063
Other Wastes	16.0%	30,736
Furniture/Mattresses	5.1%	9,797
Carpet	4.5%	8,644
Other	6.4%	12,294
TOTAL	100%	192,099

Note: Composition data are calculated at 90% confidence interval

- **Private Landfill.** PVT Land Company accepts approximately 355,000 tons per year of refuse from construction and demolition activities.

3.4 REFUSE MANAGEMENT COSTS

Refuse management costs for the system are presented below. The data are for system operations in 1996, 1997 and 1998.

- **Collection.** City's average collection cost is \$88.11 per ton. The cost is based on 1996-97 fiscal year when approximately 302,000 tons of refuse was collected .
- **Convenience Centers.** The operating cost at the City's convenience centers is approximately \$57 per ton of refuse handled. This cost is based on 1996-97 fiscal year when approximately 33,500 tons of refuse was handled.
- **Transfer Stations.** The operating cost at the City's transfer stations is approximately \$31 per ton of refuse handled. This cost is based on 1996-97 fiscal year when approximately 227,000 tons of refuse was handled.
- **H-POWER.** The H-POWER income and expense for the year 1996-97 were as follows:

Income		
Material Sales		\$112,000
Electricity Sales		\$27,300,000
Equity		\$25,000,000
	Total Income	\$52,412,000
Expense		
Operating and Maintenance		\$55,140,000
Annualized Capital Costs		\$18,700,000
	Total Expense	\$73,840,000
Net Cost		21,428,000
Refuse Processed		588,940
Net Cost Per Ton		\$31.36

- **Waimanalo Gulch Landfill.** The Waimanalo Gulch Landfill accepts noncombustible waste, including the ash from H-POWER, and other materials, mostly from private waste haulers and self-haulers. Householders do not pay for waste disposal. Commercial customers pay \$72.25 per ton, which includes a state tax of \$0.35 per ton and a 12 percent City recycling surcharge.
- **PVT Landfill.** The PVT landfill has a tip fee of \$25 per ton.
- **General Recycling.** City recycled approximately 17,000 tons of material in the fiscal year 1996-97. Recycling operations cost was approximately \$1,400,000. Revenue from the sale of material was \$25,179. The net cost of recycling was approximately \$80.42 per ton.
- **Glass Recycling.** City recycled approximately 10,200 tons of glass in the fiscal year 1996-97. Recycling operations cost was approximately \$1,374,000. Revenue from the sale of glass was \$10,200. The net cost of recycling was approximately \$134.83 per ton. Glass recycling is completely supported by the Advance Disposal Fee (ADF) system.