

## **C2: Community-based Recycling**

### **1. Background**

Presently, Metro Manila generates approximately 5,350 tons of garbage a day. The amount of waste being recycled is approximately 200 tons/day (4%) at generation source (households), 54 tons/day (1%) and 71 tons/day (1%) at collection stage by garbage collectors and waste pickers, respectively, or a total of 327 tons/day (6%).

Recycling is a very important activity in the management of solid waste especially in Metro Manila where critical issues, such as lack of land for solid waste management facilities, financial resources, public participation, need to be addressed.

In light of this situation, the study has initiated the conduct of a pilot project on recycling involving selected communities.

### **2. Objectives**

The objectives of the pilot project are as follows:

- (1) To study typical waste management practices at generation source (households);
- (2) To identify ways of public participation on solid waste management at the community level;
- (3) To improve residents' understanding and responsibility for waste-related matters and environmental issues; and
- (4) To improve the master plan considering the results of the pilot project.

### **3. Policy of Implementation**

The pilot project on community-based recycling aims to verify the role of recycling activities in the overall waste management master plan. Based on the results of the project, especially on the aspect of management, the recycling plan will be revised accordingly.

The master plan stresses the importance of community participation in recycling. A Community Waste Manager is designated to manage a Community Recycling Center/Barangay Recycling Station, and spearhead education and enlightenment campaigns. This pilot project on recycling is a basic model for community participation on solid waste management as it involves group collection and segregation of recyclable waste by the community.

The following were the criteria in the selection of the pilot areas:

- (a) exhibit general condition of Metro Manila;
- (b) show interest and intent to conduct recycling activities;
- (c) has strong community leaders to support the project; and
- (d) profess willingness to contribute time to the project, and work towards its sustainability.

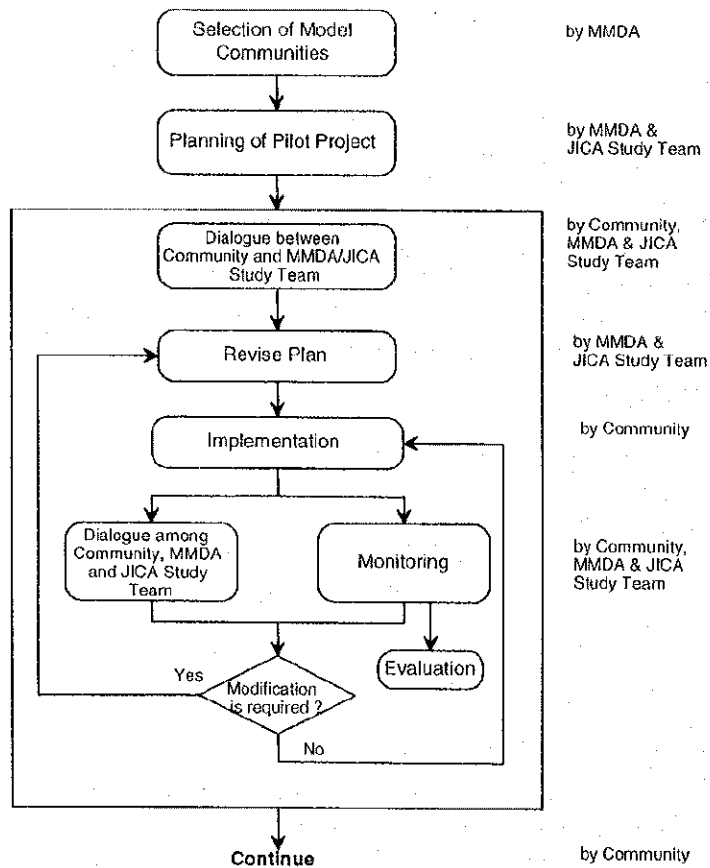
#### 4. Process of Pilot Project

The process of community-based recycling pilot project is shown in Figure 4.1. Out of six candidate sites, two communities had been selected with the assistance of MMDA (refer to Figure 4.2):

- 1) Soldier's Village, Barangay Sta. Lucia, Pasig, and
- 2) Barangay 193, Pildera II, NAIA, Pasay City.

Profile of the above communities is shown in Table 4.1.

The selected communities carried out the pilot project from April 1998. JICA provided the necessary equipment and other materials necessary to implement the project.



**Figure 4.1 Process of Community Based Recycling Pilot Project**

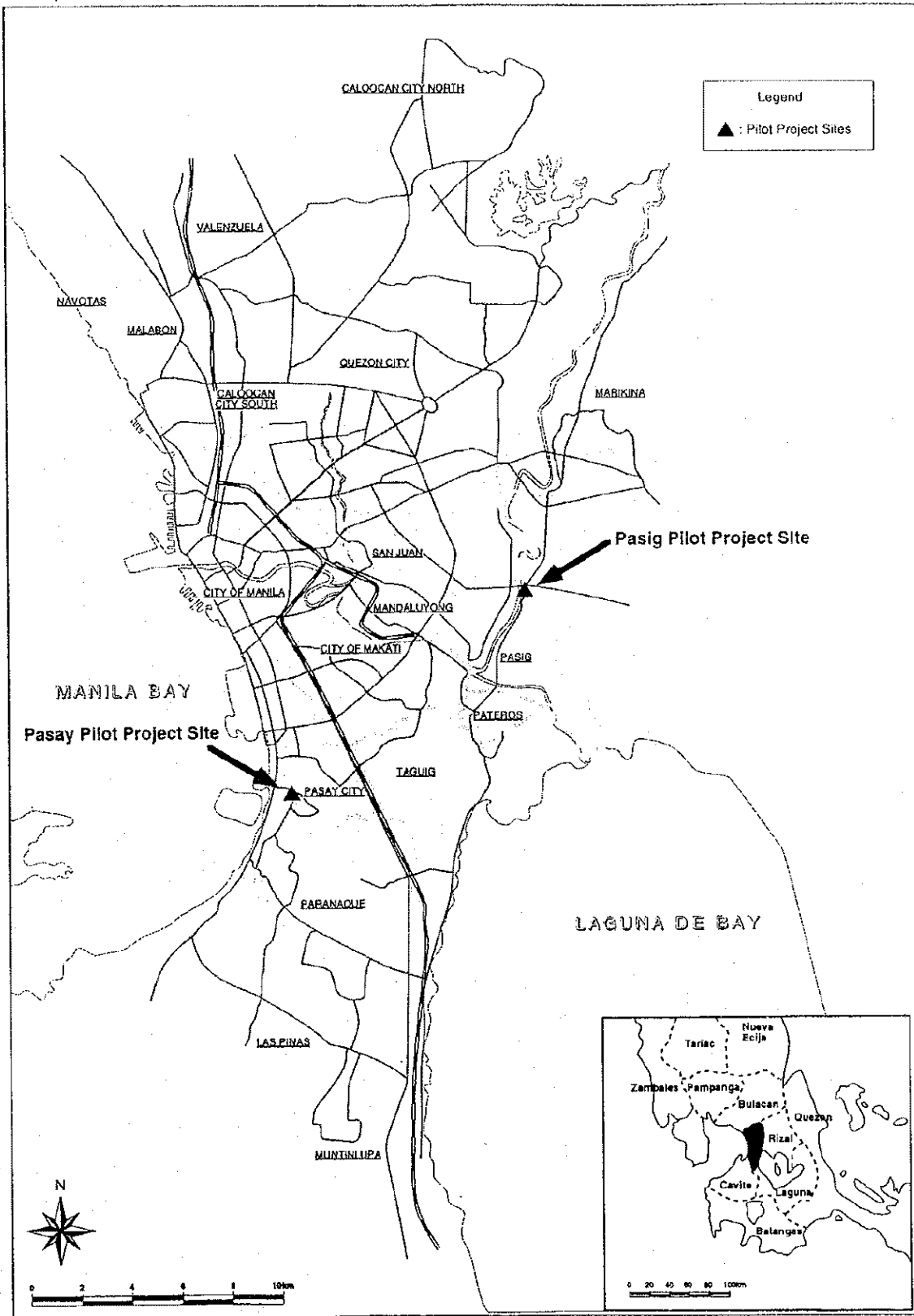


Figure 4.2 Pilot Project Sites of Community-based Recycling

**Table 4.1 Profile of Pilot Project Communities on Recycling**

Item	Soldier's Village	Pildera
1. Land Area	4.14 ha.	n.a.
2. Land Use	Predominantly residential, with some home-based business like sari-sari stores, snack stalls (e.g., banana-cue, barbecue), <i>carinderia</i>	Predominantly residential, with some business enterprises and home-based business
3. Population	1,630 (1997)	8,490 (1995)
4. Total Number of Households	326	1,771
5. HH Income Level	Low to middle income	Low to Middle Income
6. No. of Schools	2 (Queenship of Mary Elementary School) (Sta Lucia Day Care Center)	1 (PADEFO Day Care Center)
7. Parks and Open Spaces	Basketball Court	NAIA Park
8. Hospitals	None	Health Center only
9. Markets	None	None
10. Existing Organization(s)	Soldiers Village Neighborhood Association	PILDERA II Homeowners Association PILDERA II Homeowners Credit Coop. (members are Bgy. 193 & Bgy. 194)
11. Location of Nearest Junkshop	Mangahan Floodways Service Road (Soldier's Village Junkshop)	Road 1 cor. 3rd St., PILDERA II (Juanito's Junkshop)
12. Garbage Collection System <sup>1/</sup>		
a. Frequency	twice a week	daily along national road (MMDA); every 2 weeks (LGU)
b. Type of vehicle	10-wheeler dump truck	Compactor; open dump truck none
c. Fees paid by residence	none	None
13. Market	None	<i>Talipapa</i>

Source: 1) Soldier's Village Homeowners Association

2) Office of the Barangay Chairman, Bgy. 193,

<sup>1/</sup> The compactor enters the barangay upon request only.

SOLDIER'S VILLAGE, Pasig City



BARANGAY 193, Pasay City



## 5. Implementation of Pilot Project

### 5.1 Case of Soldier's Village

#### (1) Profile of Community

Soldier's Village is found in the eastern section of Metro Manila, and forms part of Barangay Sta. Lucia in Pasig, Metro Manila. Located near the Mangahan Floodway, it is a developing area whose residents are mostly soldiers of the Philippine Army/Air Force and their families. Other pertinent information about the area is found in Table 4.1.

#### (2) Major Issues for Community Based Recycling

Community-based recycling in Soldier's Village addressed the following major issues related to solid waste management:

- irregular collection of garbage (only one dump truck services the village), and
- difficulty of maintaining cleanliness in the village.

#### (3) Concept of Pilot Project on Recycling

The concept of recycling that is practiced in the village is explained by Figure 5.1. It promotes group collection with a recycling center as the repository of collected waste. Residents segregate recyclable waste at home, while resident sub-groups headed by street leaders collect recyclable waste and bring them to the center.

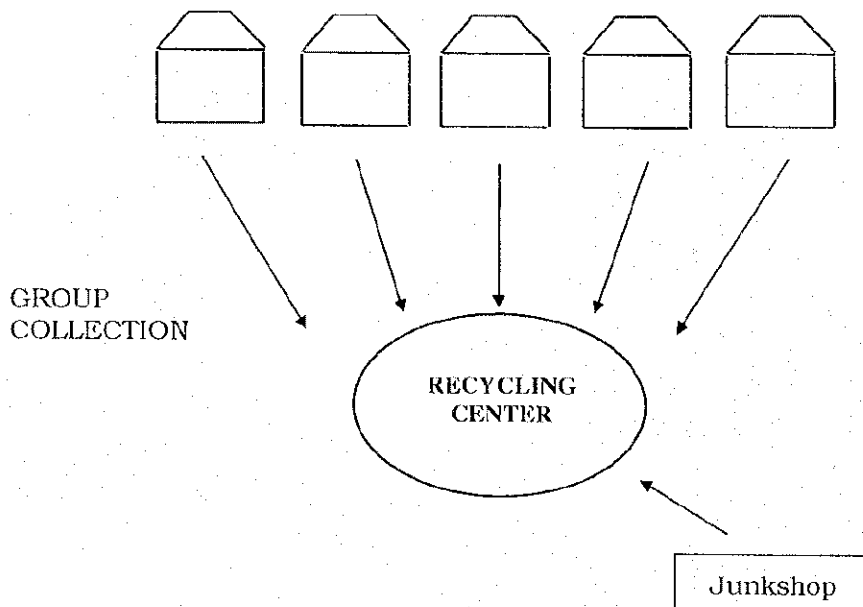
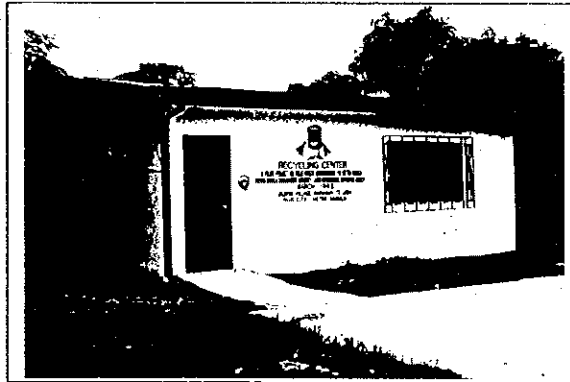


Figure 5.1 Concept of Recycling Pilot Project in Soldier's Village

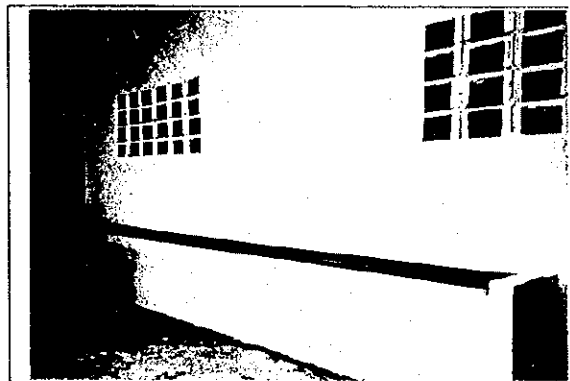
(4) Implemented Program on Recycling

The collective efforts of the Study Team and MMDA counterparts to put in place a recycling program at Soldiers Village involved the following activities:

- a. Meetings. Several meetings preceded the actual implementation of the pilot project. The community has a high awareness of what recycling is all about inasmuch as Soldier's Village had already conducted a recycling program with the assistance of MMDA-PMO. (Problems encountered because of unsafe storage area forced the community to end the program.)
- b. Organization of Core Group. Street leaders and their members were designated from among volunteer residents in order to handle all activities related to the recycling project (refer to Figure 5.2). Their responsibilities include information dissemination, collection, further segregation and sale of recyclable waste, and maintenance of recycling center and equipment. The core group was latter official named as Recycling Project Management Group (RPMG).
- c. Construction of Recycling Center. A space was available in the area for the construction of a recycling center. It is located among several important structures in the area including a chapel, Day Care Center and multi-purpose town hall. The Recycling Center has a total area of 40 sq.m.



A front view of the Recycling Center in Soldiers Village (top). Two horizontal bars at the side provide space for newspapers and cartons (bottom).



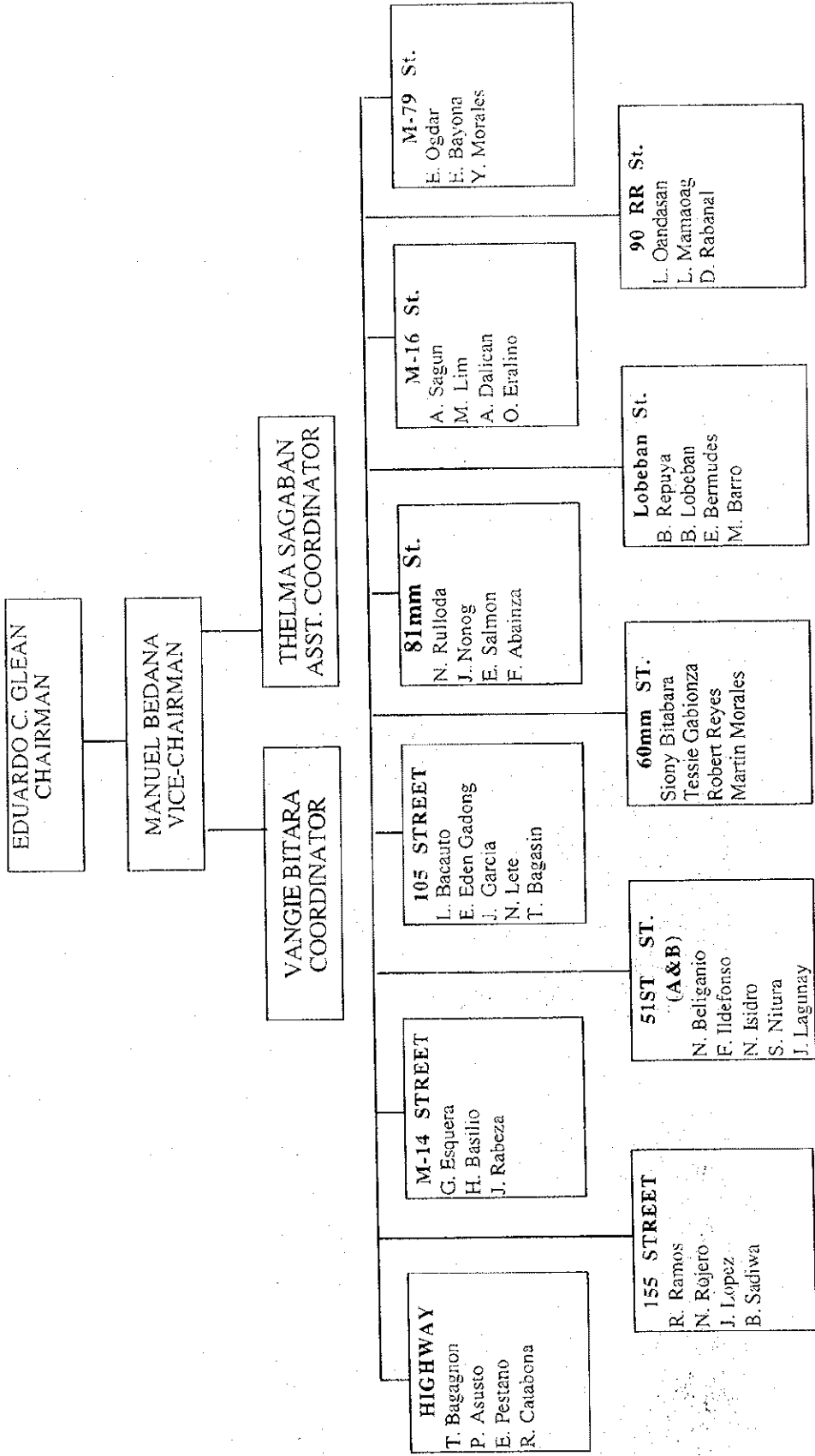


Figure 5.2 Organization of Core Group on Recycling, Soldier's Village, Pasig City



- d. Provision of Equipment. The community was also provided with some equipment, such as pushcarts, bins and weighing scale. In addition, a number of stickers were also distributed as a sort of promotional tool to encourage the residents to contribute to the recycling project.

Equipment	No.
Wooden pushcarts	3
Steel pushcarts	1
Garbage roller bins	2
Weighing scale	1

- e. Workshop. A focused group discussion (FGD) was conducted on May 30, 1998. During the FGD, duties and responsibilities were clarified, issues and concerns were threshed out, solutions and alternatives were offered (refer to Appendix 5.1 for the FGD output). An Action Plan drawn up based on the FGD output was signed by the barangay chairman, the village president, chairman of the youth council, JICA consultant and the head of MMDA's IPDG-SWMO (refer to Appendix 5.2).
- f. Collection of Recyclable Waste. Street leaders follow a designated time, day and route in the collection of recyclable waste. Plastic containers (shampoo, detergent, etc.), glass bottles and cartons comprise the biggest number of recyclable materials being collected.



Ms. Elsie Encarnacion of MMDA acted as facilitator at the FGD in Soldiers Village



Dedication and hard work characterize the effort exerted by the members of the RPMG, especially during collection days.

- g. Selection of Junk shop. A list of junk shops was provided by MMDA. From among the junk shops listed, several were contacted to obtain a price list of recyclables. ACJ Junk Shop owned by Mr. Alexander Areola, who belong to the Clean and Green project of the First Lady of Pasig, was selected.
- h. Sale of Recyclable Waste. As of October 8, 1998, the total amount of money earned from the sale of recyclable waste is P2,265.50. Specifics of the sale are shown in Table 5.1

**Table 5.1 Record of Sale of Collected Recyclables  
(Soldiers Village Recycling Center)**

Item	Quantity		Unit Price		Total Amount (P)	
	10/8	9/15	10/8	9/15	10/8	9/15
▪ Assorted carton	111 k	148 k	0.80	0.80	88.80	118.40
▪ Old newspapers	40 k	107	1.70	1.70	68.00	181.90
▪ Waste paper (asstd. papers)	55 k	-	0.60	-	33.00	-
▪ Gin bottle	100 btl	787 btl	0.70	0.70	70.00	550.90
▪ Sunny orange bottle (big)	17 btl	-	1.00	-	17.00	-
▪ Sunny orange bottle (small)	85 btl	-	0.40	-	34.00	-
▪ Catsup bottle						
▪ Long neck bottle	33 btl	209 btl	0.60	0.60	19.80	125.40
▪ Flat ( <i>lapad</i> ) bottle (big)	5 btl	-	1.75	-	8.75	-
▪ Flat ( <i>lapad</i> ) btl (small)	31 btl	-	0.80	-	24.80	-
▪ Soft drinks bottle (1 l.)	10 btl	-	0.70	-	7.00	-
▪ Soft drinks btl (16 oz.)	1 btl	-	3.00	-	3.00	-
▪ Plastic ( <i>sibak</i> )	6 btl	-	1.25	-	7.50	-
▪ Iron	100 k	22 k	5.00	5.00	500.00	110.00
▪ Aluminum can	44 k	-	1.75	-	77.00	-
▪ Aluminum-made things	4 k	3 k	15.00	12.00	60.00	36.00
	-	1 k	-	18.00	-	18.00
<b>Total Sale (P)</b>	-	-	-	-	<b>1,018.65</b>	<b>1,025.60</b>

Monitoring of the pilot project is being undertaken by MMDA to determine the system's effectiveness as a waste minimization program and the possibility of its adoption in other areas as well.

Table 5.2 provides a list of dates and activities undertaken in the implementation of the recycling pilot project in Soldiers Village, Pasig, Metro Manila.

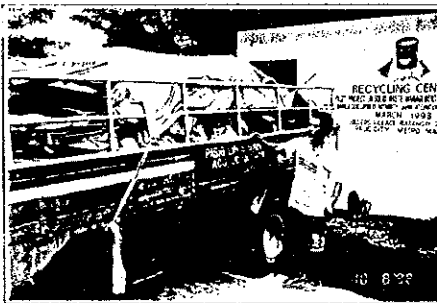
**Table 5.2 Schedule of Recycling Program of Activities, Soldiers Village, Pasig\***

	Date	Activity
	February 4	Discussion of JICA pilot project on recycling with the president of the village homeowners' association; informed village president of the possibility of building a recycling center; set the date for community meeting to inform residents of the proposed project; checked proposed site of recycling center
	February 6	Presentation of recycling concept of the Study; discussed issues and concerns regarding the proposed recycling activity
	February 11	Meeting with the core group; discussed plans on how to implement the project, e.g. items to be collected, incentives to households, distribution of stickers, among other things
	March	Construction of Recycling Center, delivery of wooden pushcarts, construction of metal pushcart
	April 2	Inspection of Recycling Center, delivered promotional stickers; discussed inauguration
1	April 22	Finalization of inauguration program
9	April 25	Inauguration of Recycling Center
9	May 15	Discussion of FGD plan, gave record sheets to be used by street leaders
8	May 30	FGD Workshop
	July 29	Meeting with village president to finalize Action Plan
	August 14	Monitoring by MMDA
	August 25	Monitoring by MMDA
	September 11	Monitoring by MMDA
	September 15	Initial sale of collected recyclables
	October 3	Monitoring by JICA Study Team and MMDA counterpart; held consultative meeting with members of the RPMG
	October 8	Second sale of collected recyclables
	October 15	Monitoring by MMDA
	October 30	Monitoring by MMDA
	November 18	Monitoring by MMDA
	November 27	Monitoring by MMDA



Street leaders on collection day of recyclables

Further segregation of the recyclable items that have been collected by members of the RPMG.



ACJ Junkshop loaded with recyclables.



Receiving the payment for the recyclables is Ms. Helen Basilio, RPMG Secretary.

## 5.2 Case of Barangay 193, Pildera II, Pasay City

### (1) Profile of Community

Barangay 193, PILDERA II is located at the southern portion of Metro Manila. It is bounded at the north by MIA Road, at the west by a creek, and at the east by Ninoy Aquino Avenue. It is a densely populated area of low to middle income families. Its roads are cemented but narrow with barely enough space to accommodate two medium-sized vehicles. Other information about the pilot area is shown in Table 4.1.

### (2) Major Issues for Community Based Recycling

In Barangay 193, the following major issues related to solid waste management need to be addressed:

- irregular collection of garbage result in the indiscriminate dumping at canals thereby obstructing its flow and contributes to flooding in the area; and
- unsightly mounds of garbage along a major road.

### (3) Concept of Pilot Project

There are a number of areas in Metro Manila that are not as fortunate as Soldier's Village, which has an available space for construction of a recycling facility such as a recycling center. This is the case of Barangay 193, Pildera II, in Pasay City.

The concept of recycling that was adopted in Barangay 193 required the installation of recycling stations at selected streets (refer to Figure 5.3). Each recycling station has 3 sacks for recyclable waste (e.g. bottles, plastics, aluminum cans or newspapers). When the sacks are full, these will be collected by means of a pushcart. The recyclable items will be sold to a junk shop immediately after collection.

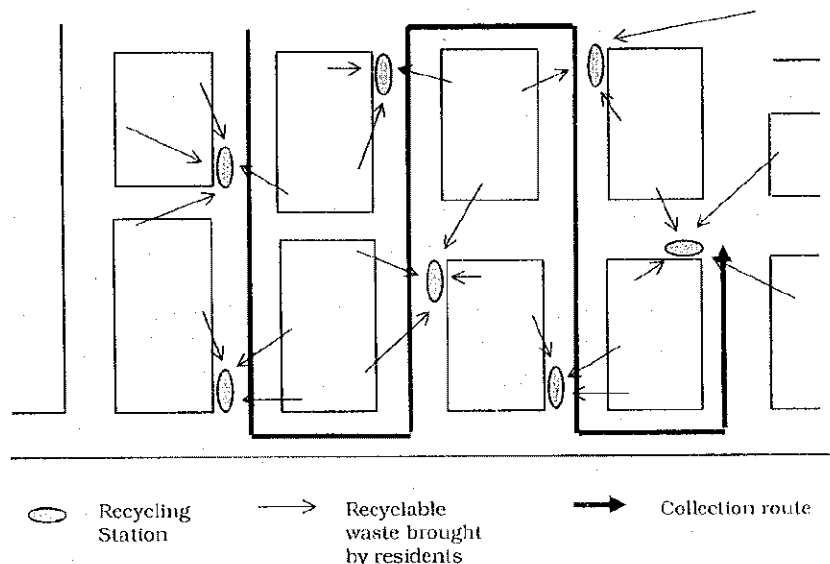


Figure 5.3 Concept of Recycling Stations in Barangay 193, Pasay City

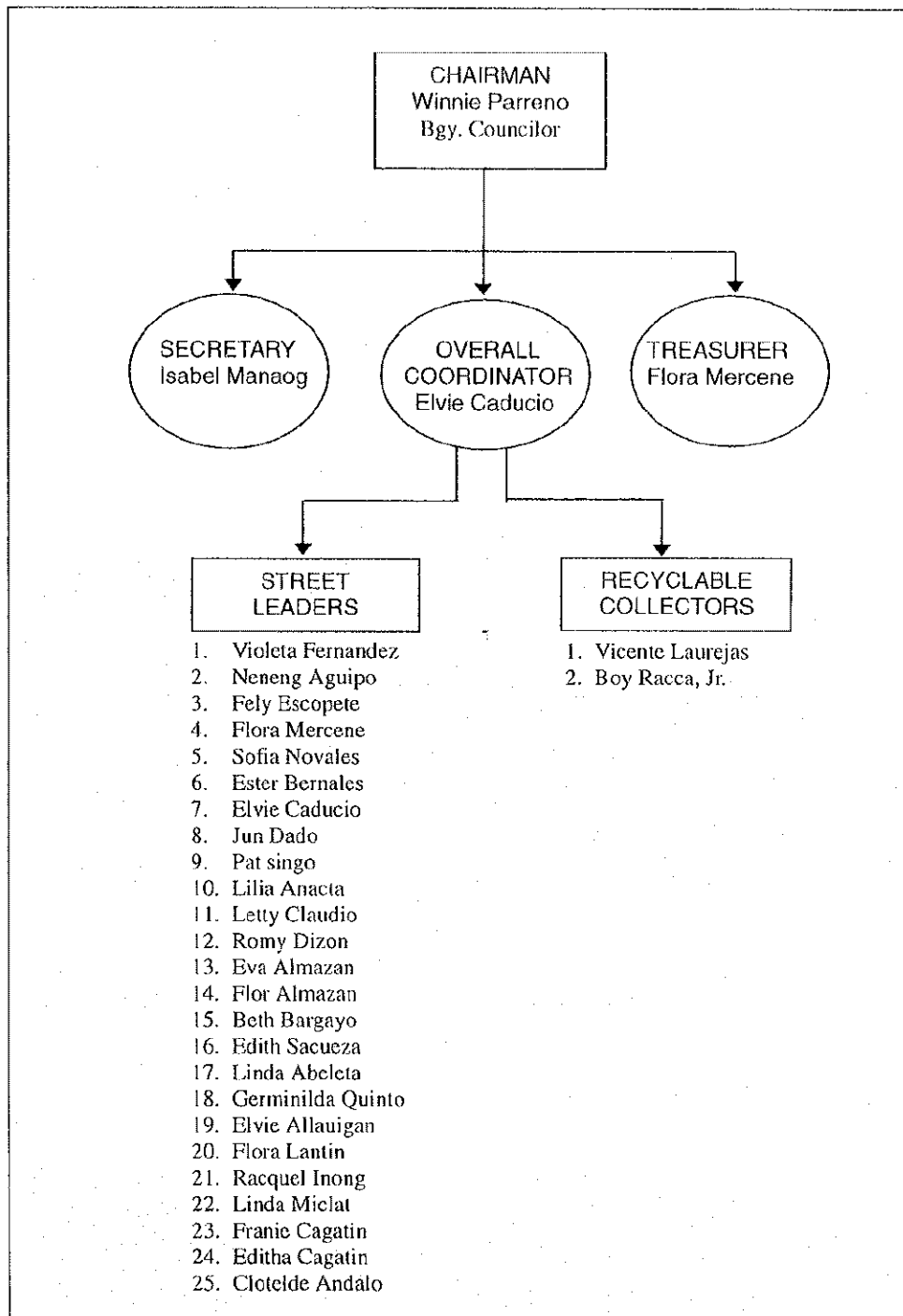
#### (4) Implemented Program on Recycling

The collective efforts of the Study Team and MMDA counterparts to put in place a recycling program at Soldiers Village involved the following activities:

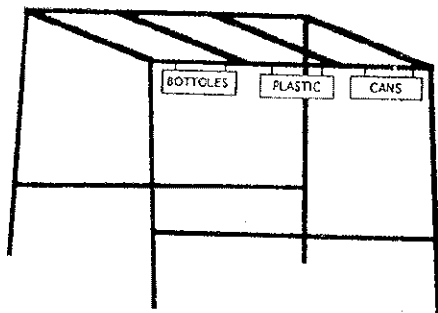
- a. Meetings. Various activities were undertaken during meetings held with the officials and residents of Barangay 193. These meetings provided opportunities to fully discuss the overall concept of the project, and to determine the residents' understanding of and support for the project.
- b. Organization of Core Group. A group of volunteer residents of Barangay 193 was organized to handle all activities related to the recycling project (refer to Figure 5.4). This group was later officially named as Zero Waste Management Group.
- c. Construction of Recycling Stations. Two types of recycling stations were installed in Barangay 193 (refer to Figure 5.5). Type A has three open compartments from where sacks can be hung. Type B also has three compartments but one compartment is fully enclosed as this is reserved for recyclable waste that should not get wet such as newspapers and cartons. Nine Type A and three Type B recycling stations, or a total of 12, were built and distributed throughout the barangay.
- d. Provision of Equipment. The community was also provided with other equipment to complete the operational requirements, such as garbage roller bin, wooden and metal pushcarts, and a weighing scale. In addition, a number of stickers were also distributed as a promotional tour to generate curiosity and interest for the recycling project.

Equipment	No.
Recycling station A	9
Recycling station B	3
Garbage roller bin	1
Wooden pushcart	2
Steel pushcart	3

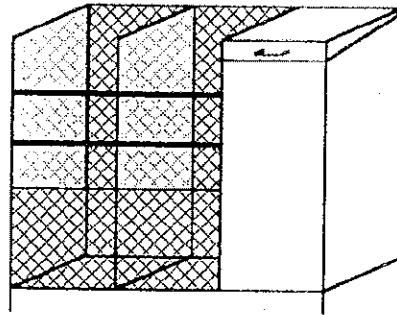
- e. Workshop. In order to assess the progress of the project, address new issues and problems, provide countermeasures, and further clarify the roles of key players, an FGD was conducted on June 6, 1998. The output of the FGD is shown in Appendix 5.3. Thereafter, a resolution was passed by the Barangay Council to promote and support zero waste management through recycling (refer to Appendix 5.4).



**Figure 5.4 Organization of Core Group on Recycling, Barangay 193, Pasay City**



Type A Recycling Station



Type B Recycling Station

Figure 5.5 Recycling Stations at Bgy. 193, Pasay City

- f. Collection of Recyclable Waste. The collectors of recyclable waste follow a designated time, day and route. Large amounts of glass bottles are collected, others are cartons, plastics, and newspapers
- g. Selection of Junk shop. A junk shop can be found within Barangay 193 (Juanito's Junkshop). Its price was compared with another junk shop and it was found that there was not much difference. Therefore, the junk shop within the community was selected as the buyer for the recyclable items.
- h. Sale of Recyclable Waste. As of October 27, 1998, the total amount of money earned from the sale of recyclable waste is P1,737.40. Specifics of the sale are shown in Table 5.4.

Monitoring of the pilot project is being undertaken by MMDA to determine the system's effectiveness as a waste minimization program and the possibility of its adoption in other areas as well.

Table 5.5 provides a list of dates and activities undertaken in the implementation of the recycling pilot project in Bgy. 193, Pasay City.



Launching ceremony of the pilot project



Members of the ZWMG



**Table 5.4 Record of Sale of Collected Recyclables (Bgy 193 Recycling Stations)**

Item	Sale (P)				
	June 14	July 27*	Sept. 4	Sept. 21	Sept. 24
Assorted glass bottles	125.60		88.90	69.80	57.60
Carton boxes	28.00		4.60	47.60	-
Plastics	165.00		78.00	120.00	66.00
Broken glass	-		1.00	7.50	-
Newspapers	-		6.00	14.00	1.00
Magazines	-		-	-	-
Aluminum cans	-		10.00	-	-
Metal	-		-	-	-
<b>Total</b>	<b>318.60</b>	<b>308.60</b>	<b>188.50</b>	<b>258.90</b>	<b>124.60</b>

\*No breakdown available

Continued

Item	Sale (P)				
	Oct. 2	Oct. 12	Oct. 14	Oct. 17	Oct. 27
Assorted glass bottles	40.10	57.60	18.80	11.20	20.10
Carton boxes	-	-	-	13.30	-
Plastics	77.00	60.00	30.20	30.00	60.00
Broken glass	11.50	1.50	1.00	-	-
Newspapers	36.00	20.00	-	6.00	20.00
Magazines	18.50	-	-	-	-
Aluminum cans	-	-	-	-	-
Metal	-	6.00	-	-	-
<b>Total</b>	<b>183.10</b>	<b>145.10</b>	<b>50.00</b>	<b>60.50</b>	<b>100.10</b>

**Table 5.5 Schedule of Recycling Program of Activities at Bgy. 193, Pasay City**

	Date	Activity
	February 4	Conduct of lecture on recycling; explained recycling concept; identified
	February 8	Meeting with the core group
	February 12	Launching of pilot project
	February 21	Inspection of on-going recycling activity; resolved problems encountered; discussed needs of the project
	February 28	Arrangement for construction of recycling center by private contractor; inspected recycling center site
	March	Suspension of construction work at site due to land dispute; worked out substitute recycling concept; entered into an agreement with private contractor to build recycling stations and pushcarts; inspected finished equipment
	May 22	Monitoring by MMDA
	June 6	FGD Workshop
1	June 14	Initial sale of collected recyclables
9	July 22	Monitoring by MMDa
9	July 27	Second sale of collected recyclables
8	August 14	Monitoring by MMDa
	August 28	Monitoring by MMDA
	September 4	Third sale of collected recyclables
	September 12	Monitoring by MMDa
	September 21	Fourth sale of collected recyclables
	September 24	Fifth sale of collected recyclables
	September 25	Monitoring by MMDa
	October 2	Sixth sale of collected recyclables
	October 5	Monitoring by JICA Study Team and MMDA counterpart; held consultative meeting with ZWMG
	October 10	Monitoring by MMDA
	October 12	Seventh sale of collected recyclables
	October 14	Eighth sale of collected recyclables
	October 17	Ninth sale of collected recyclables
	October 27	Tenth sale of collected recyclables
	October 31	Monitoring by MMDA

## 6. Evaluation

A preliminary evaluation of the pilot project has been made on three aspects: technical, social and economic.

### *Soldiers Village, Pasig City*

#### (1) Technical Aspect

The collection of recyclable items is going on smoothly. The Recycling Project Management Group has made some changes on the manner of collection and segregation as they see fit. Basically, household members save and store recyclable waste at home. They could either wait when street leaders go around their respective route assignments with push carts to collect the recyclables during the weekend, or request a street leader to collect the items right away during the week to avoid storing recyclables at home

Households do not strictly do segregation. At the beginning, the street leaders just dumped all their collection in the recycling center, contrary to what has been taught them to do – that is, to group items of similar type and store them in an orderly manner. They realized the importance of following this rule when the time came to sell the items. The heap of recyclable items looked like garbage and sorting them out was time-consuming. The RPMG was advised by the junk dealer to segregate the items so that the sale will be more organized the next time.

The first sale of collected recyclables taught the RPMG a number of things:

- 1) Initial sorting by material, e.g. bottle, newspaper, carton, plastic, etc., allows the junk dealer to do a final sorting faster because they can easily see what can be bought.
- 2) There are times when a junk dealer will buy some recyclable waste one time, and then not buy them another time. It all depends on the demand for the item. The RPMG can decide whether to store the items for future sale.
- 3) Junk dealers do not buy all kinds of plastics. For example, except for those with a bluish tinge, plastic bottles of water are not recyclable. Plastics that are brittle, cracked or crushed easily are not recycled.
- 4) Non-recyclable glass bottles can be broken and sold as “broken glass.” The street leaders were shown how to break bottles, although they were advised to leave it to the junk dealers

There were some problems with the equipment that was provided the community for the project. For example, the weighing scale has broken down; the wheels of the wooden push cart have to be adjusted to eliminate tilting the pushcart sideways when going through the door of the recycling center.

The RPMG has suggested that a uniform (T-shirt and cap) will further enhance their collection activities. It provides for easy recognition and serves as some sort of a reminder, like “oops...I have to prepare the things I have to give to the RPMG.”

The recycling center has a total area of 40 sq.m. It provides adequate space to conduct sorting activities and storage of several weeks' worth of collected recyclables, if the RPMG so desires.

## (2) Social Aspect

Community participation is strong and active, although there is a small percentage of households who continue to sell their recyclable items directly to junk buyers, since these buyers are allowed to enter the village.

Presently, there is no direct effort to encourage non-participants to prevent any confrontation. Indirectly, the RPMG hopes to show the benefits of recycling through future projects for the community.

The Youth Council has an important role as it can provide the link to make the young community members understand the need to recycle. It is hoped that the enthusiasm of the youth can further energize the community and sustain their recycling efforts.

## (3) Economic Aspect

As of October 8, 1998, Soldiers Village RPMG has sold P2,265.50 worth of recyclable waste, equivalent to almost five months collection. The RPMG hope that they can earn enough to implement their plan to either barter for recyclable items or buy them from households. The expense incurred by the group is all on food which to date totals P225.00

The RPMG was advised to post the amount of sale on the wall outside the recycling center so that everyone will be informed. In addition, expenses incurred on account of the recycling activities being undertaken are to be properly recorded.

### *Barangay 193, Pasay City*

#### (1) Technical Aspect

The plan was that the recycling stations would be strategically located where residents would surely notice them, such as near sari-sari-stores. However, this strategy was compromised by the occurrence of two things:

- (a) the recycling stations were used as garbage collection bins by some residents and the street sweeper; and
- (b) there were times when the recyclable items were stolen.

Some the 12 recycling stations were therefore transferred near the homes of the street leaders themselves.

Each recycling station has a designated member of the Zero Waste Management Group (ZWMG) to check on its contents to ensure that only the acceptable recyclable materials are placed inside. The sacks containing the recyclable materials are collected by means of a pushcart. These are then grouped according to type and brought to the nearby junkshop as soon as possible.

Since there are only three sacks per station, it is important that a member of the ZWMG check on the stations from time to time throughout the day in order to replace the sacks when they are already filled up. Especially during the rainy season, the section allotted

for items that must not get wet (newspaper, carton) should be covered properly. In order to ensure that recyclable items are not stolen, especially at night, the ZWVG were advised to prepare a schedule board to be posted at each recycling station informing the residents of the drop-off and collection times of recyclable waste. In this way, no recyclable waste will be left overnight.

The ZWVG were also reminded to properly maintain the recycling stations in order to ensure a longer lifespan, especially since these are exposed to sunlight and rain. Furthermore, the recycling stations are open to scavenging by stray dogs and cats that may destroy the sacks, and may be accidentally bumped by tricycles and other vehicles.

## 2) Social Aspect

The success of the pilot project at Bgy. 193 is very much dependent on the total commitment of the residents in the community inasmuch as the drop off of recyclable materials is voluntary and at the residents' convenience.

At the beginning, information dissemination was effected by holding street meetings on recycling that were presided over by the barangay captain. The members of the ZWVG continued the campaign for community participation. All the benefits of recycling had been explained to the residents: environment conservation, minimization of waste, development of community projects, among other things. Still there were those who showed little interest.

This is the reason why strong leadership is necessary to carry out a successful recycling project. There will be times when some people will lose interest, so it is important that measures are instituted to revive interest and sustain the project.

## 3) Economic Aspect

The collection of four months worth of recyclable materials has earned for the barangay a total of P1,737.40. Much like the RPMG at Pasig, the members of the ZWVG are thinking of buying the recyclable materials themselves from the residents when they have enough money to serve as capital. As for expense, money has been spent on food, sacks and a notebook.

The ZWVG has also been advised to keep a record of all transactions arising from the recycling activities in order that a full accounting may be presented to the community from time to time.

**Appendix 5.1 OUTPUT OF FOCUSED GROUP DISCUSSION  
SOLDIER'S VILLAGE  
BARANGAY STA. LUCIA, PASIG  
MAY 30, 1998**

NAME OF PARTICIPANT	ADDRESS	OCCUPATION	Problem	Solution
1. Eleuterio H. Sta. Cruz	150 51st Engr. St.	Retired/Pensioner	<ul style="list-style-type: none"> <li>No unity of purpose; some people are uncooperative</li> </ul>	<ul style="list-style-type: none"> <li>The people in the village should be united and help each other so that the project will progress.</li> </ul>
2. Heien P. Basilio	20 M-14 St.	Housewife	<ul style="list-style-type: none"> <li>Uncooperative neighbors</li> <li>Lack of bins to separate the different recyclable items</li> </ul>	<ul style="list-style-type: none"> <li>There should be a law that makes it illegal to throw recyclable items.</li> <li>An ad regarding this matter should run on TV or make big placards.</li> </ul>
3. Delma B. Oliveros	157 51st St.	Housewife running mini sari-sari store	<ul style="list-style-type: none"> <li>No cooperation from neighborhood</li> <li>Lack of ads</li> </ul>	<ul style="list-style-type: none"> <li>Talk to the neighbors in a right way and explain where the money from sales will go.</li> </ul>
4. Ligaya R. Bocauto	311-105 St.	Housewife	<ul style="list-style-type: none"> <li>No cooperation</li> <li>Some prefer to sell directly to junkshop to make money</li> <li>No access to key to recycling center</li> <li>Rainy season poses problems</li> </ul>	<ul style="list-style-type: none"> <li>Incentives are needed.</li> <li>In my opinion, if they want to give, then well and good; those who do not want to give, then they should be left alone.</li> </ul>
5. Rogelio Pescasio	M-79 St.	Civil Engineer of consulting company	<ul style="list-style-type: none"> <li>Lack of cooperation</li> <li>Lack of knowledge of the importance of this project</li> </ul>	<ul style="list-style-type: none"> <li>Give vital information for the management set-up for them to follow.</li> <li>Proper organizational management</li> </ul>
6. Isidoro Aniban	60 M-16 St.	DECS employee	<ul style="list-style-type: none"> <li>No cooperation</li> <li>Some are busy with work</li> <li>Appointment of people to manage the recycling center</li> </ul>	<ul style="list-style-type: none"> <li>Explain clearly the recycling process and its benefits.</li> <li>Appoint a person who do not have a job to manage the center.</li> </ul>
7. Teofilo D. Bagasin	177 51st St.	Military (AFP)	<ul style="list-style-type: none"> <li>No proper management of recycling activities in order that</li> </ul>	<ul style="list-style-type: none"> <li>Those who will manage the recycling center should be</li> </ul>

				the other people can understand its importance	elected. • The recycling process can be easily undertaken under the supervision of JICA. • There should be guidelines drawn up that the people can follow to make a success of the project • Cooperation is needed and everyone should be well-informed. • We should continue with this project and make it really work. • We should not think of self-interest, but rather what is good for the whole community. • Cooperation, unite, and act on it. • Each housewife should be sent a letter to attend meetings in order to be well-informed. • The recycling management should explain to everyone how the people can benefit from the project.
8. Guadalupe M. Esguerra	M-14 St.	Housewife/'Hilot'		<ul style="list-style-type: none"> <li>No cooperation</li> </ul>	<ul style="list-style-type: none"> <li>The recycling process can be easily undertaken under the supervision of JICA.</li> <li>There should be guidelines drawn up that the people can follow to make a success of the project</li> <li>Cooperation is needed and everyone should be well-informed.</li> <li>We should continue with this project and make it really work.</li> <li>We should not think of self-interest, but rather what is good for the whole community.</li> <li>Cooperation, unite, and act on it.</li> <li>Each housewife should be sent a letter to attend meetings in order to be well-informed.</li> <li>The recycling management should explain to everyone how the people can benefit from the project.</li> </ul>
9. Salve Rogando	78 M-79	Housewife/sews clothes on the side		<ul style="list-style-type: none"> <li>No unity of purpose</li> <li>Do not want to segregate waste</li> </ul>	<ul style="list-style-type: none"> <li>Cooperation is needed and everyone should be well-informed.</li> </ul>
10. Gaspar Lachica	188 51st St.	Part-time construction worker		<ul style="list-style-type: none"> <li>Lack of cooperation/action</li> <li>Non-leadership</li> </ul>	<ul style="list-style-type: none"> <li>We should continue with this project and make it really work.</li> </ul>
11. Ellen Ramos	51st St.	Housewife		<ul style="list-style-type: none"> <li>Lack of cooperation</li> <li>All talk, no action</li> </ul>	<ul style="list-style-type: none"> <li>We should not think of self-interest, but rather what is good for the whole community.</li> <li>Cooperation, unite, and act on it.</li> </ul>
12. Romeo Villamar	108 155th St.	Insurance underwriter		<ul style="list-style-type: none"> <li>Lack of knowledge of the importance of this project</li> <li>Even if people understand, some expects something in return (barter), else, they would rather sell directly to the junkshop</li> </ul>	<ul style="list-style-type: none"> <li>Each housewife should be sent a letter to attend meetings in order to be well-informed.</li> <li>The recycling management should explain to everyone how the people can benefit from the project.</li> </ul>
13. Jess Legunay	182 51st St.	Caretaker		<ul style="list-style-type: none"> <li>No cooperation</li> </ul>	<ul style="list-style-type: none"> <li>Barter trade</li> </ul>
14. Juliet Lopez	155 Ave.	Housewife		<ul style="list-style-type: none"> <li>No cooperation</li> </ul>	<ul style="list-style-type: none"> <li>Barter trade, so that the children will be encouraged to bring recyclables to the center</li> </ul>
15. Tessie Gabionza	102 60-MM St.	Housewife		<ul style="list-style-type: none"> <li>No cooperation</li> </ul>	<ul style="list-style-type: none"> <li>Cooperation is needed for the project to succeed and for us to reach our goals.</li> </ul>
16. Evangeline Vitara	128 50-MM St.	Gives tutorial lesson Manages store		<ul style="list-style-type: none"> <li>No cooperation</li> </ul>	<ul style="list-style-type: none"> <li>The street leaders should go from house to house to personally explain the project.</li> </ul>
17. Elma Nitura	193 51st St.	Housewife		<ul style="list-style-type: none"> <li>No cooperation</li> </ul>	<ul style="list-style-type: none"> <li>Everybody should cooperate and help one another</li> <li>More information dissemination.</li> </ul>

18. Ma. Lilia Abainza	144 90th St.	Civilian employee	Lack of cooperation	<ul style="list-style-type: none"> <li>Street leaders should pick up the recyclables from houses.</li> <li>Barter trade. This way, the children will also be encouraged.</li> </ul>
19. Luz Marano	103 155th Ave.	Housewife	<ul style="list-style-type: none"> <li>No cooperation from some members</li> <li>Does not follow the procedure in segregating waste</li> <li>Lack of bins inside the recycling center to segregate the recyclables</li> </ul>	
20. Elena Lobeban	01 M. Lobeban St.	Housewife	<ul style="list-style-type: none"> <li>No cooperation</li> <li>No access to key</li> <li>Lack pushcart</li> <li>Lack of rainy-day gear for collectors</li> </ul>	<ul style="list-style-type: none"> <li>Be patient and persevere. A little sacrifice is also necessary.</li> </ul>
21. Clarita Canilang	43 M16 St.	Housewife	<ul style="list-style-type: none"> <li>Collectors have difficulty collecting recyclables during the rainy days</li> <li>No cooperation from neighbors</li> <li>The question is: What will they get out of this project?</li> </ul>	<ul style="list-style-type: none"> <li>Work out a system wherein the collector will buy the recyclables or issue coupons that can be exchanged for something else.</li> </ul>
22. Leopolda Realosa	155 Ave.	Housewife	<ul style="list-style-type: none"> <li>No one is collecting from house to house</li> <li>Lack of cooperation</li> </ul>	<ul style="list-style-type: none"> <li>Barter trade.</li> </ul>
23. Isidro Corazon	79 51st St.	Housewife		
24. Cristina Yu	158 51st St.	Retired service man	<ul style="list-style-type: none"> <li>No unity</li> <li>Lack of communication</li> <li>No cooperation</li> </ul>	<ul style="list-style-type: none"> <li>Cooperation is necessary.</li> <li>There should be guidelines.</li> <li>Attendance at meetings is necessary</li> </ul>
25. Eduardo C. Glean	120 155th Ave.		<ul style="list-style-type: none"> <li>Non-cooperation of members</li> <li>Newly organized</li> </ul>	<ul style="list-style-type: none"> <li>Organize and assign a fulltime manager.</li> <li>Give incentives.</li> </ul>



**Appendix 5.2 Draft Action Plan For Community Based Waste Recycling at  
Soldiers' Village, Barangay Sta Lucia, Pasig City**

**1. OBJECTIVES**

- 1.1 Spell out ways by which waste recycling at the community level can be carried out
- 1.2 Redefine roles of stakeholders
- 1.3 Encourage "self-help" in generating funds for community project

**2 PLAN OF FRAMEWORK**

- 2.1 This improved action plan has been formulated as a result of the Focused Group Discussion held on May 30, 1998 with the representatives from the homeowners association
- 2.2 Solutions to problems encountered in the initial implementation of the pilot project have been incorporated in this improved action plan.
- 2.3 This pilot project shall be monitored and evaluated until the end of the year.

**3 COMPONENTS**

**3.1 Discharge by Households**

Frequency	:	Once every Saturday
Time	:	3:00 - 4:00 P.M
Place	:	Infront of the house
Containers	:	Plastic bag

**3.2 Collection by Street leaders**

Frequency	:	Once every Saturday
Time	:	3:00 - 4:00 P.M.
Collection system	:	Street leaders receive bag of recyclables from each household assigned to him and place this item in the push cart
Equipment	:	One Push cart per street leaders ( total of 6 Push cart for 12 routes )

### 3.3 Storage System

- Facility : Floor Area : 40 Square meter, within the basketball court, near the day care center
- Manner : Collected recyclable items are deposited by the street leaders in the recycling center. Proper recording is maintained by Recycling Center manager.

### 3.4 Management System of Recycling Center

- \* Recyclable waste deposited by the street leaders are properly recorded (kind of recyclable item volume/ weight
- \* Deposited items are sorted and properly arranged inside the Recycling Center.
- \* When volume is big enough, the items are sold to a Junk Shop.
- \* Record of sales is properly documented and deposited in a bank

## 4 RESPONSIBILITIES / ACCOUNTABILITIES OF STAKEHOLDERS

### 4.1 Resident

- a. Segregate waste at home. Recyclable wastes such as plastic, paper, bottle and iron will be handed to collectors every Saturday,
- b. Encourage other residents to participate in the program
- c. Know (find out) the status of the project

### 4.2 Home Owners Association ( HOA )

1. The officers of the Home Owners Association are the over-all key organizers and implementors of the pilot project.
2. The officers supervises the recycling management group
3. Members of the association actively participate in the project.

#### **4.3 Street leader**

- a. Inform the residents about the schedule of the collection and route of the push cart
- b. Collect recyclable wastes from household ( of assigned route ) every Saturday from 3:00 to 4:00 P.M
- c. Keep record of the participating household and collected recyclable

#### **4.4 Barangay Officials**

- a. Supervise the implementation and management of the project
- b. Pass a resolution requiring waste segregation in the community
- c. Enforce the implementation of the resolution

#### **4.5 Recycling Center Management Group**

- a. Manage the recycling center
- b. Record properly the deposited recyclables (route source, weight, or number of pieces)
- c. When the volume of deposited/stored recyclables is big enough, contact Junk Shop and sell
- d. Keep record of sales
- e. Inform members of the community about volume of recyclables sold and the amount of proceeds

#### **4.6 MMDA/JICA**

- a. Provide Recycling Center
- b. Provide push cart
- c. Monitor and guide the pilot project, Evaluate the project in November or December 1998

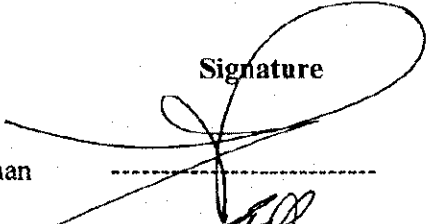
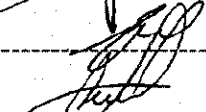
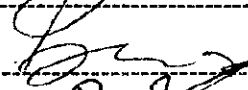

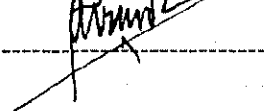
#### **4.7 Sanguniang Kabataan**

Help in the implementation of the project and assist the Homeowner Association and the Recycling Management Group in their recycling project

4.8 Junk shop

- a. Buy the recyclable items and give the Recycling Management Group an update of buying price of recyclables
- b. Coordinate with the Recycling Management Group about the possibility of improving the efficiency of their picking up of the sorted recyclable wastes. Example proper sorting of bottles; cleaning up papers ( removing plastics, fasteners, etc).

5. CONFORME OF BARANGAY OFFICIALS, HOMEOWNERS ASSOCIATION, JICA AND MMDA

Name	Position	Signature
1. Mr. Fernando V. Tesorero	Barangay Chairman	
2. Tsgt Eduardo C. Glean	President SVHAI	
3. Ezbra B. Beltran	SK Chairman	
3 Mr. Akinori Sato	Consultant	
4. Mr. Rogelio U. Uranza	Head IPDG-SWMO	

02a/actplan

## RECYCLING PROJECT MANAGEMENT GROUP OFFICERES

Manager	-	Vangie Bitara
Assistant Manager	-	Ligaya R. Bocauto
Secretary	-	Sgt. Romeo M. Villamar
Assistant Secretary	-	Helen P. Basilio
Treasurer	-	Engr. Rogelio Pescanio
Auditor	-	Ellen Ramos
Assistant Auditor	-	Juliet Lopez

02a/recpro

**STA. LUCIA BARANGAY COUNCIL**  
Sta. Lucia, Pasig City

**BARANGAY COUNCIL**

**FERNANDO V. TESORERO**

Punong Barangay  
14 Rosario Village  
Tel. No. 655-06-14

**AVELINA P. EVIOTA**

Kalihim  
24 Ilang-ilang, de Castro

**MA. SHIRLEY MORANTE**

Ingatyaman  
18-A Everlasting  
Tel. No. 655-04-93

**ELPIDIO BUNAG**

Kagawad  
12 Moleguas St. de Castro  
Tel No. 655-10-12

**REYNALDO BALINGIT**

Kagawad  
Rosario Village  
Tel. No. 656-06-95

**WILLIE GUALLAR**

Kagawad  
20 Camia St. de Castro  
Tel. No. 655-04-67

**EZBRA B. BELTRAN**

SK Chairman  
Rosario Village  
Tel. No. 656-06-95

**QUIRINO GALICIA**

Kagawad  
#2 Champaca St.  
Tel. No. 656-22-61

**MELECIO SANTOS**

Kagawad  
14 Ilang-ilang de Castro  
Tel. No. 656-29-64

**RAUL JAVIER**

Kagawad  
Metropolis Village  
Tel. No. 656-59-61

**RICARDO CONDE**

Kagawad  
43 Countryside Ave  
Tel. No. 656-84-71

**Appendix 5.3 OUTPUT OF FOCUSED GROUP DISCUSSION  
BARANGAY 193  
PILDERA II, PASAY CITY  
JUNE 6, 1998**

NAME OF PARTICIPANT	ADDRESS	OCCUPATION	Problem	Solution
1. Franie O. Cagatin	Chaper Rd., Pildera II	Carpenter/Tanod	<ul style="list-style-type: none"> <li>• People do not follow the laws in the barangay</li> </ul>	<ul style="list-style-type: none"> <li>• Everybody should cooperate and follow the recycling rules.</li> </ul>
2. Rodrigo Del Mundo	Road 4	Sari-sari Store Owner/Kagawad	<ul style="list-style-type: none"> <li>• The project is not successful yet cause of lack of unity.</li> </ul>	<ul style="list-style-type: none"> <li>• People should be well-informed about the important of recycling</li> </ul>
3. Sofia Novales	Road I	Housewife	<ul style="list-style-type: none"> <li>• Drainage and garbage problem</li> </ul>	<ul style="list-style-type: none"> <li>• Put a recycling station along our street</li> </ul>
4. Editha Cagatin	Chapel Rd.	Housewife	<ul style="list-style-type: none"> <li>• We don't know anything because we donot have the equipment for recycling</li> </ul>	<ul style="list-style-type: none"> <li>•</li> </ul>
5. Consolacion Salazar	No. 14, Rd. 5	Housewife	<ul style="list-style-type: none"> <li>• Lack of sacks</li> <li>• Children get some of the recyclables</li> </ul>	<ul style="list-style-type: none"> <li>• There is a need for more recycling stations and sacks.</li> <li>• Barangay action should be required for those who violate the recycling regulation for the 3rd time.</li> </ul>
6. Santiago Tadtas	Road 4	Sari-sari Store Owner/Kagawad	<ul style="list-style-type: none"> <li>• Garbage</li> </ul>	<ul style="list-style-type: none"> <li>• Discipline those found to violate recycling regulations.</li> </ul>
7. Vicente Laurejas	33 Rd. 4	Tanod	<ul style="list-style-type: none"> <li>• People who do not follow the laws in the barangay.</li> </ul>	<ul style="list-style-type: none"> <li>•</li> </ul>
8. Linda Mielat	# 28 2nd St.	Housewife	<ul style="list-style-type: none"> <li>• Our neighbors still do not know the purpose of the project that is why they dispose of their garbage just anywhere.</li> </ul>	<ul style="list-style-type: none"> <li>• We need a recycling station along our street.</li> <li>• Somebody has to guard the recycling station at night.</li> </ul>
9. Clotelde Andallo	Chapel Rd. St.	Gov't Employee/ Sari-sari store owner	<ul style="list-style-type: none"> <li>• No recycling station in our street.</li> </ul>	<ul style="list-style-type: none"> <li>• Put a recycling station along our street.</li> </ul>
10. Teody Santos	11-Road 1	Kagawad	<ul style="list-style-type: none"> <li>• Lack of recycling station</li> <li>• Disposal problem of cans that have been collected</li> </ul>	<ul style="list-style-type: none"> <li>• Add more recycling stations</li> <li>• Add more sacks.</li> <li>• There should be proper</li> </ul>

					<ul style="list-style-type: none"> <li>• Lack of sacks</li> </ul>	<p>coordination in the disposal of recyclables.</p>
11. Evangeline Almazan	8 3rd St.	Barangay Health Worker		<ul style="list-style-type: none"> <li>• Other people steal the recyclables from the recycling station</li> <li>• There are people who do not want to cooperate.</li> </ul>	<ul style="list-style-type: none"> <li>• Collection of recyclables should be done weekly.</li> </ul>	
12. Nelly Quinto	3rd St.	Real estate broker		<ul style="list-style-type: none"> <li>• Some garbage pickers get the recyclables and sells them to the junkshop themselves.</li> <li>• Some do not segregate their garbage and give their garbage to the garbage men.</li> </ul>	<ul style="list-style-type: none"> <li>• Guard against waste pickers and children who get the recyclables</li> <li>• Try to explain to your neighbors what to do with their recyclables and where to put them.</li> </ul>	
13. Florida Almazan	#8 3rd St.	Sari-sari store owner/ Barangay Health worker volunteer		<ul style="list-style-type: none"> <li>• Some do not cooperate.</li> </ul>	<ul style="list-style-type: none"> <li>• There should be cooperation.</li> <li>• Collection of recyclables should be done regularly.</li> </ul>	
14. Erlinda Abaleta	12 3rd St.	Housewife		<ul style="list-style-type: none"> <li>• Lack of recyclable collectors</li> </ul>	<ul style="list-style-type: none"> <li>• There should be cooperation.</li> </ul>	
15. Felecitas Escopete	30 Road 1	Laundry woman		<ul style="list-style-type: none"> <li>• Recycling stations are not strategically located</li> </ul>	<ul style="list-style-type: none"> <li>• There should be unity in each area.</li> </ul>	
16. Anita Sinoc	5 Road 1	Housewife		<ul style="list-style-type: none"> <li>• Some people do not follow the barangay regulations</li> <li>• No cooperation</li> </ul>	<ul style="list-style-type: none"> <li>• We should have a recycling station in our area in order to educate those who are still uninformed about the project.</li> </ul>	
17. Elvira Caducio	#14 Road 4	BHW - volunteer		<ul style="list-style-type: none"> <li>• People throw garbage in the Recycling stations</li> <li>• Children sit on top of the Recycling stations</li> </ul>	<ul style="list-style-type: none"> <li>• Put covers on the recycling station</li> <li>• Guard them well.</li> <li>• Add more recycling stations.</li> </ul>	
18. Editha B. Sacueza	3rd St.	BHW - volunteer		<ul style="list-style-type: none"> <li>• Garbage problem</li> <li>• Scattered garbage</li> </ul>	<ul style="list-style-type: none"> <li>• Collection of recyclables should be done everyday.</li> </ul>	
19. Flora Lantin	317 5th St.	BHW - volunteer		<ul style="list-style-type: none"> <li>• No daily collection of garbage in our area</li> </ul>	<ul style="list-style-type: none"> <li>• Conduct a house-to-house information campaign about waste segregation and the importance of cooperation.</li> </ul>	
20. Leticia Claudio	261 Chapel Rd.	Real estate broker		<ul style="list-style-type: none"> <li>• I get apprehensive that the Recycling Station in front of our</li> </ul>	<ul style="list-style-type: none"> <li>• Get in touch with the recyclable collector; if this is not possible,</li> </ul>	



				house might overflow with recyclables because there's no collector.	then I have to bring the garbage myself.
21. Elizabeth Bargayo	3rd St.	BHW - volunteer does crochette		<ul style="list-style-type: none"> <li>Those who do not want to cooperate are a hindrance to the project.</li> <li>No unity</li> </ul>	<ul style="list-style-type: none"> <li>Meeting should be conducted in each street to inform everybody about the project.</li> </ul>
22. Nening Aguipe	#10 Road 1	Housewife			<ul style="list-style-type: none"> <li>I can't think of any solution right now as our street still not have any recycling station. If we get one, maybe the people will cooperate.</li> </ul>
23. Isabel Manaoag	3rd St.	Bgy. secretary		<ul style="list-style-type: none"> <li>Collection is slow</li> </ul>	<ul style="list-style-type: none"> <li>There should be a permanent collection who will go around the barangay.</li> <li>There should be a collection schedule; preferably every week.</li> </ul>
24. Lilia Anacta	Chapel Rd.	Housewife		<ul style="list-style-type: none"> <li>We are not informed; we do not have a recycling station in our area.</li> </ul>	<ul style="list-style-type: none"> <li>We should have a recycling station in our area.</li> <li>Explain to the people what they have to do.</li> </ul>

Appendix 5.4 OFFICE OF THE BARANGAY CHAIRMAN  
BARANGAY 193 ZONE 20  
PASAY CITY, METRO MANILA

Excerpt of the minutes of the special session of the Barangay Council of Barangay 193 Zone 20 held at the Office of the Barangay Chairman on July 18, 1998 at 8:30 P.M.

Present:

- |                          |                   |
|--------------------------|-------------------|
| 1. Charlie I. Chavez     | Barangay Chairman |
| 2. Santiago Tadlas       | Councilor         |
| 3. Antonio Balbastro     | Councilor         |
| 4. Leonardo Cuya         | Councilor         |
| 5. Wenceslao Farrero     | Councilor         |
| 6. Teodorico Santos      | Councilor         |
| 7. Rodrigo del Mundo Jr. | Councilor         |
| 8. Jaime del Mundo       | Councilor         |

RESOLUTION - 11  
UNDER NEW ADMINISTRATION  
SERIES - 98

A RESOLUTION FOR IMPLEMENTING ZERO WASTE  
MANAGEMENT THROUGH RECYCLING.

In motion seconded,

RESOLVED, as it is hereby resolved, to implement Recycling Activities on Garbage in promoting and supporting Zero Waste Management in Pildera II Barangay 193 Zone 20 Pasay City.

WHEREAS, a seminar was conducted by MMDAJICA group to the residents and officials of Barangay 193 for understanding and sense of responsibility on waste-related matters and environmental issues.

WHEREAS, a pilot project for COMMUNITY BASED WASTE RECYCLING was endorsed to the Barangay 193. Recycling is a solution for the nation-wide problem on bountiful garbage, the project enables the constituents to segregate useful wastes like plastics, bottles, newspapers etc. to the other waste, and sell to the nearest Junk Shop/Contractor to re-acquire usage of the material. Thus, minimizes and reduces waste in the barangay.

WHEREAS, after the seminar, they created a management group and select from the participants for the position of Chairman, Over-all Coordinator and Street Leaders/Coordinator for the project. This group named "BARANGAY 193 ZERO WASTE MANAGEMENT GROUP" (Bgy. 193 ZWMO).

WHEREAS, the group aims, is to promote recycling activities to the constituents of the Barangay 193, to provide additional source of income to the barangay as help for the general welfare of the residents and to promote cooperation and camaraderie within the barangay.

WHEREAS, Street Leaders will be responsible for (a) ensuring effective and proper implementation of the project in their assigned area, (b) keeping records of and information materials in their assigned area, (c) looking after the recycling stations, (d) submission of monthly report on the amount of income earned from the collected recyclable, (e) providing residents in his/her area the necessary information on the status of the project.

WHEREAS, MMDAJICA has provided Pushcarts and Recycling stations. A Moveable Recycling Station with three (3) sacks attached, individually tagged Plastic, Bottles and Cans respectively wherein recyclable will be placed inside. And the group will guide, monitor and evaluate outcome of the pilot project in the barangay.

WHEREAS, Barangay Officials will implement and enforce guidelines and will charge necessary penalties to those who will disobey to the provision of the said project.

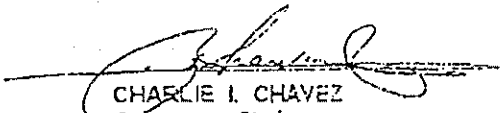
WHEREAS, the Barangay will charge penalties on the following grounds; (1) throwing of garbage on the Recycling Station, (2) stealing of Recyclable Items on the Recycling Station and Warehouse, (3) destruction of Recycling equipment and Station.

WHEREAS, Penalties are; first (1<sup>st</sup>) offense - bail of THREE HUNDRED PESOS (P 300.00) or equivalent imprisonment of FORTY EIGHT HOURS (48 hrs./2 days) to City Jail, second (2<sup>nd</sup>) offense - bail of FIVE HUNDRED PESOS (P 500.00) or equivalent imprisonment of ONE HUNDRED TWENTY HOURS (120 hrs./5 days), third (3<sup>rd</sup>) offense - bail of ONE THOUSAND PESOS (P 1,000.00) or equivalent imprisonment of one (1) month to three (3) months to City Jail.


WHEREAS, no one is excused within the penalties on the above grounds, those who will be caught in the act by the Barangay Official will be penalized according to the offense, those who will be caught in the act by Civilian and Street Leaders prior investigation will be instigated by the Barangay Officials, to those who will be caught in the act below seven (7) years old, their parent will be penalized under the jurisdiction of the Barangay Chairman.


WHEREAS, RESOLVED FURTHER, that copies of this resolution be furnished to the Office of Liga ng mga Barangay, MMDANICA and Barangay Action Center for their information and reference.

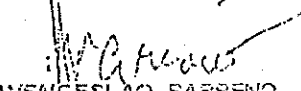
APPROVED, this 8<sup>th</sup> day of July, 1998.

  
CHARLIE I. CHAVEZ  
Barangay Chairman

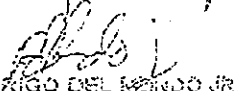
  
SANTIAGO TADIAS  
Councillor

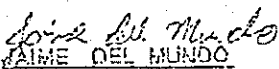
  
ANTONIO GALBASTRO  
Councillor

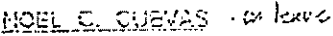
  
LEONARDO CRUZ  
Councillor

  
YENCENSLAO PARRENO  
Councillor

  
TEODORICO SANTOS  
Councillor

  
RODRIGO DEL MUNDO JR.  
Councillor

  
JAIME DEL MUNDO  
Councillor

  
NOEL C. CUEVAS  
SK Chairman



### **C3: Environmental Education**

#### **1. Background**

Waste collection coverage in Metro Manila is insufficient, resulting in waste being illegally dumped and left scattered on open spaces and back streets, thrown in rivers/creeks, or burned. The impacts of these practices on the environment are pollution of air and water, degradation of land, worsening of flood problems, and health hazards owing to animals that feed on garbage.

Education on solid waste management is very important for promotion of people's awareness. It should be aimed basically at students of elementary and secondary schools. It is not enough, however, that the students are provided with written materials for classroom instruction. Going on field trips and actually seeing how waste is being managed is one very effective approach for education, especially when dealing with solid waste management. By doing this, the future generation can appreciate the importance of waste minimization and proper waste disposal.

#### **2. Objectives**

The objectives of the educational tour are as follows:

- a) To promote the importance of teaching the public, especially the young, on proper solid waste management for a safe and healthy living environment; and
- b) To make the students realize their responsibility for keeping the environment from further degradation.

#### **3. Policy of Implementation**

No criteria was imposed on the selection of schools and students who will join the tour, except that the schools are located in Metro Manila. Since the existing landfill is located in San Mateo, it was important that a school located in San Mateo was included.

The school superintendent of the NCR Secondary Schools left the selection to the discretion of district supervisors. Some decided that the students come from just one school; some districts opted for participation of several schools in their district. As to year level, there are those who preferred to send third or fourth year students, while those with a higher quoted, all year levels were represented.

#### **4. Process of Educational Tour**

##### **(1) Tour Arrangement**

Arrangements had to be done prior to the conduct of the education tour and it involved coordination with the following government agencies:

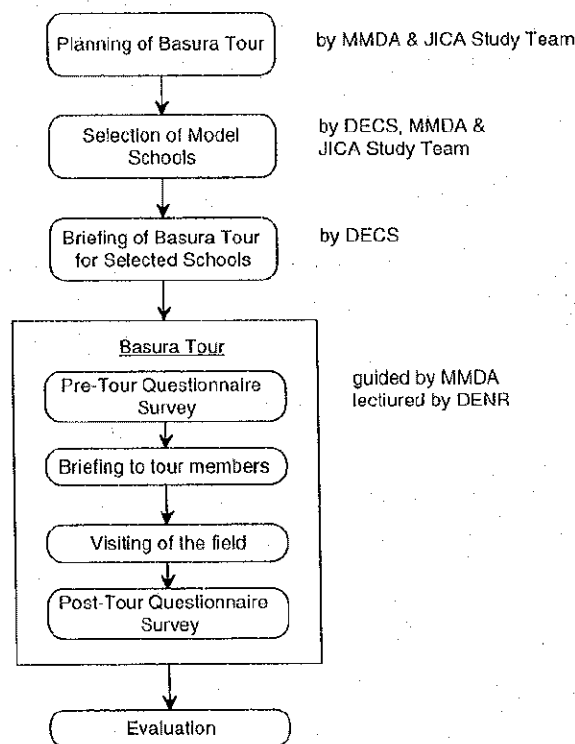
- 1) Department of Education Culture and Sports-Secondary Schools Division was

- 1) Department of Education Culture and Sports-Secondary Schools Division was responsible for the grouping of schools and disseminating of information about the tour to the different Schools Division Superintendents (refer to Appendix 1).
- 2) Department of Environment and Natural Resources-Environmental Management Bureau was tasked with providing handouts to give the participants and a lecturer on the present state of our environment relative to the problem on garbage.
- 3) Solid Waste Management Task Force gave permission to visit the San Mateo Sanitary Landfill and assigned an officer to explain its operation.
- 4) Task Force on Clean and Green, Quezon City Government gave permission to visit Payatas Open Dumpsite and assigned an officer to explain its operation.

(2) Process of Educational Tour

The process of educational tour is shown in Figure 4.1. MMDA and JICA Study Team prepared the draft plan of educational tour, after which DECS, MMDA and JICA Study Team revised the plan, and arranged three school groups as follows:

- Group I : San Mateo, Rizal, Caloocan City, Quezon City
- Group II : Paranaque, Las Pinas, Muntinlupa, TAPAT (Taguig & Pateros)
- Group III : Manila, Makati, Pasay, Mandaluyong



**Figure 4.1 Process of Educational Tour**

## 5. Implementation of Educational Tour

### 5.1 Profile of Student Respondents

A total of 45 students and 11 teachers from different schools in the National Capital Region and San Mateo, Rizal participated in the educational tour, as shown in Table 5.1. Only the students were requested to fill out the pre-tour and post-tour questionnaires.

There were almost an equal number of male and female students in the group. Majority of the students (71%) are 15 to 16 years old, junior and seniors (69%) in high school, as shown in Table 5.2.

**Table 5.1 Breakdown of Educational Tour Participants**

City/ Municipality	School	No. of Students	No. of Teachers
San Mateo, Rizal	San Mateo National High School	10	1
Quezon City	Quezon City Science High School	4	1
Caloocan City	Caloocan High School	4	1
Paranaque	Paranaque Municipal High School	2	1
	Paranaque Science High School	2	
Muntinlupa City	Muntinlupa National High School	4	1
Las Pinas	Las Pinas East Municipal High School	3	1
Tagig	Tagig National High School	1	1
Manila	Manuel A. Roxas High School	1	1
	Ramon Magsaysay High School	1	
	Araullo High School	1	
Makati	Makati Science High School	1	1 (Division Supervisor)
	Makati High School	1	
	Fort Bonifacio High School	1	
	Benigno Aquino High School	1	
Pasay City	Pasay City East High School	4	1
Mandaluyong	Mandaluyong High School	4	1
Total		45	11

**Table 5.2 Sex, Age and High School Year of Students**

Sex	% of Students	Age	% of Students	HS Year	% of Students
Male	51.1	13 years old	13.3	First Year	15.6
Female	48.9	14 years old	15.6	Second Year	15.6
		15 years old	28.9	Third Year	33.3
		16 years old	42.2	Fourth Year	35.5
Total	100.0	Total	100.0	Total	100.0

### 5.2 Tour Schedule and Activities

The one-day tour covered Payatas Open Dumpsite and San Mateo Sanitary Landfill. The students were divided into three groups and were scheduled on February 12, 19 and 26, 1998, respectively. The approximate times of departure, stay and arrival at the sites for

each group were properly coordinated (Table 5.3). In between travel to the tour sites, a brief lecture was given on solid waste (e.g. amount generated per day, amount recycled, cost of solid waste management, etc.) and the environment.

The students were also requested to answer a pre-tour questionnaire to determine their level of awareness on the environment, particularly on solid waste management. Following the students' visit to the sites, they answered a post-tour questionnaire.

A questionnaire survey was conducted before the start tour and after tour. The forms used are shown in Appendix 5.6 and Appendix 5.7



Table 5.3 Schedule and Activities of Educational Tour

GROUP No: I		GROUP No: II		GROUP No: III	
TOUR SCHEDULE: February 12, 1998		TOUR SCHEDULE: February 19, 1998		TOUR SCHEDULE: February 26, 1998	
0830 - 0900	Assembly Time Place: DECS, NCR (beside SM City) Bago Bantay, Quezon City	0730 - 0815	Assembly Time Place: Paranaque Municipal High School	0730 - 0810	Assembly Time Place: in front of Wendy's Restaurant, Bucandia LRT
0900	Departure for Payatas Open Dumpsite - Introduction & orientation - Answer pre-tour questionnaire - Snacks (on-board) - Short lecture by DENR	0815	Departure for San Mateo Sanitary Landfill - Introduction & orientation - Answer pre-tour questionnaire - Snacks (on-board) - Short lecture	0810	Departure for San Mateo Sanitary Landfill - Introduction & orientation - Answer pre-tour questionnaire - Short lecture by DENR
1020 - 1050	Observation/tour inside Payatas Open Dumpsite	1100 - 1155	Observation/briefing at San Mateo Sanitary Landfill	1045 - 1145	Observation/tour inside San Mateo SLF
1050	Departure from Payatas	1155	Departure from San Mateo	11:15	Departure from San Mateo - Point out garbage collection activities along the way
1215 - 1300	Lunch Break	1250 - 1325	Lunch Break	1240 - 1330	Lunch Break - Point out junkshops and other activities along the way
1300	Departure for San Mateo Sanitary Landfill - Short lecture by DENR	1325	Departure for Payatas - Point out junkshops and other activities along the way	1430 - 1500	Observation/tour inside Payatas Open Dumpsite
1340 - 1420	Observation/tour inside San Mateo Sanitary Landfill Site - Answer post-tour questionnaire	1405 - 1430	Observation/briefing at Payatas Open Dumpsite	1500	Departure from Payatas
1420	Departure from San Mateo - Snacks (on-board)	1430	Departure from Payatas		Stopover at Jollibee, Commonwealth - Answer post-tour questionnaire - Snacks
1650	Arrival at DECS, NCR, Bago Bantay, Q.C.	1800	Arrival at Paranaque Municipal High School	1745	Arrival LRT Bucandia, in front of Wendy's

### 5.3 Results of the Questionnaire Survey

#### (1) Problems of Living Environment in Metro Manila

Before the start of the tour, the students were asked to rank the problems pertaining to the living environment in Metro Manila. Table 5.4 shows the results of this exercise. Among those ranked as number one, air pollution garnered the highest number (37%) followed by squatters (31%), water pollution (18 percent), traffic congestion (17%), flooding (9%) and noise pollution (2%).

The results of the post-tour shown in Table 5.5 indicate that among those ranked as the number one most serious problem in Metro Manila's living environment, air pollution remained at the top position (43%) followed by squatters (32%) and water pollution (19%). However, traffic congestion (5%) was relegated last, with flooding and noise pollution having equal weight (7%).

**Table 5.4 Pre-Tour Ranking of Living Environment Problems in Metro Manila**

Problem	(% of students)						Total
	1	2	3	4	5	6	
Water Pollution	17.8	40.0	28.9	8.9	4.4	0.0	100.0
Air Pollution	36.6	19.5	24.4	17.1	2.4	0.0	100.0
Noise Pollution	2.3	2.3	7.0	4.7	16.3	67.4	100.0
Squatters	30.9	16.7	16.7	16.7	19.0	0.0	100.0
Traffic Congestion	16.7	16.7	7.1	26.2	30.0	2.4	100.0
Flooding	9.3	2.3	11.6	23.3	25.6	27.9	100.0

**Table 5.5 Post-Tour Ranking of Living Environment Problems in Metro Manila**

Problem	(% of students)						Total
	1	2	3	4	5	6	
Water Pollution	18.6	48.8	25.6	2.3	2.3	2.3	100.0
Air Pollution	43.2	18.2	25.0	11.3	2.3	0.0	100.0
Noise Pollution	6.8	0.0	4.6	6.8	13.6	68.2	100.0
Squatters	32.5	9.3	25.6	16.3	16.3	0.0	100.0
Traffic Congestion	4.7	16.2	9.3	37.2	27.9	4.7	100.0
Flooding	7.0	7.0	9.3	25.5	34.9	16.3	100.0

(2) Garbage, Recycling, and Method of Disposal

The table below shows the response of the students on the questions pertaining to garbage, recycling and awareness of method of disposal

**Table 5.6 Garbage, Recycling and Awareness of Method of Disposal**

Item/	Pre-Tour	Post-Tour
Volume of Garbage Generated (% of students)		
5,000 tons/day	20.0	60.0
6,000	28.9	17.8
7,000	51.1	22.2
Total	100.0	100.0
Percentage Recycled (% of students)		
5 percent	52.3	24.2
6	25.0	66.7
7	22.7	8.9
Total	100.0	100.0
Aware of Method of Garbage Disposal (% of students)		
Yes	46.7	97.8
No	53.3	2.2
Total	100.0	100.0

The pre-tour results revealed that majority of the students (51%) thought that Metro Manila generates about 7,000 tons of garbage a day and that only 5% are being recycled. (Based on our study, Metro Manila generates 5,000 tons of garbage per day and about 6 percent are being recycled.)

Fifty-three percent of the students did not know the method of garbage disposal in Metro Manila. Those who checked the 'yes' column gave varied answers such as zero waste management, recycling and composting, waste incineration, sanitary landfill, open dumpsite, or a combination of the last three mentioned.

After the tour, the students were enlightened. Sixty percent and 68% answered correctly the volume of garbage being generated in Metro Manila and the percentage of garbage being recycled, respectively. Almost all the students (98%) knew that garbage is being disposed of by means of open dumpsite and sanitary landfill.

(3) Definition of Terms

The students were asked to define or explain three methods of garbage disposal: sanitary landfill, waste incineration, and open dumpsite. The definitions given during the pre-tour are listed in Appendix 5.8 and Appendix 5.9. Except for some corrections in spelling and grammar, no other attempts were made to modify the students' answers.

About 27% of the students could not define sanitary landfill and open dumpsite, while 36% did not have any idea about waste incineration. Majority of those who answered know simply the following: a sanitary landfill involves garbage being dumped in a hole and then covered with soil; an open dumpsite is a vacant space where garbage is dumped haphazardly; and waste incineration is burning of waste.

After the tour, there was an improvement as 100% of the students were able to define what a sanitary landfill is, or at least, briefly explained what it is all about, although 13% and 3% did not write anything about waste incineration and open dumpsite, respectively.

(4) Number of Legal Garbage Disposal Sites

More than half of the students (61%) answered that there are two legal garbage disposal sites before the start of the tour. (The Study Team considers the sanitary landfills in Carmona and San Mateo as legal garbage disposal sites.) After the tour, the figure improved to 76%.

(5) Use of Garbage Disposal Sites

The percentage of those who answered that garbage disposal sites cannot be used forever is almost the same for pre tour (93%) and post-tour (94%).

(6) Cost of Solid Waste Management

Based on the Study, the cost of solid waste management is P2,800 million pesos. However, before the start of the tour, half of the students were of the opinion that it would cost a great deal of money (P3,500 million) to manage solid waste, while about 43 percent guessed it right. This percentage increased to 58% after the tour.

**Table 5.7 Number of Disposal Sites, Life Span and Cost of Solid Waste Management**

Item/	Pre-Tour	Post-Tour
Number of Disposal Sites (% of students)		
One	9.0	15.5
Two	60.5	75.6
Three	30.0	8.9
Total	100.0	100.0
Usage is Forever? (% of students)		
Yes	6.8	6.7
No	63.2	93.3
Total	100.0	100.0
Cost of Solid Waste Management (% of students)		
P2,000 million	6.8	14.0
P2,800 million	43.2	58.1
P3,500 million	50.0	27.9
Total	100.0	100.0

The following three items were asked only in the post-tour questionnaire.

(7) Possible Effects of Throwing Garbage into Rivers/Creeks

The students have very definite ideas of what can happen/is happening as a result of garbage being thrown into rivers and creeks. Their answers may be grouped according to the possible effects on human life and the environment.

**Table 5.8 Possible Effects of Throwing Garbage into Rivers/Creeks**

Water Pollution	<ul style="list-style-type: none"> <li>• Death of fishes and other marinelife</li> <li>• Increase in water-borne diseases</li> <li>• Contamination of water</li> <li>• Shortage of water</li> <li>• Breeding place of mosquitos and other insects that can cause sickness</li> </ul>
Air Pollution	<ul style="list-style-type: none"> <li>• Bad odor coming from dirty rivers and creeks</li> <li>• Increase in respiratory diseases and other health problems</li> </ul>
Clogged Drainage	<ul style="list-style-type: none"> <li>• Flooding</li> </ul>
Unemployment	<ul style="list-style-type: none"> <li>• People who depend on uncontaminated rivers/creeks for employment will lose their source of income</li> </ul>
Destroy the beauty of nature and the next generation will no longer be able to see any rivers nor creeks	
Rivers/creeks may become open dumpsites, no longer bodies of water	

(8) Activities that Contribute to the Increasing Amount of Waste

According to the students the activities that contribute to increasing amount of waste are as follows:

**Table 5.9 Activities that Contribute to Increasing Amount of Waste**

<ul style="list-style-type: none"> <li>- Overpopulation</li> <li>- Increase in number of squatters</li> <li>- Industrialization</li> <li>- Lack of knowledge about waste segregation and recycling</li> <li>- Dumping of garbage everywhere</li> <li>- Increase use of non-biodegradable products like plastic cups, disposable diapers, etc.</li> <li>- Lack of concern and discipline, like buying things that are unimportant, throwing things that can be reused</li> <li>- Unsystematic method of garbage collection</li> <li>- Unawareness of people regarding environmental protection</li> </ul>
--

(9) Household Activities that Contribute to Minimize Garbage Generation

There are a variety of ways in which households can minimize waste based on the list made by the students. These are presented in the following table.

**Table 5.10 Activities that Contribute to Minimize Waste Generation**

- Recycling and reusing things, practicing segregation of biodegradable and non-biodegradable items, and composting
- Disposing garbage in a proper way
- Burying garbage in their backyard
- Minimizing purchase and use of non-biodegradable products
- Patronizing products that can be recycled
- Getting information or attending seminars about proper waste management
- Having concern for the cleanliness of our surroundings and cooperate with government projects on waste management

One student had a very good solution to minimizing the amount of garbage: Live a simple life - the less you want, the less you consume, the less you consume, the less demand you generate, the less demand you generate, the less opportunities industries have in continuing their environment-unfriendly practices.

#### **6. Evaluation of the Tour**

The tour of Payatas open dumpsite and San Mateo sanitary landfill, admittedly, is a novel way of presenting the gravity of the garbage problem in Metro Manila. Usually, when one speaks of a tour, it brings to mind the presentation of positive or pleasing aspects of things. The Study Team however, felt that it was not enough that information on solid waste management be disseminated to the students by distributing handouts or pamphlets; exposing the students to a part of the waste disposal cycle would contribute to a better understanding of the problem.

Although the students had an idea of what the tour was all about, they were not really prepared to "walk on garbage," as what had happened at Payatas, nor to smell the foul odor from the disposal sites. Had it not been for the teachers, most of the students would not have even alighted from the bus at Payatas.

In general, however, the tour went well. The initial reluctance to ask questions just "to get it over with" as soon as possible was replaced by the normal curiosity of the young when faced with something that they thought they knew all about. At Payatas, the students showed concern for the residents in the area, the health of scavengers, treatment of garbage and hours of operation. Landfill operation, safety, toxic waste were the concerns of the students at San Mateo SLF.

The garbage tour may be considered a small step, but it is a first step towards promoting awareness of the garbage problem. It may have involved only a handful of students, but as a consequence of the tour, an audio-visual presentation in VHS format had been produced in the hope of reaching a wider audience. A request has been made with the DECS Secondary Schools Division to make use of the tape and incorporate it in their "war on waste" program to promote waste minimization and recycling.

BASURA TOUR '98



**Appendix 5.6**  
**PRE-TOUR QUESTIONNAIRE SURVEY**

School Name: \_\_\_\_\_

Date: \_\_\_\_\_

City where school is located \_\_\_\_\_

INSTRUCTION: PLS. PUT A CHECK (✓) BESIDE YOUR ANSWER

**I. Student Profile**

- 1) Sex:  1. Male      2) Age:  1. 13 yrs. old      3) HS Year Level:  1. 1st Year  
 2. Female                                     2. 14 yrs. old                                     2. 2nd Year  
    3. 15 yrs. old                                     3. 3rd Year  
    4. 16 yrs. old                                     4. 4th Year

**II. Awareness of Living Environment**

- 4) In your opinion, what is the most serious problem pertaining to our living environment in Metro Manila? (Rank from 1 to 6, with 1 as the most serious.)
1. Water pollution  
 2. Air pollution  
 3. Noise pollution  
 4. Squatters  
 5. Traffic congestion  
 6. Flooding
- 5) How much garbage, do you think, is generated per day?
1. 5,000 tons/day  
 2. 6,000 tons/day  
 3. 7,000 tons/day
- 6) Do you know the method by which garbage in MManila is being disposed of?
1. Yes       2. No
- 6a. If your answer to Q6 is Yes, what is this method/s? \_\_\_\_\_
- 7) If you know the meaning of the following terms, please define/explain briefly:
1. Sanitary Landfill: \_\_\_\_\_
2. Waste incineration: \_\_\_\_\_
3. Open dumpsites: \_\_\_\_\_
- 8) What percentage of the total garbage in Metro Manila is being recycled?
1. Five percent  
 2. Six percent  
 3. Seven percent

**III. Solid Waste Management**

9. How many legal garbage disposal sites are there in Metro Manila?
1. One       2. Two       3. Three
10. Do you think these disposal sites can be used forever ?       1. Yes       2. No
11. What do you think is the cost of solid waste management in Metro Manila?
1. P 2,000 million       2. P 2,800 million       3. P 3,500 million



**Appendix 5.7**  
**POST-TOUR QUESTIONNAIRE SURVEY**

School Name: \_\_\_\_\_

Date: \_\_\_\_\_

City where school is located \_\_\_\_\_

INSTRUCTION: PLS. PUT A CHECK (✓) BESIDE YOUR ANSWER

**I. Student Profile**

- 1) Sex:  1. Male      2) Age:  1. 13 yrs. old      3) HS Year Level:  1. 1st Year  
 2. Female                       2. 14 yrs. old                       2. 2nd Year  
     3. 15 yrs. old                       3. 3rd Year  
     4. 16 yrs. old                       4. 4th Year

**II. Awareness of Living Environment**

- 4) In your opinion, what is the most serious problem pertaining to our living environment in Metro Manila? (Rank from 1 to 6, with 1 as the most serious.)
1. Water pollution  
 2. Air pollution  
 3. Noise pollution  
 4. Squatters  
 5. Traffic congestion  
 6. Flooding
- 5) How much garbage, do you think, is generated per day?
1. 5,000 tons/day  
 2. 6,000 tons/day  
 3. 7,000 tons/day
- 6) Do you know the method of garbage disposal in Metro Manila?
1. Yes  
 2. No

6a. If your answer to Q6 is Yes, what is this method/s? \_\_\_\_\_

7) If you know the meaning of the following terms, define/explain briefly:

1. Sanitary Landfill \_\_\_\_\_  
\_\_\_\_\_
2. Waste incineration: \_\_\_\_\_  
\_\_\_\_\_
3. Open dumpsite: \_\_\_\_\_  
\_\_\_\_\_

8) List down the possible effects of throwing garbage into rivers and creeks.

1. \_\_\_\_\_  
2. \_\_\_\_\_  
3. \_\_\_\_\_  
4. \_\_\_\_\_  
5. \_\_\_\_\_

9) What percentage of the total garbage in Metro Manila is being recycled?

1. Five percent  
 2. Six percent  
 3. Seven percent

10) Enumerate activities which you think contribute to the increasing amount of garbage being generated in Metro Manila

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_

11) In what way can individual households contribute to the minimization of garbage being generated in Metro Manila?

- 1) \_\_\_\_\_
- 2) \_\_\_\_\_
- 3) \_\_\_\_\_

### III. Solid Waste Management

12) How many legal garbage disposal sites are there in Metro Manila?

1. One       2. Two       3. Three

13) Do you think these disposal sites can be used forever ?     1. Yes     2. No

14) What do you think is the cost of solid waste management in Metro Manila?

1. P 2,000 million     2. P 2,800 million     3. P 3,500 million

**Appendix 5.8**  
**DEFINITION OF TERMS**  
**(Pre-Tour)**

**Sanitary Landfill**

- Where million tons of garbage are dumped on the soil.
- Method of disposing garbage by burying them into a piece of land.
- Method of disposing garbage by which a large place is meant to be the one used for garbage disposal.
- Method wherein the garbage are put far from the people to protect them.
- This is the place where garbage is disposed then a truck flattens it.
- It is an open area or place far from a town or city wherein garbage is disposed of/dumped.
- A landfill is a place wherein numbers of tons of waste and garbage are being disposed of.
- The waste is dumped in a big land then they will fill with soil in the garbage.
- This is where garbage are dump in a big hole then when all garbage are placed and covered with soil.
- Dumping of garbage or burying of waste under a landsite.
- A place where the waste is dumped then it can be developed to a recreational place.
- Maybe, they will dig deep in places where there are less people living in it, then put the garbage in the hole.
- This is where garbage is dumped into a big hole in the ground, then cover it with soil.
- Process of waste management whereby the trash are dumped in a pit then waste will be covered with soil and will be leveled. This is done in one particular area at a time.
- A bit the same as open dumpsite.
- A field wherein garbage are being dumped then covered by soil is used.
- This is a place where garbage is dumped, then covered by soil.
- The garbage will be dumped in a vacant land and some soil will be put on it.
- The garbage is dumped in low area.
- The garbage is dumped in low area.
- Maybe it is one site allotted for waste.
- A place where garbage are being dumped. This is a large hole where people put their garbage after being collected by dump tractor.
- A place where garbage or waste are being disposed or dumped. It is usually far from people in the city.
- It is a means by which garbage is disposed wherein biodegradable wastes are buried in a landfill, piled with soil layers in between.
- Digging holes on ground which is used in dumping garbage; after the garbage is placed, the holes are covered.
- A plot of land where garbage is dumped, then covered with soil if its use has been maximized
- A place where garbage is disposed.
- An area far from civilization where the garbage is being dumped and filled with land until it forms mountains of waste materials.
- It is an open area far from many people and near a body of water wherein garbage are being filled up.
- People use to bury their garbage underground.
- An operation used by the government wherein garbage are put or transported to a landfill.
- A method by which all the garbage are buried underground.
- A garbage disposal wherein there is an alternation between garbage and soil wherein it is used to fill up a land to be used in the future.

### Waste Incineration

- Firing or burning waste products or garbage by means of machine.
- Method of disposing garbage through a device called garbage incinerator.
- A method using a machine which has a long chimney where the smoke coming from garbage is released.
- A method wherein the garbage are burned using the incinerator.
- This is the process where garbage is being burned by an incinerator.
- A process of putting or applying a high temperature to the waste or the process of burning.
- The device used to burn this garbage is an incineration plant.
- This is the process wherein waste is being disposed by being burned.
- Waste is being burned in a incinerator.
- This is the place where waste are burned to decrease its ton.
- Burning of garbage in an incinerator.
- A method of disposing waste.
- To incinerate means to destroy, maybe they will find a way to destroy waste.
- It is the burning of wastes.
- It is used to dispose large amount of garbage/waste usually used in urban areas like MM.
- Burning of waste which were segregated
- Burning of waste/garbage with the use of so-called incinerators
- This is the process of burning garbage
- Burning garbage.
- Burning garbage.
- Process by which waste are placed in an incinerator and the rest, I don't know...
- The process by which carbon or other harmful substances will be taken off.
- A method by which garbage are being disposed by burning the waste in an incinerator.
- It is a process in which our waste and garbage are crushed into pieces so that it will be easy to reuse.
- Burning waste materials by use of incinerators.
- Burning of garbage by an incinerator.
- This is where the collected garbage is disposed for the purpose of burning it.
- Burning of waste materials.
- Waste materials are being incinerated.
- A process in which waste materials are burned off.

### Open Dumpsite

- Open space where the garbage was thrown and collected by people.
- A method of disposing garbage by throwing them in a certain place.
- Dumpsites where a large number of garbage is disposed. An open place where garbage is thrown.
- A method wherein garbage are disposed in a place nearby people.
- An open wide hole in a land and garbage are dumped here.
- Any hole or free place where garbage can be thrown or disposed.
- Free portion wherein several amount of waste are being placed.
- The waste is thrown in one place.
- This is a place where garbage is dumped or a specific place where garbage are thrown.
- The waste is thrown anywhere of a place.
- Where waste of a certain place are dumped, it is a big open land where garbage can be found.
- They are making dumpsites wherein everyone is free to throw their garbage.
- Where garbage is dumped without any land for its cover; it's a large area.
- It is a process in which garbage/wastes are being buried.

- Open pit or just a hill of garbage where the trucks dump their load.
- Dumping of tons of garbage collected from a certain area in a certain site.
- Open field wherein garbage is being dumped like that of Smokey Mountain.
- A place where garbage is dumped, may be it's a large area like Smokey Mountain.
- The garbage will be dumped in a vacant lot.
- Throwing garbage in your yard.
- Maybe it is an open field where garbage is being thrown.
- Open place where waste is being stocked.
- This is a site where the garbage is being dumped.
- Places where garbage are usually thrown; biodegradable and non-biodegradable are mixed and then it will be sprayed with chemicals and then with soil. Ex. Smokey Mountain
- Open area where waste materials are dumped.
- Places wherein garbage are stocked into.
- A plot of land where garbage is dumped.
- This is the known practice of garbage disposal. A system commonly used in garbage disposal.
- A place or land where waste materials or garbage collected by the government's garbage collectors is being dumped.
- A place for waste materials. These waste materials are being dumped in this dumpsite.
- A place where biodegradable and non-biodegradable are dumped to be decomposed/recycled.
- Those vacant lots or any place that people use to throw their garbage there.

**Appendix 5.9**  
**DEFINITION OF TERMS**  
**(Post-Tour)**

**Sanitary Landfill**

- This is where the garbage is dumped off and cover by soil.
- A method of disposing garbage by throwing them in a landfill where garbage are detained in a treatment pond.
- A place where garbage are disposed except those market and hospital garbage. It is safer than open dumpsites.
- A place where garbage is dump in a prepared soil and gravel place, they place there the waste, then covered with soil.
- A method wherein garbage are disposed and covered by soil. It doesn't harm the people.
- Place where garbage are being disposed then covered by the soil and put some chemicals for treatment.
- A method of disposing garbage using a tract of land and covering it by the use of soil.
- Dumping waste and covered by soil.
- A place wherein garbage/wastes are disposed but before it was disposed, it is treated first.
- A dumpsite wherein waste are disposed and covered by soil when it reaches 3 meters high.
- Method in which garbage is dumped in a large area and covered with land and the "katas" is treated in a treatment pond.
- This is a method of disposing garbage in a good way. All of the garbage are dumped and covered with soil and the leachate that the garbage contains is removed and goes in different process to make it clean and ready for discharge. The place can be developed for recreational use after 10 years.
- They are burying the garbages by putting soil on them.
- Method of waste disposal in which we can get rid of odor, methane gas and leachate.
- This is a process to determine the amount of track and to be able to separate by Phases 1- 5. (?)
- *Ito ay ang pagtatapon ng basura at kapag 3 m na ang kapal ay tinatakpan ng lupa.*
- This is where the garbage is buried in the soil and they have a limitation.
- An organized way of dumping waste/garbage in a certain area.
- A method of waste disposal whereby waste are put in a pit and full shall be covered with soil, then will levelled accordingly.
- Process of dumping garbage wherein it is dumped in a field then later on covered with soil.
- Dumping garbage in low areas.
- By dumping garbage layer by layer.
- Garbage will be buried in the soil and may serve as fertilizers for plants.
- Dumping of garbage in an area then it is covered by soil.
- A place where garbage are placed in an open hole having 3 layers, plastic, particularly beneath. After the garbage reaches 4 m in height, it will be filled again, covered with 6 in. of soil and will be filled again with garbage.
- *Pagdedespose ng garbage sa isang lugar at tatapunan ng lupa (alternately).*
- A place where garbage are being dumped. This is a very effective method of disposing garbage and it has a leachate collection that prevents the by-product of the garbage to penetrate into bodies of water.
- *Ito iyong paraan ng pagsasaayos ng basura na pagkatapos maitambak ang basura ay tinatabunan ng lupa.*
- A place where garbage is being disposed and it has pipes and connections to prevent outbreak of diseases.

- It is covered with soil and chemicals.
- The process of disposing garbage by digging hectares of soil wherein garbage is properly plotted and disposed of after the garbage is placed in holes, it is covered neatly.
- A method wherein garbage is piled up in layers with intermediate soil layers. Here the leachate is collected and treated to meet the standards of DENR. Garbage is made to decompose.
- Method of covering garbage and rubbish with soil to inhibit growth of bacteria and, at the same time, separate water waste.
- Garbage is covered by soil and undergoes several treatments.
- A systematic open dumpsite.
- A place where garbage is disposed of in an orderly manner.
- Garbage is being covered with soil and at the bottom, there are pipes for leachate.
- Dumping of garbage which uses land to fill the waste that is being dumped for almost one or two feet below.
- Garbage are being covered /filled up by the land. This method is safe and better compared to open dumpsite.
- A place for dumping garbage but they don't accept some garbage and this process is safe as pipes collect toxic waste so that ground water is not affected.
- Garbage is buried underground and used as fertilizers for plants once it has been processed.
- A method of garbage disposal wherein garbage disposal is well maintained.
- An operation used by the government wherein garbage is transported into bottom of the soil.
- Method by which all the garbage is buried underground. It is much safer compared to other methods of disposing garbage.

#### **Waste Incineration**

- Method of burning waste materials by means of machine based technology.
- A method of disposing garbage (hospital wastes) by burning them in a device called waste incinerator.
- A process of burning of garbage
- A place where garbage are burn to decrease their weight then compost it into fertilizers.
- A method wherein garbage are burned using incinerator.
- A process by which garbage are being disposed by burning advisable for toxic/hospital waste.
- A method of disposing garbage using a machine, has a long chimney.
- The garbage is burned and gas is released, especially hospital wastes.
- Burning waste in the incinerator.
- Waste incineration is a process wherein biodegradable materials are being burned.
- Burning of garbage in order to more or less tons of waste
- Method wherein wastes are burned especially the hospital wastes.
- It is the process or method of disposing garbage by burning it.
- They are burning garbage.
- Burning of garbage/waste.
- This is the process where garbage is burned and used as electricity.
- Burning of garbage (esp. one that does not decompose through an incinerator).
- Simply burning of waste.
- Waste are being burned in an incinerator.
- By burning garbage by use of incinerator.
- Burning of garbage.
- There is an incinerator used in burning the garbage.
- Burning of garbage.
- Process by which waste are treated on an incinerator and the steam
- Output will be used to produce electricity.

- By the use of incineration; *sinasala nito ang mga fumes or harmful substances sa pagsusunog.*
- A method used in disposing garbage where an incinerator is used to burn waste.
- A method in which the hospital waste and toxic waste are being melted.
- The process used in disposing hospital wastes. The process involves proper burning of waste in a machine so that disease will be minimized.
- Burning of toxic and hospital waste using the incinerator.
- Method of burning waste in such a way that there won't be any ill effects to the atmosphere like pollution.
- Garbage is being burned.
- Burning of garbage through an incinerator.
- This is where hospital waste are disposed of for the safety of our environment and also the people.
- Waste is being burned.
- This is used for hospital waste materials and toxic waste which they burn.
- The waste materials are being incinerated like hospital waste.
- Process where garbage is burned off.
- A process by which the waste are burned in an incinerator.

#### **Open Dumpsite**

- A place where a garbage is dumped improperly.
- Do not cover with soil and the most serious or not good dumping site.
- A method of disposing garbage by throwing them in a site.
- A place where garbage are dump and segregated by the scavengers and after the garbage is thrown, soil will be dumped over it.
- A place where garbage is dumped and many scavengers find their luck in that pile of garbage.
- A method wherein garbage are disposed in an open manner not covered by soil.
- A site with a big hole and garbage are dumped there to become a compost almost similar to landfill.
- A method of disposing garbage in a place but not covering it so it is open and segregated by scavengers.
- Throwing garbage in a definite place or mountain.
- An open dumpsite is a place wherein waste dumped is more well treated.
- Waste disposal wherein garbage are thrown and where there is a vast area of land especially for waste.
- Method in which garbage is dumped in a large area but it is not covered and scavengers are permitted in the area.
- A place where there is an open area where garbage are discharge. It has many disadvantages because it is not safe for the health of the people near it.
- It's a place where garbage are thrown.
- Method in which garbage are being dumped without any rules, soil cover, etc.
- *Ito ay pagtatapon ng basura at pagkatapos ay papatagin ng bulldozer at hindi tatakpan ng lupa.*
- The trucks contribute their collection to determine the possible amount of garbage in Q.C. (?)
- There is no limitation of dumping of garbage.
- Dumping of garbage in a certain area.
- Piles of garbage spread and covered with soil.
- Open field wherein garbage is being dumped like that in Smokey Mountain.
- Where garbage is thrown up.
- Garbage are thrown.



- The garbage are just thrown and dumped in a vacant lot without applying any chemical and deodorizers.
- Dumping of garbage in an open area.
- Site where garbage are dumped freely, scavengers are cravings for newly dumped garbage.
- I think it is not advisable. I don't like the idea.
- *Isang lugar na open space kung saan basta itinatapon ang mga basura ng mga partikular na lugar.*
- A place where dump trucks put the garbage that they have collected but it can help pollute bodies of water because leachates here are not disposed of properly.
- A process by which the waste is thrown only and burned.
- A place where garbage is being disposed and many scavengers are seen.
- The garbage are only piled up and then some soil will be showered into.
- It is more hazardous than sanitary landfill.
- A process that is like sanitary landfill but it is more hazardous to health because garbage is exposed to human race and it may lead to critical health problems.
- The most common method of garbage disposal; like the landfill, garbage are also piled with intermediate soil layers without a definite height. This is mostly identified by the presence of vectors and scavengers.
- Garbage is placed in an open area.
- A plot of land where garbage is dumped.
- Place where garbage is disposed of and allows scavengers to help reduce the weight of garbage.
- Using open area for dumping garbage.
- The garbage are being dumped in one place. This method is not good for the health of concerned citizens.
- A place where garbage are dumped and there is not limit in this dumpsite or they dump and dump garbage.
- People use to throw their garbage in a vacant lot or any place and you can see some scavengers.
- A method of garbage disposal where all you have to do is to dump and leave it that way.
- It is an operation wherein garbage, whether biodegradable or non-biodegradable, is thrown into the place or particular place.
- A method in which all the garbage are dumped in an open space.

## **D. ENVIRONMENTAL SURVEY**

## **D: Environmental Survey**

### **I. Environmental Survey for New Sanitary Landfill Development Project**

#### **1.1 Background**

JICA Study Team proposed the New Parcel "B" Sanitary Landfill Project as one of the priority projects in the Master Plan. This Project is required to undertake an Environmental Impact Statement (EIS) in accordance with the requirement of the revised rules and regulations for the EIS System embodied in DENR's DAO No. 37 series of 1996. MMDA should provide an EIS as the proponent of the Project. This environmental survey is presented as a basic data for EIS which MMDA may use to prepare an EIS.

#### **1.2 Scoping Session**

The Philippine EIS System is based on a series of presidential decrees, executive orders, proclamations, letters of instructions, and implementing rules and regulations. The most important one among these is Presidential Decree (PD) 1586 and Proclamation 2146. The previous revision to the implementing rules and regulations of PD 1586 was DENR Administrative Order (DAO) No. 21 series of 1992 which provided the set of procedures for the whole process of securing an Environmental Compliance Certificate (ECC). This set of procedures has recently been replaced by DAO No. 37 series of 1996 (cited as DAO 96-37) which became effective in January 1997.

The DAO 96-37 gives higher importance on public participation and social acceptability in the processing of ECC applications. Public participation is giving citizens the opportunity to influence major decisions that affect them. Its goal is to enable the people to take responsibility for environmental protection and management through active involvement in decision making. DENR believes that public participation is the only process to promote and acquire social acceptability of a proposed project. It will reduce the level of misinformation and distrust. In addition, it will help identify the concerns of affected groups and help focus the planning activities on issues of concern. This is expected to result in an improved decision-making process.

In this procedure, the most important process at early stage is the scoping session. This session has two levels: the first level scoping session and second level scoping session (on-site scoping session). MMDA requested the official holding of scoping sessions to EMB. The first level scoping session was held last October 20, 1998, at the office of PTFWM-EMB. Representatives of EIA-RC, EIA-EMB, MMDA, and JICA, and some local consultants attended the session.

The presentations during the session covered the following:

- EIA-EMB initiated the session and mentioned the objective of the session.
- MMDA gave a brief description of the project.

- The scope of the EIS study to be conducted was explained by using FORM 1: Procedural Evaluation (Screening Phase).

The important issues discussed during the session were as follows:

- MMDA, JICA and the EIA Study Team should coordinate with the Barangay Captain of San Rafael, Rodriguez (formerly Montalban), Rizal.
- The scope of work, such as survey items, survey points were checked.
- It was suggested to the proponent to make an early start on drawing up plans and strategies on the social acceptability aspect.

The second level scoping session (on-site scoping session) was held on November 13, 1998, at the Rodriguez Ancestral Home, Rizal Province. Participants from the local community came from the mayor's office, the Sangguniang Bayan, and non-governmental organizations. EIA-RC, EIA-EMB, PTFWM-EMB, MMDA, JICA were adequately represented.

During the second level scoping, the following were discussed during the presentation and open forum:

- MMDA presented the proposed project and to enjoined the participants to voice their concerns so that these may be addressed in the study, thereby paving the way for an environment-friendly and technically-sound disposal site.
- JICA Study consultants gave a belief presentation on the technical aspect of the project and answered some clarificatory questions.
- MMDA expounded on the impact of implementation of the project.
- Important issues raised during the open forum included the proposed implementation of the project in a protected area under NIPAS, problems at the existing San Mateo SLF and how these can be prevented in the proposed project, benefits to the host community, and environmental concerns on water, air, noise, odor.

### **1.3 Methodology of Survey**

The methodology of the environmental survey for an EIS, which was requested at first level scoping session, is shown in Table 1.1.

**Table 1.1 Survey Items, Sampling Points, Sampling Times**

Survey Item		Sampling Point	Sampling Time
Socio-economy	Population, Household, Employment, Income, Land & Resource Use, Health Condition, Education, etc.	Study area & its surroundings	1 time
Ecology	Vegetation, Wildlife	Study area & its surroundings	1 time
Air Quality	SO <sub>x</sub> , NO <sub>x</sub> , CO, TSP Climate (Wind Direction, Wind Velocity, Temperature, Humidity)	1 point (surrounding area)	1 time (3 days continuously)
Water Quality	pH, BOD, SS, DO, E-coli, inventory of wells/ springs (groundwater resources)/ surface water bodies	4 points (upstream: 2, downstream: 2, vicinity area)	1 time
Soil	Heavy metals (Pb, Hg, As, Cd)	4 points	1 time
Odor	Odor Concentration, H <sub>2</sub> S, Methane	2 points (surrounding area: 1, nearest residence: 1)	1 time
Noise/ Vibration	Noise/ Vibration Level by Transportation, Background Noise/ Vibration Level, Traffic Volume by Type	6 points (for road transportation: 2, for background level: 2, for traffic volume: 2)	1 times (24 hours continuously)

## 1.4 The Atmosphere

### 1.4.1 Meteorological Conditions

The climate of the proposed project site is similar to that of the existing sanitary landfill in San Mateo, Rizal. The project site falls within the Type I Classification of the Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA) characterized by two distinct pronounced seasons: extremely wet from May to October and quite dry from November to April. The excessive rainfall amounts received during the very wet months are due the geographical location of the area making it exposed to the moist southwest monsoon and the fact that the tropical cyclone seasons coincides with the peak of the monsoon.

### 1.4.2 Rainfall

The area receives an annual average rainfall of 2,561.0 mm. Based on the record, there are about 162 rainy days within the year. The first four months of the year are very dry compared with the monthly averages during the rest of the year. Its wettest months are the 3-month period from July to September, during which the monthly means all exceed the 400-mm mark, and with only 7 dry days per month.

### 1.4.3 Temperature

The project site has cooler temperatures than most of other nearby areas. The monthly mean temperatures range from 24.1 °C in December to 27.3°C in May. The early

mornings in December are the coldest with minimum temperature average to 19°C. During the early afternoons in April, the temperature reaches a reading of 33.4°C.

#### **1.4.4 Relative Humidity**

The mean annual relative humidity is 78%. The project site is most humid from July to September with the atmospheric moisture index soaring to 85%. The monthly values dip to 66% in April.

#### **1.4.5 Cloud Cover**

Cloud cover index is parallel indicator of the rainfall amounts recorded in the municipality. The cloudiness has an average of 3 oktas (only partly cloudy) in April. During the months of July to September, the skies are overcast (7 oktas). The mean cloudiness is 6 oktas.

#### **1.4.6 Prevailing Winds**

The project site is exposed to the southwest monsoon. This made the southwesterly winds prevails during the months of late June to September. In October, the winds shift to southeasterlies because of the trade winds prevailing over the country. In November, the northeast monsoon sets in most places along the eastern coast of archipelago. However, in Montalban and the rest of the areas shielded by the mountainous region to the northeast, the winds shift to southeasterlies and stay until June when the southwest monsoon sets in again.

#### **1.4.7 Tropical Cyclone**

Tropical cyclone is the most influential factor that brings considerable rainfall in the Philippines. Typhoons usually occur from June to December with highest frequencies in July and August. The mean annual number of typhoons that pass through the Philippine Area of Responsibility (PAR) is about 20 of which an average of 9.2 actually cross the country. In addition, an average of two typhoons does not make land but cause damage. The cyclones originate in the region of Marianas and Caroline Islands in Pacific Ocean. Their movements follow westerly or northwesterly course over the country and deposit substantial amount of rainfall. About 47% of typhoons are associated with cyclones.

In the project area, tropical cyclones contribute largely to the copious rainfall received from July to September. There are at least five tropical cyclones in the year that cross the geographical zone to which the project site and the rest of Metro Manila belong. The passage of these cyclones is mostly expected during the months of August to October.

Tables 1.2 and 1.3 summarize the climatological data for the municipality of Montalban, Rizal.

**Table 1.2 Climatological Data for Montalban, Rizal**

Month	Rainfall (mm)	No. of Rainy days	Relative Humidity (%)	Cloudiness (0-8)	Prevailing Direction	Wind Speed (kp)
Jan	17.9	5	74	6	NE	9
Feb	9.7	3	70	5	NE	9
Mar	13.4	4	68	3	E	9
Apr	35.7	4	66	6	E	9
May	163.6	13	74	6	NE	9
Jun	342.5	19	81	6	SW	9
Jul	496.5	23	86	7	SW	9
Aug	525.0	25	85	7	SW	9
Sep	469.6	23	85	7	SW	9
Oct	223.1	13	80	6	NE	9
Nov	155.5	13	80	6	NE	9
Dec	18.5	11	79	6	NE	9
Annual	2561.0	163	78	6	NE	9

Source: PAGASA

**Table 1.3 Temperature Data for the Municipality of Montalban, Rizal**

Month	Mean	Maximum	Minimum
Jan	24.2	28.9	19.5
Feb	24.6	30.1	19.1
Mar	25.9	31.8	19.9
Apr	27.1	33.4	20.8
May	27.3	32.6	22.0
Jun	26.6	31.2	22.0
Jul	26.6	30.6	22.5
Aug	25.8	29.7	21.9
Sep	25.2	29.2	21.2
Oct	25.6	30.2	21.0
Nov	25.0	30.0	20.0
Dec	24.1	19.1	19.0
Annual	25.7	30.6	20.7

Source: PAGASA

#### 1.4.8 Air Quality Survey

The existing air quality of the area was characterized in terms of the following parameters: total suspended solids (TSP), sulfur dioxide (SO<sub>2</sub>), nitrogen dioxide (NO<sub>2</sub>), carbon monoxide (CO), hydrogen sulfide (H<sub>2</sub>S) and odor concentration. All analyses and tests are conducted in a manner specified and prescribed by DENR Administrative Order (DAO) No. 14, Series of 1993 otherwise known as the "Revised Air Quality Standard of 1992, Revising and Amending the Air Quality Standard of 1978." The applicable methods for sampling and measurement of the aforementioned parameters are summarized in Table 1.4

**Table 1.4 Methods of Air Sampling and Measurement**

Air Quality Parameter	Air Sampling Procedure	Method of Measurement	Units of measurement
Sulfur Dioxide	Graseby Gas Bubbler Sampler	Pararosaniline Method	µg/Ncm
Nitrogen Dioxide	Graseby Gas Bubbler Sampler	Griess Salzman Method	µg/Ncm
Total Suspended Solids	Graseby High Volume Gas Sampler	Gravimetric Analysis	µg/Ncm
Carbon Monoxide	Quest Envirotrack IV Gas Monitor (UL registered instrument with accuracy traceable to US-NIST)	Direct Reading (with disposable sensor)	ppm
Odor	Quest Envirotrack IV Gas Monitor	Direct Reading (with disposable sensor)	---
Hydrogen Sulfide	Quest Envirotrack IV Gas Monitor	Direct Reading (with disposable sensor)	Lower explosive limit (LEL)

(1) Dry Season Measurement

Ambient air sampling was conducted during dry weather condition from March 4 to March 7, 1998. Ambient air temperature ranges from 20 to 30 °C with daily average temperature close to 25 °C.

The sampling site is about 5 meters from unpaved road, which is the main source of dust. Variation on dust concentration is attributable to frequency of vehicles coming to the area as well as the wind direction. Traffic density was very light which is composed mainly of passenger jeepneys. These jeepneys arrive and leave the area every 15 to 30 minutes during daytime. Table 1.5 summarizes the relevant information for this undertaking.

**Table 1.5 Location of the Air Quality Sampling Point During Dry Season**

Survey Item		Sampling Point		Sampling Time
		No.	Location Description	
Air Quality	SOx, NOx, CO, AP, Climate (Wind Direction, Wind Velocity, Temperature, Humidity), Odor Concentration, H2S	S-12	Beside Pintong Bocaue Elementary School	March 4-7, 1998
		S-1	Inlet of leachate treatment pond (anaerobic pond)	
		S-5	Residential area at the north of the site	

Tables 1.6 and 1.7 show the summary results of the survey. Per DAO No. 14, the measurement of TSP, SO<sub>2</sub>, NO<sub>2</sub> and CO are carried out for 24-hour averaging time and are expressed in unit weight per normal cubic meter (Ncm) at 25°C and 760 mmHg. On the other hand, the measurements for odor, hydrogen sulfide and carbon monoxide are carried out at 30-min averaging time per DAO 14.



The results on TSP concentration show that almost all the values obtained exceeds the DENR standard of 230 µg/Ncm. The highest dust concentration of 509 µg/Ncm was recorded on March 5. The results are attributable to the arrival of more than 20 motorbikes, which held a sports cycling activity in the nearby area. The rest of the parameters registered values, which are well below the DENR ambient air quality standards. This observation suggests that during normal days, the traffic volume in the area does not cause significant contributions to the ambient SO<sub>2</sub>, NO<sub>2</sub> and CO level.

**Table 1.6 Results of the Dry Season Air Quality Survey for TSP, SO<sub>2</sub> and NO<sub>2</sub> at sampling point S-12**

Parameters	DRY SEASON			
	DENR Std.	March 4, 1998	March 5, 1998	March 6, 1998
TSP, ug/Ncm	230	231	509	356
SO <sub>2</sub> , ug/NCM	180	<4	<4	9.21
NO <sub>2</sub> , ug/Ncm	150	<0.10	<0.10	<0.10
CO, ppm	9	<1	<1	<1

**Table 1.7 Results of the Dry Season Air Quality Survey for Odor, H<sub>2</sub>S and CO at sampling stations S-1 and S-5**

Parameters	DENR Std.	Sampling Location							
		S-1				S-5			
		T1	T2	T3	T4	T5	T6	T7	T8
LEL	---	2%	1%	2%	2%	1%	1%	1%	1%
H <sub>2</sub> S, ppm	---	<1	<1	<1	<1	<1	<1	<1	<1
CO, ppm	9	<1	<1	<1	<1	<1	<1	<1	<1

Note:  
 T1 - 5:00-5:30 am                      T5 - 5:30-6:00 am  
 T2 - 12:00-12:30 pm                  T6 - 12:30-1:00 pm  
 T3 - 6:00-6:30 pm                    T7 - 6:30-7:00 pm  
 T4 - 0:00-12:30 am                    T8 - 12:30-10:00 am

% LEL is percent of the lower explosive limit. In the absence of odor measurement procedure, H<sub>2</sub>S and methane, which are the common sources of odor in a landfill, are measured. Methane has a lower explosive limit of 5% by volume or 50,000 ppm (material Safety Data Sheet). Therefore, the 1% reading represents methane concentration (assuming that all combustible gases that is detected is methane) of approximately 500 ppm

Similarly, the measured concentration levels for odor, carbon monoxide and hydrogen sulfide indicate that all the values obtained are well below the DENR standard. Based on the registered data, the hydrogen sulfide level in the area is less than 1 ppm or insignificant. Combustible gases read 1% and 2% of the LEL on separate occasions. Since air samples are obtained near the anaerobic treatment pond for leachate, ambient levels may be slightly higher than the immediate environment far from this pond. Although these pollutants may be considered low, it may still exert moderate health impact to those workers who are already afflicted with respiratory diseases. In general, these values are still considered insignificant to generate adverse impact in the environment.

(2) Wet Season Measurement

Ambient air sampling was conducted during wet weather condition from October 17 to 28, 1998. Table 1.4.8 summarizes the relevant information for this undertaking.

Table 1.9 presents the summary results for TSP, SO<sub>2</sub> and NO<sub>2</sub> measurements at sampling point S-12. Compared with DENR ambient standards, each of the air pollutants measured registered a notably very low ambient concentration levels. Comparing the results with those data gathered during dry season, the values for wet season are far lower which indicate that there are no significant sources of these pollutants in the area. Further, the down pour of rains during wet season help attenuate the ambient levels of these pollutants thus resulting to a much lower value compared to the dry season values. Similarly, this observation suggests that during normal days of wet season, the traffic volume in the area does not cause significant contributions to the ambient SO<sub>2</sub>, NO<sub>2</sub> and CO level.

**Table 1.8 Location of the Air Quality Sampling Point During Wet Season**

Survey Item		Sampling Point		Sampling Time
		No.	Location Description	
Air Quality	Sox, NOx, CO, AP, Climate (Wind Direction, Wind Velocity, Temperature, Humidity), Odor Concentration, H2S	S-12	Beside Pintong Bocaue Elementary School	October 17-28, 1998
		S-1	Inlet of leachate treatment pond (anaerobic pond)	
		S-5	Residential area at the north of the site	
		PB4	Area near Wawa Dam	
		PB2	At Pintong Bocaue	

**Table 1.9 Results of the Wet Season Air Quality Survey for TSP, SO<sub>2</sub> and NO<sub>2</sub> at Sampling Station S-12**

Parameters	WET SEASON			
	DENR Std.	Day 1	Day 2	Day 3
TSP, ug/Ncm	230	52.12	37.16	38.97
SO <sub>2</sub> , ug/NCM	180	<4	5.83	<4
NO <sub>2</sub> , ug/Ncm	150	3.78	4.72	4.72

**Table 1.10 Results of the Wet Season Air Quality Survey for TSP, SO<sub>2</sub> and NO<sub>2</sub> at Sampling Station PB-4**

Parameters	WET SEASON			
	DENR Std.	Day 1	Day 2	Day 3
TSP, ug/Ncm	230	23.38	64.87	43.60
SO <sub>2</sub> , ug/NCM	180	<4	<4	<4
NO <sub>2</sub> , ug/Ncm	150	3.71	7.69	1.92

**Table 1.11 Results of the Wet Season Air Quality Survey for Odor, H<sub>2</sub>S and CO at Sampling Stations S-1 and S-5**

Parameters	DENR Std.	Sampling Location							
		S-1				S-5			
		T1	T2	T3	T4	T5	T6	T7	T8
LEL	---	<1	1%	<1	<1	<1	<1	<1	<1
H <sub>2</sub> S, ppm	---	<1	<1	<1	<1	<1	<1	<1	<1
CO, ppm	9	<1	1	2	<1	<1	<1	<1	<1

Note:  
 T1 - 6:15-6:45 am                      T5 - 6:20-6:50 am  
 T2 - 12:20-12:50 pm                  T6 - 12:25-12:55 pm  
 T3 - 7:30-8:00 pm                      T7 - 7:35-8:05 pm  
 T4 - 11:00-11:30 pm                  T8 - 11:11-40:00 pm  
 % LEL is percent of the lower explosive limit. In the absence of odor measurement procedure, H<sub>2</sub>S and methane, which are the common sources of odor in a landfill, are measured. Methane has a lower explosive limit of 5% by volume or 50,000 ppm (material Safety Data Sheet). Therefore, the 1% reading represents methane concentration (assuming that all combustible gases that is detected is methane) of approximately 500 ppm

**Table 1.12 Results of the Wet Season Air Quality Survey for Odor, H<sub>2</sub>S and CO at sampling stations S-1 and S-5**

Parameters	DENR Std.	Sampling Location							
		S-1				S-5			
		T1	T2	T3	T4	T5	T6	T7	T8
LEL	---	<1	<1	<1	<1	<1	<1	<1	<1
H <sub>2</sub> S, ppm	---	<1	<1	<1	<1	<1	<1	<1	<1
CO, ppm	9	<1	1	<1	<1	<1	<1	<1	<1

Note:  
 T1 - 6:00-6:30 am                      T5 - 5:00-5:30 am  
 T2 - 12:00-12:30 pm                  T6 - 12:00-12:30 pm  
 T3 - 7:15-7:45 pm                      T7 - 7:00-7:30 pm  
 T4 - 10:45-11:15 pm                  T8 - 11:00-11:30 pm  
 % LEL is percent of the lower explosive limit. In the absence of odor measurement procedure, H<sub>2</sub>S and methane, which are the common sources of odor in a landfill, are measured. Methane has a lower explosive limit of 5% by volume or 50,000 ppm (material Safety Data Sheet). Therefore, the 1% reading represents methane concentration (assuming that all combustible gases that is detected is methane) of approximately 500 ppm.

The results for odor, H<sub>2</sub>S and CO measurements also suggest that during wet season, there are no significant sources of these pollutants in the area. In Case of the sampling station within the existing landfill, it should be noted that S-1 is just located at the inlet of the leachate anaerobic treatment pond. One possible reason is that during wet season and colder period in the area, microbial activities that are responsible for the emissions of these air pollutants are less active. Hence, the result of the measurements is lower than those registered during dry season wherein the surrounding is much warmer. Warmer environment may induced more active microbial activities in the area.