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APPENDIX F PRESENT MUNICIPAL SOLID WASTE MANAGEMENT

F.1 Overview of MSWM Situation in Poznan

F.1.1 Sanitary Condition

Poznan is generally a very beautiful and clean city, a fact that may be attributed to the efforts made by the Municipality on sanitation. However, an increasing number of insanitary places can still be found within the residential area.

1) Public Space

The public spaces are kept clean and hygienic. A sufficient number of trash boxes are provided in public areas and waste collection is conducted frequently. Trash boxes overflowing with waste and litters can be hardly observed.

2) Residential Area

a. New Apartment Building Area

This area is kept clean and hygienic. Large containers are provided and a hoist truck collection system, which is considered to be working very well, is employed widely in this area.

b. Old Apartment Building Area

Containers overflowing with garbage can be seen in many places. Containers are mostly found at the back yard of these buildings. The reason behind the inadequate implementation of storage and discharge are as follows:

- The majority of the residents do not care about the sanitation of the area, and all responsibilities are left to the guardians. The sanitary condition of the area is, therefore, highly dependent on the guardians.
- The residents and also SANITECH are not particularly interested in these areas as the waste storage area can not be seen from outside.
- Offices are closely situated together in apartment buildings and employees are not very particular with proper waste disposal measures.

c. Detached and Semi-detached Houses Area

Waste collection, which is conducted once a week or every other week, is less frequent in these areas compared to the others, and, therefore, gives way to the breeding of maggots and flies in many of the containers. Although many of the residents put soil in the dust bins to prevent the breeding of these insects, the quantity placed only adds up to the weight of the dust bins, thus making collection less efficient.

3) Suchy Las Disposal Site

All sorts of waste, including hazardous ones, are disposed of at the Suchy Las Disposal Site. Although soil covering is implemented, the operation is not conducted appropriately to keep the site clean.

F.1.2 SWM Situation

SWM is the responsibility of the Municipality, and two departments are designated for it, namely the Investment Department and the Communal and Residential Affairs Department. The present SWM situation of Poznan City is shown in Table F.1.2-1.

The implementation of SWM is left to the municipal enterprise, SANITECH, and the municipality is not directly involved with the management. Further, the Municipality is considered to have little influence on the SWM, since all subsidies to SANITECH have been terminated.

Table F.1.2-1 Present Solid Waste Management Situation

Description		Responsible Administration Body	Executing Agencies	
			Governmental Enterprise	Private Enterprise
Disposal Site	Planning	Investment Dept. Municipality	-----	-----
	Construction		City Development Authority Sub-con (SANITECH)	
	Operation	Communal & Residential Affairs Dept. Municipality	SANITECH	-----
Municipal Waste Collection			SANITECH	LEWAR, TECH-KOM
Road Sweeping	State Road	Provincial Government	Provincial Authority for Roads in the City	Sub-con (Lekan) (HUBERTUS) (DROMO) (SRCE)
	Provincial Road		Sub-con (SANITECH)	
	Municipal Road	Communal & Residential Affairs Dept. Municipality	SANITECH	
Public Area Cleansing	Green Area		Green Area Authority	
	Trash Boxes along Street		-----	HUBERTUS

F.1.3 Final Disposal

1) General Characteristics

Except for the old incinerators installed in hospitals, the city of Poznan has no waste processing facilities. The Suchy Las Disposal Site located outside of the city to the north of Poznan, is the only disposal site used by the city and virtually all kinds of wastes, i.e, municipal, industrial, construction, hospital, are disposed of.

The operation of the site started in 1984. The methods employed are considered not adequately hygienic and waste volume is not precisely monitored by weight.

2) Present Problems

The most serious problem concerning the construction of a disposal site is the difficulty in obtaining permits for land use.

During the regime of the Socialist Government, land use permits were easily granted by the absolute authority. After the democratization of the country in 1989, however, any proposal made by the Government or Municipality were opposed or questioned by the people.

A democratic manner has not been adopted yet as to the establishment of an agreement between the Government and the residents concerning the granting of permit for the construction of a disposal site. In addition, there are no intermediary agencies that may conduct such negotiations for the Municipality or the Government.

Almost all administrative organizations and institutions are reluctant to issue permits because they fear criticism from the people. This negative behaviour delays necessary countermeasures and widens the gap between the facts and requirements specified by the legislation. The majority of the supervising agencies seem to have given up supervising the implementation due to these too big gaps.

Those residing near the Suchy Las disposal site are not whatsoever obliged to cooperate with the waste disposal measures of the City, because they are not residents of the city. To persuade these residents, the Municipality agreed to give financial support. Compensation started in 1989 and the total cost for 3 years, from 1989 to 1991, amounted to approximately 6 million US\$. The enormity of the cost seems to weigh down the finances of the municipality, making the further use of Suchy Las as a disposal site or the use of a disposal site outside of the city very difficult.

3) Background of SWM Facility Site

There are 25 previous and existing registered disposal sites operated after 1945 as shown in Fig.F.1.3-1. Before the operation of the Suchy Las disposal site, cavities or holes were used for garbage disposal. These former disposal sites are now utilized as parks, public ground and green areas.

Since all of the cavities in the cities have been filled up with wastes, there are no suitable sites left for disposal. The final disposal site has to bank waste on flat land. However, waste embankment restricts future land use measures, leaving waste to consume the entire space. The acquisition of permits for the use of such land in Poznan is very difficult as the citizens are strongly opposed to its recommended use.

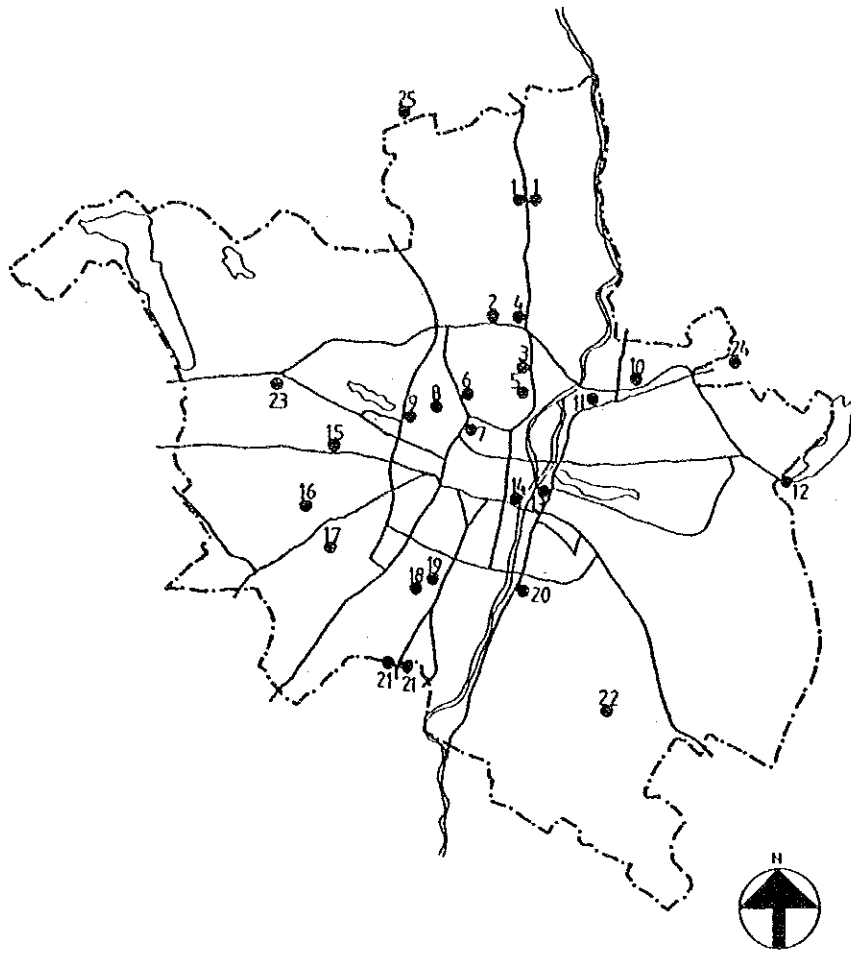


Fig.F.1.3-1 Location of Previous and Existing Disposal Sites in Poznan and its Vicinity

No.	Location	Area(ha)
1.	Umultowo I and II were used for 10 years, 1974-84	16.0
2.	Lechicka St. / Former Fortification No. V	7.5
3.	Naramowicka St. - Serbska St.	1.0
4.	Lechicka St. - Naramowicka St.	5.5
5.	Winogrody St. - Naramowicka St. Sports Field	5.0
6.	Obornicka St. - Słowianska St.	7.2
7.	Pułaskiego St. - Sports Ground AZS	5.2
8.	Al. Wielkopolska, Both banks of river Bogdanka	1.5
9.	Niestachowska St. near Park Solacki	6.5
10.	Bałtycka St. - Syrenia St.	2.0
11.	Smolna St.	6.5
12.	Boarder of Poznan and Swarzedz near road No. 2 (used for over 40 years) Near lake Swarzedzkie and Cybina River	6.0
13.	Piotrowo St. / Embankment of Warta River	2.7
14.	Left Bank of Warta River - Queen Jadwigi Bridge (fomer Marchlewskiego Bridge)	21.5
15.	Bukowska St. (former Swierczewskiego street) near the airport	3.0
16.	Wyszomirska St. - Marcelinski Forest	8.0
17.	Taczanowskiego St. - Smardzewska St.	1.2
18.	Zatorze	1.0
19.	Drużynowa St. and its surroundings	9.0
20.	Starolecka St.	1.0
21.	Opolska St. boarder of Lubon and on both sides of Garaszewo Street	5.2
22.	Garaszewo	4.5
23.	Sytkowo (Smochowice)	3.0
24.	Mechowo (near Bogucin) - landfill site for industrial waste of POMET, now Worker's gardens	15.0
25.	Suchy Las	12.94
		in 1991
	Total	157.94

F.1.4 Waste Collection

1) Present Waste Collection System

Waste collection services are carried out by the enterprises in accordance with the contract established between the customer and the enterprise. The enterprise independently collects waste collection fees from the customers according to the number of containers and the frequency of collection. The market for waste collection business is considered to be very competitive as its operation requires neither a license nor permit.

Contracting waste collection services became compulsory on the 1st of June 1992. Many of the householders, however, did not comply by declaring that they dispose of the wastes themselves.

The present service coverage and share condition are summarized in Fig. F.1.4-1.

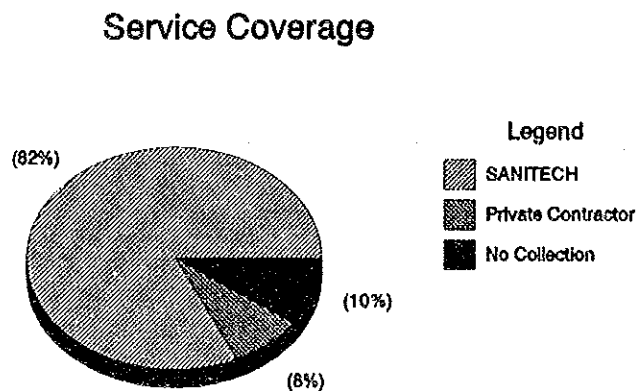


Fig.F.1.4-1 Present Condition of MSW Collection Service

SANITECH, which provides the biggest number of householders with municipal waste collection services, is not capable of catching up with the increasing amount of waste presently generated. Further, it is not capable of meeting the frequency for waste collection services stipulated in the contract, too. The majority of the customers, therefore, are dissatisfied and many of those from the detached and semi-detached housing areas are reconstructing their contracts to less frequent collection services to accommodate the incapacities of SANITECH. Due to dissatisfaction with the collection services and the exorbitant collection fees, more

and more people cancel their waste collection services contract. Accordingly, these intensified illegal dumping in Poznan.

2) Waste Amount

Since the shift to a market-oriented economy in 1989, it is believed that the amount of waste in Poznan has increased and still does, albeit the absence of reliable data. Formerly, people can only buy commodities with the coupons given to them by the government; in 1989, however, they became free to purchase any product in unlimited quantities. This change is considered to have led to drastic waste generation increase.

In spite of these, the administrative authorities have not taken any effective countermeasure. In fact, the number of waste collection trucks decreased within the past 5 years, as shown in Fig.F.1.4-2, resulting in the decrease in waste collection frequency. This also decreases the efficiency ratio of the waste collection services and haulage operation as well.

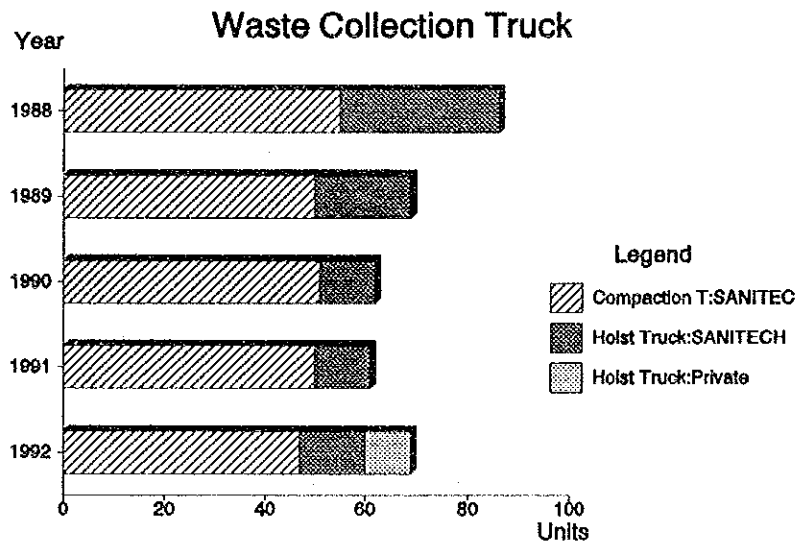


Fig.F.1.4-2 Number of Waste Collection Truck

F.1.5 Illegal Dumping

Illegal dumping is a very serious problem in Poznan City and is observed to have particularly increased since 1989. Few of the authorities such as the Provincial Environment Inspector, the Communal and Residential Affairs Department of the

Affairs Department of the Municipality, the municipal police established in 1990, started to give it special attention. It is difficult to point out the violators due to the absence of a supervising system.

With the cooperation of the municipal police, the Communal and Residential Affairs Department within the Municipality endeavors to reinstate the municipal lands affected by illegal dumping. If a violator is identified, however, he shall be obliged to reinstate the area, otherwise the contractor shall be ordered by the municipality to undertake it. The budget allocated for the reinstatement of lands has been increasing lately and is becoming a heavy burden to the municipal budget.

It is very difficult to locate the sites within the city of Poznan where illegal dumping takes place as their number has been observed to increase by the day. Fig.F.1.5-1 and Table F.1.5-1, which show the conditions of the illegal dumping sites, were prepared by combining the survey results of the JICA Study Team and the illegal dumping data given by the district branches of the Communal and Residential Affairs Department.

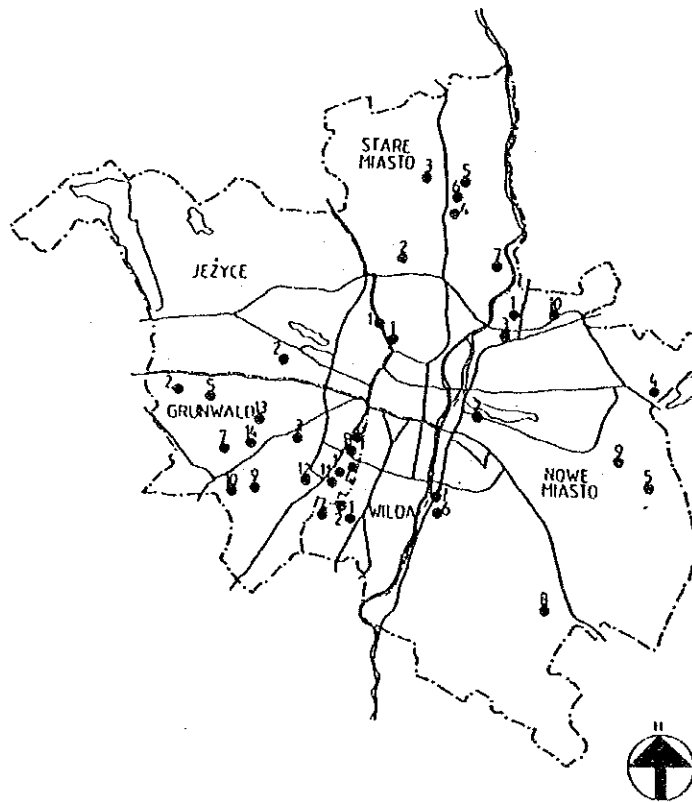


Fig.F.1.5-1 Location of Existing Illegal Dumping Sites

Table F.1.5-1 Present Illegal Dumping Site

No.	Location district-street	Surface sq.m	Removal pre- dicted cost zlotych	Remark
I.	GRUNWALD			
1.	Gorki St.	55	4,950,000	50% organic, 50% construction materials,
2.	Slawinska St.	1,150	9,430,000	contract ready
3.	Konfederacka St.	2,450	20,090,000	contract ready
4.	Dwatory St.	12,000	350,000,000	construction materials
5.	Bajkowe Quarter	4,500		constr. m. + earth 90%
6.	Chlodna St.			constr. m. + organic
7.	Cmentarna St.			constr. m.
8.	Dmowski St.			constr. m. + organic
9.	Junikowska St.			constr. m.
10.	Misnienska St.	4,336	5,000,000	constr. m.
11.	Krzywa St.	176	130,000,000	constr. m. 50% + organic 50%
12.	Weglowa St.	4,600	700,000,000	constr. m. + earth 80%
13.	Plasia St.	25,000	130,000,000	constr. m. 80% + organic
14.	Miczurina St.	4,600		constr. m. 80% + org. + earth
II.	NOWE MIASTO			
1.	Chemiczna St.	8,000		30% communal + constr. m. + earth
2.	Majakowski and Kurlandzka St.	20,000		concrete plates + earth + constr. m. 90%
3.	Smolna St.	10,000		30% communal
4.	Sarnia St.	20,000		50% communal + 50% constr. m., earth
5.	Darzynska St.	5,000		100% communal
6.	Ksiazeca St.	5,000	90,000,000	communal + machinery + motorcar body
7.	Starolecka St.	30,000	560,000,000	constr. m.
8.	Graszewo	4,000	70,000,000	constr. m. + industrial m.
9.	Kobylepole	500	140,000,000	constr. m. + communal
10.	Baltycka St.	80,000		constr. m. + industrial + communal
III.	JEZYCE			
1.	Obornicka St.	3,000	80,000,000	constr. m.
2.	5 Sycznia St.	10,000	150,000,000	constr. m.
IV.	WILDA			
1.	Opolska St.	4,000		now being removed
2.	Bohaterow Westerplatte, Przelecz and Krajewski St.	15,000		
V.	STARE MIASTO			
1.	Obornicka and Slowianska St.	12,000	333,000,000	contracted
2.	Umultowska, Sarmacka and Madziarska St.	8,000	224,000,000	poor houses area
3.	Umultowska and Zagajnikowa St.	10,000	280,000,000	constr. m.
4.	Bozydara St.	200		constr. m.
5.	Jarowa St.	200	5,600,000	constr. m.
6.	Kopcowa and Blonie St.	200	5,600,000	constr. m.
7.	Karpia St.	30,000	5,600,000	communal + industrial m.
	Total	333,967		

F.2 Waste Stream

F.2.1 Concept of Waste Stream

The waste stream in the Study area is drawn up based on the following surveys:

- WACS (Waste Amount and Composition Survey) in summer and winter;
- POS (Public Opinion Survey);
- disposal amount obtained at the Suchy Las landfill; and
- information on discharge amount obtained from PEC and sewage plants.

A concept of the waste stream is illustrated and shown in Fig.F.2.1-1. Solid waste generated in each generation source is classified into the three categories; i.e. recycled, discharged and self-disposed waste. The discharged waste is divided into waste collected by each collection service and waste illegally dumped.

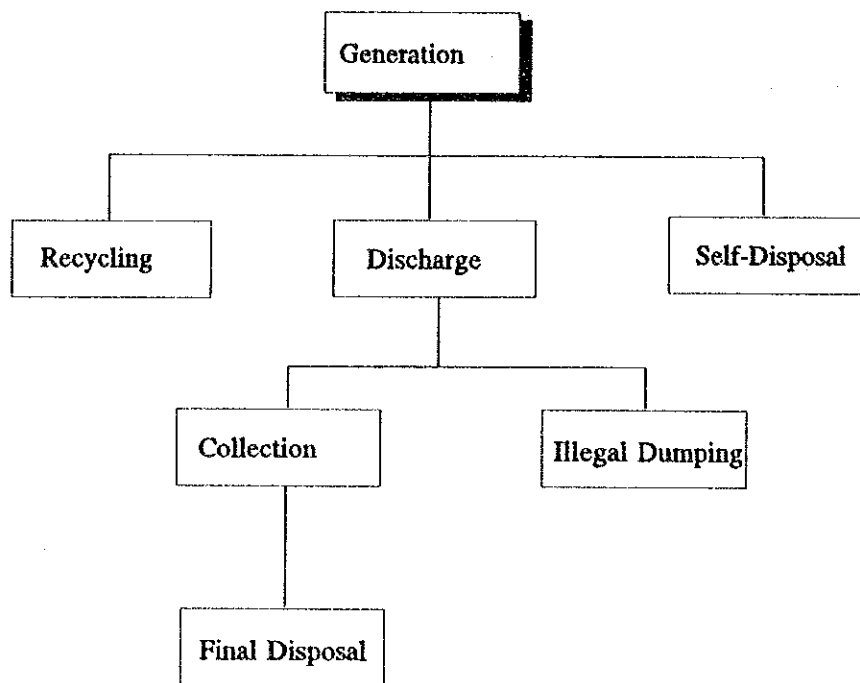


Fig.F.2.1-1 Concept of Waste Stream

F.2.2 Waste Stream

1) Classification of Waste

The following sorts of wastes are hauled to the disposal site at present.

a. MSW

- i. Household Waste
 - Household Waste (excluding ash)
 - Domestic Ash
- ii. Commercial waste
 - from catering shops
 - from other shops than catering
- iii. Market waste
- iv. Institutional waste (Office waste)
- v. Road sweeping waste
- vi. Bulky waste

b. Other wastes

- i. PEC ash
- ii. Sewage sludge
- iii. Others (construction waste, etc.)

2) Waste Stream

The discharge ratio of MSW without bulky wastes was calculated in the WACS and the total disposal amount was measured at SLL (Suchy Las landfill). The discharge ratio of bulky wastes was not surveyed but their total disposal amount was measured at SLL.

The amount of recyclable and self-disposed wastes is hard to determine and requires a lot of work. Although the waste stream could not be completed because of this, a draft was prepared as a reference for future studies and is shown in Fig.F.2.2-1.

Illegal dumping amount may be deduced as follows

$$\begin{aligned} \text{Illegal Dumping Amount} &= \text{Discharge Amount} - \text{Collected Amount} \\ &= 27.3 \text{ ton/day (ton/year)} \end{aligned}$$

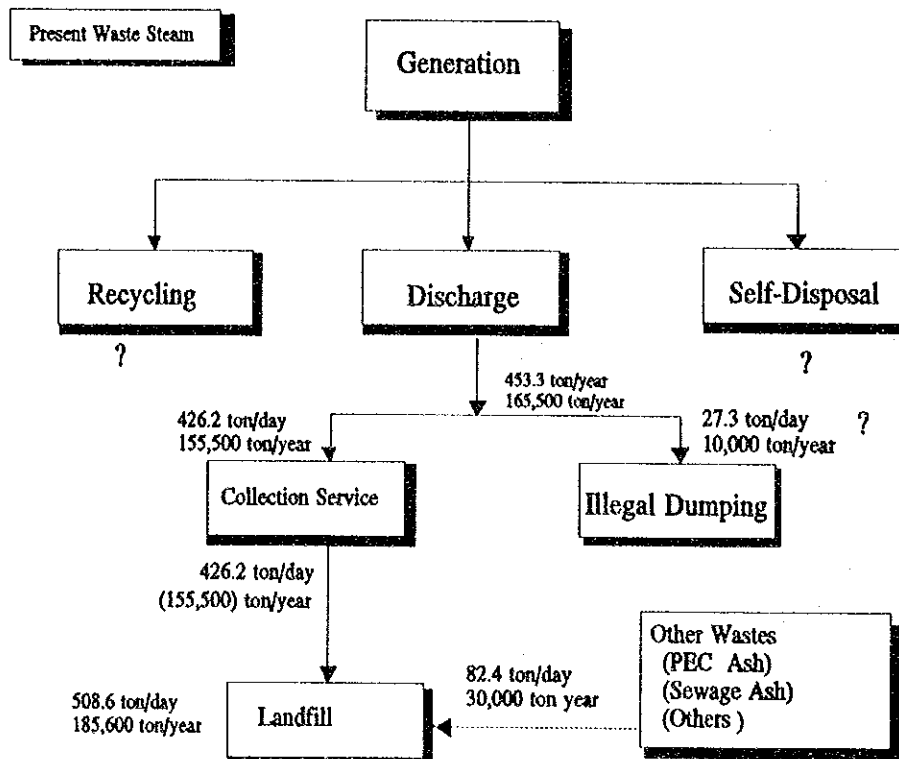


Fig.F.2.2-1 Present Waste Stream of MSW

F.3 Discharge, Storage, Collection and Haulage

F.3.1 Discharge

There are two discharge methods employed:

- carrying of waste to where the dustbin or communal containers are, or
- dropping of waste into a dust chute opening.

a. Dustbins and communal containers

This is the most common discharge method and the most problem free.

b. Dust chute

In buildings with more than 12 floors, the installation of dust chutes is required by the law. There are chutes made of asbestos -cement.

Chutes are often troublesome as the rough surface gets contaminated with waste and is difficult to clean or disinfect. They are frequently misused and become stuffed. Accordingly, the residents in apartment buildings stopped using dust chutes due to insanitary and clogging problems.

The population still employing dust chutes is estimated between 30 - 80,000.

F.3.2 Storage

There are three types of containers utilized in the study area: 110 litre dustbins, 1.1 m³ communal containers, and 6 to 10 m³ communal containers.

- Dustbins of 110 litre capacity (SM-110) are mechanically emptied into the compactor collection truck.
- Wheeled containers of 1.1 m³ capacity, called in "Bohr" (type PA-11), mechanically emptied into the compactor type collection trucks.
- Communal containers of 6 - 10 m³ capacity; full containers are exchanged by empty ones at the container locations with a hoist truck.

Those containers used are shown in Table F.3.2-1.

Table F.3.2-1 Situation of Container Use

	New building apartment area	Old building apartment area	Detached & Semi-detached area
110 l dustbin	not used	used	used
1.1 m ³ communal container	not used	mainly used	not used
6 - 10 m ³ communal container	used	not used	not used

The SM-110 type of dustbin generally used has a hinged lid and is made of steel. Plastic bins have been introduced, but are only suitable in areas where district heating is installed. At premises with solid fuel heating, hot ashes are likely to be put in the dustbin with resultant damage. The use of plastic bins, however, was considered to have the following advantages:

- less weight and easier handling
- more attractive appearance
- easier to clean
- quieter in the emptying operation

The PA-11 wheeled containers used are made of steel. These containers are placed in residential areas constructed with high rise apartment buildings and also in some commercial areas. These containers are difficult to maintain; the wheels in some cases do not stand up to rough usage, and lids of most containers are found to be missing.

Large communal containers are used extensively in suburban areas where large quantities of waste are generated. They are used in shopping areas and markets, too. The following are some of the difficulties experienced in the use of these containers:

- waste freezing on to the side wall of the container in winter
- closed containers with loading apertures too high for convenient use

F.3.3 Collection and Haulage

1) Collection Frequency

In areas where large communal containers are used, the frequency of collection depends on the quantity of waste to be collected and its location. Most apartment blocks receive once or twice a week collection, a frequency considered to be most common in the area.

In areas where compactor trucks are used, collection frequency depends on the capacity of the collection trucks, as there are no spares. Collection of waste from individual houses is commonly conducted once or more than once a week. In spite of the fact that the contract stipulated a particular frequency, collection is not conducted periodically due to poor collection and haulage capacity. In fact the number of collection trucks owned by SANITECH has decreased since 1988, as shown in Table F.3.3-1. Although private contractors have been supplementing hoist trucks, no institution or agency seem to be doing so with regard to compactor trucks. With this problem, waste collection and haulage is becoming more ineffective.

Table F.3.3-1 Number of Collection Trucks owned by SANITECH

Year	Compaction Truck (unit)	Hoist Truck (unit)
1988	55	31
1989	50	19
1990	51	11
1991	50	11
1992	47	13

2) Collection Truck

Compactor trucks and communal containers are generally used. The two standard types of collection trucks used are:

- rear-loading plate compactor
- rear-loading rotating type (KUKA design)

Collection trucks with compaction bodies are produced by two manufacturers; by Wroclaw in Poland and Presko and by Wuko in Lodz. Trucks for moving bulky containers are also manufactured by them. The rear loading rotating KUKA trucks are made in Czechoslovakia.

The capacity of these trucks ranges from 12 m³ to 16 m³ and their loading capacity is 6 to 8 tonnes. For the transportation of large containers, on the other hand, hook-lift type of trucks are extensively used.

3) Operation Method

Trucks for loading dustbins and containers, carrying a team of 3 or 4 people (including the driver) are expected to make 2 trips a day. The sub-contractor of SANITECH often makes 3 trips a day but for 10 – 12 hours. The average time to complete a collection route is 3 – 4 hours, and it also depends on the type of property served, the kinds of dustbin and containers, and general traffic conditions. The collection services are expected to cover a distance between 30 and 50 km per round trip, occasionally exceeding 70 km.

In some of the old building areas, guardians are assigned to carry the containers beside the road before the arrival of the collection truck. The collectors then empty the containers and return them to the yard, and this part of the work is difficult and eats a lot of time, because the access to the yard is quite narrow.

F.4 Road Sweeping and Public Area Cleansing

The roads are generally observed to be kept clean and tidy. Since April of 1992, the administration has introduced a tender system for the selection of road cleaning contractors to curtail expenditures. This system is now observed to be working considerably well and hence should be continued in future.

F.4.1 Road Sweeping

1) Responsible Organization

Roads are classified into 3 categories, namely state road, provincial road, and municipal road, according to budget source. The responsible governmental bodies are shown in Table F.4.1-1.

The majority of the municipal roads is maintained by SANITECH except for a few which is maintained by a small enterprise.

Table F.4.1-1 Implementation Organization

Category of Road	Quantity	Source of Budget	Executing Agency	Contractor
State Road	683,734 m ² (49 km)	Central Government	Provincial Authority for Road in the City	-SANITECH
Provincial Road	2,124,616 m ² (221.9 km)			-Lekan -HUBERTUS -DROMO -Square and Road Cleaning Enterprise
Municipal Road	(707.1 km)	Municipality	Communal & Residential Affairs Dept. Municipality	-SANITECH
				-Private Company

2) State Road and Provincial Road

The Provincial Authority on City Roads, a government-owned provincial, is entrusted with the road sweeping works for state and provincial roads, except for state road No.2 which connects Berlin and Warsaw, within the city of Poznan.

The actual road sweeping work was monopolized by SANITECH until 1991 under the Authority on Roads in the City. The Authority on Roads in the City introduced the tender system in April 1992 to maintain the present road sweeping services within a very limited budget.

The implementation of the tender system reduced the hold of SANITECH to 80%. Aside from SANITECH, there are 4 private companies presently under contract with the Authority on Roads in the City for road sweeping work.

The present road sweeping work condition by contractor is shown in Fig.F.4.1-1.

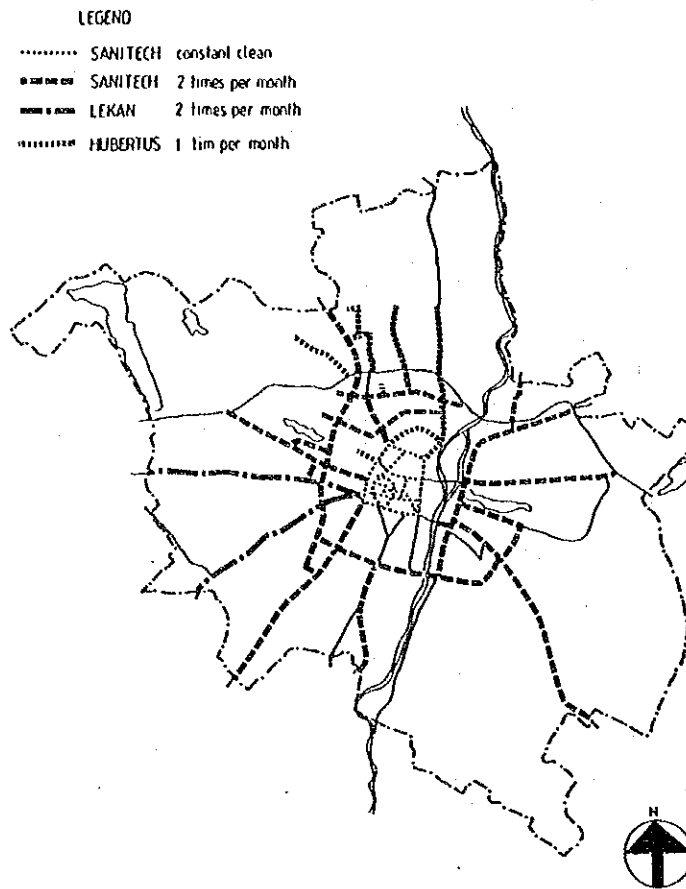


Fig.F.4.1-1 Present Assignment of Road Sweeping Work

c. Municipal Road

The sweeping work of municipal road is executed under the Communal and Residential Affairs Department of Municipality. As a result of the tender, Sanitech takes charge of the most roads except a few roads in Nowe Miasto and Stare Miasto. Those few roads are cleaned manually by the small private company.

d. The Provincial Authority of Road in the City

The scope of services of the Provincial Authority of Road in the City are construction, maintenance and road sweeping for state and provincial roads. The basic information are as follows;

Length of roads:

total	: 978.0 km
municipal	: 707.1 km
provincial	: 221.9 km
state	: 49.0 km

- . Length of roads with hardened surface: 703 km
- . Length of roads with soft surface : 275 km
- . Number of bridges : 11 pcs.
- . Number of railroad flyover bridges : 32 pcs.
- . Number of bridges and railroad bridges
 - total : 43 pcs.
 - municipal : 7 pcs.
 - provincial : 25 pcs.
 - state : 11 pcs.
- . Bridges for pedestrians
 - total : 10 pcs.
 - municipal : 3 pcs.
 - provincial : 6 pcs.
 - state : 1 pc.
- . Underground passages and tunnels
 - total : 25 pcs.
 - municipal : 1 pc.
 - provincial : 19 pcs.
 - state : 5 pcs.

F.4.2 Public Area Cleansing

The cleaning services for public areas are divided into 3: forest area cleaning services, park and green area cleaning services, and the collection of trash boxes in town. These works are respectively carried out by the agencies shown in Table F.4.2-1.

Table F.4.2-1 Assignment of Work

Category of Work	Executing Body
Forest Area Cleansing	Forest Authority
Park and Green Area Cleansing	Green Areas Authority
Waste Collection of Trash Boxes	HUBERUTUS (Private company)

The Municipal Green Area Authority covered the forest areas until February 1990. The Municipal Forest Authority established in 1990 took over thereafter. There is no concrete specification as to the distinction of forest and green areas.

1) Park and Green Area

The Municipal Green Area Authority, which is under the Communal and Residential Affairs Department, is in charge of cleaning the parks and green areas.

There are 4 work stations in Poznan City which are also utilized as transfer stations. They are in Cytadla, Niestachow, Komandoria Street, and Ogr. dzialk.

The cut grasses and wastes collected from the parks and green areas are first stored in these transfer stations. These wastes are occasionally transported to the Suchy Las Disposal Site. It is only in autumn when grasses and leaves are gathered in the natural composting yard of 2.5 ha at Albanska St. in Grunwald. The compost is not put up for sale.

The general information concerning the business of the Green Authority is as follows:

. Total area serviced	: 908 ha
- Intensive care	: 482.1 ha
- Non-intensive care	: 436.1 ha
. Total number of parks	: 34 parks
. Total area of parks	: 320 ha
. Total number of fountains	: 9 places
. Military Cemetery	: 11 places
. Municipal open ditches	: 14 places 26,575 m
. Total number of employees	: 182 persons
- workers	: 137 persons
- non-workers	: 55 persons
- management	: 33 persons
. Equipment owned :	
- Tractor	: 8 nos.
- Truck	: 2 nos.
- Delivery truck	: 6 nos.
- Large grass mower	: 5 nos.
- Small grass mower	: 20 nos.
- Mini tractor	: 6 nos.
- Forklift	: 1 nos.
. Number of sub-contractor	: 14 companies

2) Trash Boxes Collection

The collection of trash boxes is divided into two. The collection of trash boxes in tramcar stations or bus stations, and collection of trash boxes along the roads.

a. Trash Boxes in Tramcar or Bus Stations

Collection is carried out by the Municipal Transportation company. A private company called "HUBERUTUS" is actually under contract for this work, and 1,200 trash boxes are placed in the stations.

b. Trash Boxes along Roads

Collection was conducted by SANITECH until the end of 1991. HUBERUTUS took over and is monopolizing the work at present. The Communal and Residential Affairs Department finances the work.

2,107 trash boxes are placed along roads and squares. Ordinarily, the work would involve a small truck with a driver and two workers, and two workers following the truck on foot to empty the trash boxes.

c. Problems

- . Waste is easily scattered by wind because the trash box is wide open and very shallow.
- . Since the trash boxes are moveable, they are often stolen.

F.5 Processing and Final Disposal

The municipality of Poznan has only one disposal site, the Suchy Las Disposal Site located outside of the city. Furthermore, the municipality has no processing facilities except for the few incinerators installed in hospitals. In addition to this, Suchy Las will be closed down at the end of 1993 because it is located outside the city boundary and because the areal residents are opposed to the ongoing operation.

F.5.1 Processing

1) Incineration plant

The incineration plant in Poznan City was operated for 26 years, from 1928 to 1954, using coal as auxiliary fuel. At present, however, the municipality is without an incineration plant, except for those installed in hospitals.

2) Others

- There are no modern composting plants in Poznan.
- A private company called LEWAR presses wastes in the containers with a back hoe to save dumping fees
- A private recycling company called SURMET owns paper compaction machines

3) Technical Level

Boiler and heat delivery technology has accumulated in Poznan since heat distribution has been historically developed. Although there are no incineration plants, highly advanced technology from neighbouring countries like Germany, Switzerland, and Italy, can be introduced.

F.5.2 Final Disposal

The existing final disposal site is located in Suchy Las at the area belonging to the military and has been rented by the municipality since 1984. The outline of the disposal site is as follows:

1) Outline of Suchy Las Disposal Site

- Whole area : 12.7 ha
- Operation hour : 24 hours (Except Sunday)
- Landfill Method : controlled tipping
- Height of landfill : more than 15 m
- Seepage control work : not practised (except for natural clay under the ground)
- Cover material : excavated soil and others
- Waste being disposed
 - . municipal solid waste (households, office, etc.)
 - . bulky waste (refrigerator, washing machine, furniture, etc.)
 - . sludge
 - . coal ash from heat supply company
 - . construction waste
 - . part of hospital waste
 - . industrial solid waste (moulding-core sand, etc.)
- Leachate scarcely seepage due to little precipitation, 400 to 500 mm/year.

2) Others

The amount of bulky wastes is comparatively large. After they are stored at the disposal site for some time, recyclable ones are utilized by SURMET or the scavengers.

F.5.3 Illegal Dumping

Illegal dumping is a very serious problem in Poznan City and is observed to have particularly increased since 1989. Few of the authorities such as the Provincial Environment Inspector, the Communal and Residential Affairs Department of the Municipality, the municipal police established in 1990, started to give it special

attention. It is difficult to point out the violators due to the absence of a supervising system.

With the cooperation of the municipal police, the Communal and Residential Affairs Department within the Municipality endeavors to reinstate the municipal lands affected by illegal dumping. If a violator is identified, however, he shall be obliged to reinstate the area, otherwise the contractor shall be ordered by the municipality to undertake it. The budget allocated for the reinstatement of lands has been increasing lately and is becoming a heavy burden to the municipality's finances.

It is too difficult to understand all existing illegal dumping sites locating within Poznan City, because they are too many and increasing day by day. Fig.8.4-1 and Table F.5.3-1 showing the situation of illegal dumping sites are prepared by combining the survey result of the JICA Study Team and the illegal dumping data given by the district branches of the Communal and Residential Affairs Department.

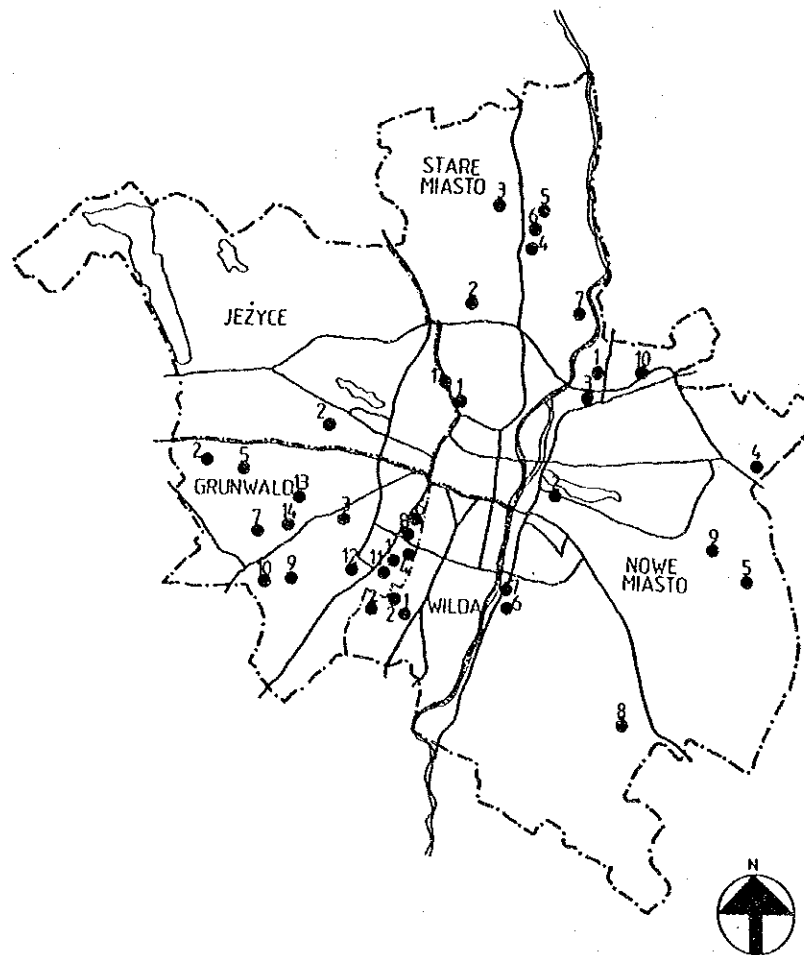


Fig.F.5.3-1 Location of Existing Illegal Dumping Sites

Table F.5.3-1 Present Illegal Dumping Site

No.	Location district-street	Surface	Removal predicted cost	Remark
GRUNWALD				
1.	Gorki St.	55m ²	4.950.000	50% organic, 50% construction materials, contract ready
2.	Slawinska St.	1.150m ²	9.430.000	contract ready
3.	Konfederacka St.	2.450m ²	20.090.000	contract ready
4.	Dwatory St.	12.000m ²	350.000.000	construction materials
5.	Bajkowe Quarter	4.500m ²		constr. m. + earth 90%
6.	Chlodna St.			constr. m. + organic
7.	Cmentarna St.			constr. m.
8.	Dnowski St.			constr. m. + organic
9.	Junikowska St.			constr. m.
10.	Wisnienska St.	4.336m ²		constr. m.
11.	Krzywa St.	176m ²	5.000.000	constr. m. 50% + organic 50%
12.	Weglowa St.	4.600m ²	130.000.000	constr. m. + earth 80%
13.	Ptasia St.	25.000m ²	700.000.000	constr. m. 80% + organic
14.	Niczurina St.	4.600m ²	130.000.000	constr. m. 80% + org. + earth
NOTE MIASTO				
1.	Chemiczna St.	0.8 ha		Contracted:
2.	Majakowski and Kurlandzka St.	2.0 ha		30% communal + constr. m. + earth
3.	Szolna St.	1.0 ha		concrete plates + earth + constr. m. 90%
4.	Sarnia St.	2.0 ha		30% communal
5.	Darzynska St.	0.5 ha		50% communal + 50% constr. m., earth
15.	Ksiazeca St.	5.000m ²	90.000.000	100% communal
16.	Starolecka St.	30.000m ²	560.000.000	communal + machinery + motorcar body
17.	Graszewo	4.000m ²	70.000.000	constr. m.
18.	Kobylepole	500m ²	140.000.000	constr. m. + industrial m.
19.	Baltycka St.	30.000m ²		constr. m. + communal
JEZYCE				
111	Obornicka St.	0.3 ha	75-80.000.000	constr. m.
1.	5 Stycznia St.	1.0 ha	150.000.000	constr. m.
2.				
WILDA				
IV.	Opolska St.	0.4 ha		now being removed
1.	Bohaterow Westerplatte.			
2.	Przelec and Krajewski St.	1.5 ha		
STARE MIASTO				
1.	Obornicka and Slowianska St.	1.2 ha	333.000.000	contracted
2.	Uultowska, Sarmacka and Madziarska St.	0.8 ha	224.000.000	poor houses area
3.	Uultowska and Zagajnikowa St.	1.0	280.000.000	constr. m.
4.	Bozydara St.	0.02 ha	5.600.000	constr. m.
5.	Jarowa St.	0.02 ha	5.600.000	constr. m.
6.	Kopcowa and Blonie St.	0.02 ha	5.600.000	constr. m.
7.	Karpia St.	30.000m ²		communal + industrial m.

F.6 Recycling

F.6.1 Recycling

Poznan used to have two recycling companies, namely the Surmet Cooperative and the S & W. Due to difficult financial situations, however, S & W was liquidated in January 1992, leaving only Surmet Cooperative as the sole recycling company in the city.

1) Surmet

Surmet was established as a labour cooperative in 1956, it is, therefore, exempt from asset tax. Surmet has 70 employees and occupies the biggest market share. It recycles bottles, paper, steel, metal, fabric and glass.

a. Bottle

Surmet has its direct shops in the town which buy empty bottles from the citizens. These shops are very popular and visited by many citizens, however, the density of shops seems to be low to collect the maximum number of bottles. The bottles collected are carried to the producer for reuse. This is based on the deposit system.

b. Paper, Steel, Metal and Fabric

There are several collecting stations which buy these products from the citizens. Surmet buys them from the citizens and sells to the factory as resource.

In addition, Surmet places large containers of 14 to 15 m³ capacity to collect these products in factories.

c. Glass

Surmet has 250 containers to collect glass in the town. There are 3 types of containers : 1.5 m³, 2.0 m³ and 2.5 m³. Those containers are collected with only one transportation vehicle. The containers are divided into 2 categories, one for transparent glass and the other for coloured glass. This is distinguished by the difference of the container colour.

d. Others

Moreover, Surmet runs a waste collection centre in the Suchy Las disposal site to buy reusable products from scavengers.

2) S & W

S & W was the state recycling company which operated in 6 provinces including Poznan. Since it was a state company, it was not exempt from asset tax, and the termination of flow of subsidies led to its liquidation.

F.6.2 Market for Reusable Materials

1) Recycled Quantity

The quantity of material recycled in 1991 is shown in Table F.6.2-1

Table F.6.2-1 Quantity of Waste Recycled in Poznan

Items	unit	Surmet	S & W	Total
Bottle	ton	1,431	---	1,431
Paper	ton	7,829	1,914	9,743
Steel	ton	23,315	---	23,315
Metal	ton	1,683	---	1,683
Fabric	ton	66	160	226
Glass	ton	277	192	469
Plastic	ton	---	53	53
Rubber	ton	---	4	4

2) Price of Reusable Material

The price of reusable materials has fluctuated and the present average price recycling companies use when purchasing from the people are shown in Table F.6.2-2.

Table F.6.2-2 Price of Reusable Material

Item	unit	Price
Paper in mixed	zl/kg	350
Cardboard	zl/kg	450
Newspaper	zl/kg	500
Bottle	zl/pc	600
Non-ferrous metal	zl/ton	207,000
Ferrous metal	zl/ton	4,435,000
Fabric	zl/ton	100,000
Glass	zl/ton	50,000

F.6.3 Scavenging

According to the scavenger survey, only an average number of around 20 scavengers work in Suchy Las disposal site. It is also concluded that there are only few scavengers in the city and that only a small amount of recyclable wastes are recovered through scavenging.

F.7 Equipment

F.7.1 Equipment

1) Equipment owned by SANITECH

SANITECH has two work stations: the headquarters and the main motorpool in Gorecka Street and the old motorpool with workshop in Niepoleglosci Street. Approximately 90 % of equipment are installed in the motorpool in Gorecka Street. Some of these equipment are shown in Tables F.7.1-1 to 4 (refer to Annex F for details).

Table F.7.1-1 Number of Container

Type	Capacity	Numbers
Large Communal Container	7 m ³	216
	8 m ³	250
	10 m ³	239
Communal Container "Bohr"	1.1 m ³	5,515
Dustbin	110 l	34,678

Table F.7.1-2 Compaction Type Truck

No.	Type	Production year	Numbers	Capacity (m ³)
1	SKODA BOBR	1980	1	11.5
2		1983	4	11.5
3		1984	2	11.5
4	JELCZ 325 JPH	1984	1	14.0
5	JELCZ 325 SM93	1982	3	13.5
6	JELCZ 325 SM 94	1984	2	13.5
7		1985	2	13.5
8		1986	3	13.5
9	LIAZ BOBR 16.2	1986	2	16.0
10		1987	6	16.0
11		1988	6	16.0

12	LIAZ BOBR 12.1	1987	2	12.0
13	LIAZ SM 100	1987	2	13.5
14		1988	3	13.5
15		1989	8	13.5
Total			47	

Table F.7.1-3 Hoist Truck

No.	Type	Production year	Numbers	Capacity (m ³)
1	STAR 28 SMW 1	1976	1	
2	STAR 28 SMW 10	1986	2	
3	STAR 28 SMW 10	1987	5	
4	STAR 28 SMW 10	1989	2	
5	STAR 200 SMW 226	1982	1	
6	STAR 28 SMW 28	1983	1	
7	STAR 28 SMW 28	1988	1	
Total			13	

Table F.7.1-4 Road Sweeper

No.	Type	Production year	Numbers	Capacity (m ³)
1	STAR 28 ZM-7	1982	1	3.6
2		1985	2	3.6
3		1986	2	3.6
4		1987	2	3.6
5		1988	2	3.6
6		1989	2	3.6
Total			11	

Table F.7.1-5 Water Sprinkle Tanker

No.	Type	Production year	Numbers	Capacity (m ³)
1	SKODA 706 AKV	1972	1	7.0
2		1974	1	7.0
3		1976	2	7.0
4		1979	1	7.0
5		1983	2	7.0
6	LIAZ SA8	1986	2	8.0
7		1988	3	8.0
Total			12	

Table F.7.1-6 Spreading and Compaction Equipment in Disposal Site

No.	Type	Production year	Numbers	Capacity (m ³)
1	BULLDOZER SM100M	1966	1	
2		1968	1	

Table F.7.1-7 List of Night-Soil Collection Vehicle

No.	Type	Production year	Numbers	Capacity (m ³)
1	JELCZ 325 SK 82	1984	5	7.2
2		1987	1	7.2
3		1988	1	7.2
4	JELCZ 325 SK 81	1989	2	7.2
5	STAR 28 SK 45	1989	5	4.5
Total			14	

Table 4.7.1-8 Sand Sprayer

No.	Type	Production year	Numbers	Capacity (m ³)
1	ZIL D-470	1971	1	---
2		1982	1	---
3	SKODA PS-7	1969	1	7
4		1971	2	7
5		1974	2	7
6		1975	1	7
7		1977	1	7
8		1978	1	7
9		1979	1	7
10		1980	3	7
11		1981	2	7
12		1982	2	7
13		SKODA PS-72	1974	3
14	1976		1	7
15	1972		1	7
16	JELCZ PS-82	1983	2	8
17		1984	1	8
18		1985	2	8
19		1987	1	8
20		1988	4	8
Total			33	

2) LEWAR

LEWAR has its main office in Umultowo along with its workshop and motorpool. The company also leases construction machinery, while the equipment used in waste collection are as stated hereunder:

- . Hoist truck : 6 units.
- . Large container 10 m³ : 2 units.
- . Large container 8 m³ : 250 units.

3) TECH-KOM

TECH-KOM has its office in Suchy Las village and the equipment it owns are:

- . Hoist truck : 3 units.
- . Large container 8 m³ : 100 units.

4) Surmet

Surmet has its main office in Druzynowa street and has several work stations in town. Equipment used to collect bottles are:

- . Tipper with telescopic crane : 1 units.
- . Container 1, 1.5, 2 m³ : 250 units.

F.7.2 Operation and Maintenance

This section only describes the operation and maintenance conditions of SANITE-CH.

1) Operation

The life span of compactor trucks is usually 7 years. Although the compactor truck of SANITECH is quite old at 6 years old (1992), its operation ratio is quite high at approximately 80%.

Maintenance is considered to be satisfactory excluded as most of the equipment are kept clean and all trucks are washed daily after use.

2) Maintenance

Before starting an engine, a driver make inspection for the vehicle and again all vehicle are taken the daily check before departing the motorpool. The special supervisor check every vehicle one by one. After returning the motorpool, the vehicle are filled up with fuel and checked and washed with water. This self maintenance work is being operated daily.

SANITECH has 20 mechanics, a number that quite exceeds the total number of trucks available. The high operation ratio observed can only be attributed to the satisfactory execution of maintenance work.

On the other hand, purchasing new equipment would be cheaper than using old ones due to exorbitant repair costs.

F.8 Guidelines on MSWM

With regard to the technical guideline and some programmes for solid waste management, the followings were identified by the Study Team;

- a. Principles of Designing Waste Sites, Ministry of Administration, Spacial Economy and Environmental Protection, January 1979;
- b. Synthesis of the Draft Programme of Municipal Waste Utilization by 2000, Ministry of Spacial Economy and Construction, February 1990;
- c. Draft Programme of Municipal Waste Utilization till the year 2000, Ministry of Spacial Economy and Construction, December 1989.

F.8.1 Principles of Designing Waste Site

The "Principles of Designing Waste Site" was prepared by the Ministry of Administration, Spacial Economy and Environmental Protection in January 1979, on the basis of research works by the Institute of Municipal Economy and experience of a group of specialists, who had presented their concepts and opinions during the symposium "Waste Neutralization in Dumping Grounds" on June 25 - 27 1973.

The principles for design are the followings:

1) Criteria for the choice of Disposal Site

- a. Disposal site should not be located, in the direction of underground water run-off and in the area where the surface of groundwater is less than 2 meters below the ground surface.
- b. Stratum of the area should be thick enough and not be permeable.

- c. In case of thin and permeable stratum, clay (thicker than 50 cm) or polyethylene sheet should be prepared.
- d. Band trenches should be built around the disposal site and concrete collectors for rain water should be prepared in the site, in case that the site might be located in a valley, a canyon or a cave, through which the surface water runs off.

2) Method to decide the size of Disposal Site

In order to decide the necessary area for disposal site, the following formula is useful.

$$P = \frac{V \times T}{H \times K_2} \times K_c \times 10^{-4}$$

P: area for disposal site (ha)

V: yearly waste volume (m³/year)

T: operation period (years)

H: height of embankment (m)

K₂: index of waste condensing in the disposal site (refer to figure)

K_c: the index of area for green belt, service road, etc. (1,5 – 2,0)

3) Design of Sanitary Landfill Site

The scope of technical documentation for sanitary landfill site should include:

- a. existing data
 - physiographic conditions, especially hydrogeologic and local climate condition,
 - the way of using and developing the environ area
 - present land use,
 - the amount and composition of waste (present & future),
 - land use plan after operation
- b. collection area
 - number of inhabitants,
 - kind of buildings,
 - kinds of industries,
 - number of employed people,

- sanitary installations.
- c. characteristics of waste
 - approximated physico-chemical composition of wastes (present and predicted),
 - the amount of wastes generated in a year (present and predicted),
- d. equipment
 - for raking waste dumped in the waste site,
 - for kneading or comminuting the waste,
 - for covering the waste with soil
 - for weighing collection vehicles
 - for disinfecting wheels of collection vehicles
 - telecommunication measures
 - for fire-fighting
 - for disinfecting the buildings in the site area.
- e. personnel
 - supervisor and workers
- f. plan (on the map of 1:1000 or 1:1500)
 - borders of the disposal site,
 - permanent buildings (administration, garages, fuel store, etc.)
 - service roads
 - electric network scheme
 - water supply
 - sewage disposal
 - possible dehydration of the disposal site
 - fence and green belts
 - protective zone
- g. operation programme taking the future land use into account
- h. economic analysis and cost estimation

4) Rules of Disposing waste

An appropriate operation of disposal site should be executed in accordance with the below-listed rules:

- a. The quality and quantity of waste should be controlled by a person in charge of disposal.
- b. Every layer of solid waste should be 50 – 70 cm thick and cover material about 15 cm.
- c. Final cover should be 50 – 100 cm thick.
- d. Earth, sand, debris, ash, cinder etc. should be used as medial cover material. However, earth and sand should be used as final cover material.
- e. Solid waste should be covered on the some day when it is dumped.
- f. No cracks nor hollows on the surface of final covering material over the waste should appear because rain water permeates.
- g. The surface of covering material should be made with a slight slope in one direction.
- h. Drain Pipes for gas should be equipped.
- i. Traffic routes for collection vehicles inside the disposal site should be indicated clearly against danger.
- j. Internal roads, ensuring proper traffic inside the disposal site, should be well maintained.
- k. A sanitary disposal site should be managed by qualified workers during the whole working day. The hours of working should be specified and written on the information plaque at the entrance gate.
- l. After the working hours, the disposal site should be closed so that no unauthorized people can enter it. The disposal site should be taken care of 24 hours a day.
- m. People working at the disposal site should have constant medical care.

- n. The work at the disposal site, should not be done without special clothes. After the work, the clothes should be preserved and disinfected according to principles of safety and hygiene of work.
- o. The prohibition of waste combustion should be obeyed. In the case of a spontaneous combustion appearance, the fire should be stopped with fire-fighting equipment at once.
- p. Refuse which can be hauled in disposal site:
 - household waste and waste of a similar type from enterprises
 - slag from boiler, ash,
 - debris from building sites,
 - large-size waste like furniture, mattresses, washing machines, paperboard packages etc.
 - dehydrated sludge,
 - agricultural waste (from land cultivation).

F.8.2 Synthesis of the Draft Programme of Municipal Waste Utilization by 2000

The programme was prepared by Ministry of Spatial Economy and Construction in February 1990. This programme are the followings:

- a. The whole waste amount in Poland will rise from 46 mill m³ in 1988 to 70 mill m³ in 2000 and continue to grow after the year 2000.
- b. Yearly supplies of containers should reach the following levels in Poland:

volume of container	number
110 l	500,000
1,100 l	150,000
800 l	150,000
5 - 7 m ³	20,000
2,200 l	4,000

The cost for them will amount to 13 billion zł.

- c. It is important to give up using dust chutes in the building since they are not sanitary and makes the solid waste management very difficult.

- d. 8 thousand collection vehicles will be required in 2000 and 1 thousand vehicles should be supplied yearly although only 300 vehicles are supplied at present. The cost for 1 thousand vehicles are 70 – 100 billion zl.
- e. It is very hard to find some disposal sites inside and even outside city. Transfer station system would be feasible wherever the distance from a collection area to a disposal site is longer than 25 – 30 km.
- f. Removal of bulky waste should be taken into account in the coming years.
- g. It is estimated that a reduction of the waste amount would be obtained by about 15% through of secondary raw materials recycling.
- h. Recycling would be suitable for environmental protection by using or neutralizing special waste like toxic waste.
- i. it is predicted that the cost for construction of new fully equipped disposal sites in 1990 – 2000 will amount to:
 $250 \text{ sites} \times 1,5 \text{ bil} = 375 \text{ bil zl.}$
- j. Present Polish experience shows advantages of composting as a method of neutralizing waste. Cities of over 50 thousand inhabitants should introduce the composting system.
- k. The low heating value of municipal waste in Poland crosses out the effectiveness of incineration system. However, it would not be useless to research and study of incineration plant of the future.
- l. A summary of cost up to 2000 spent on development of solid waste management are presented below.

	number	cost (bil zl)
containers	6,740,000	130
collection vehicles	10,000	700
transfer station	10	10
disposal sites	250	375
composting plants	50	200
total		1,415

- m. Implementation of this programme should be done with state subsidies or environment protection funds.
- n. Regarding recycling of secondary materials out of waste and composting system self-governing enterprises should aim at meeting the needs of people, not at being profitable.
- o. It will be the duty of municipalities to decide whether they choose the indicated way in this programme or not.

F.9 Administration

F.9.1 National Level

A number of ministries are directly and indirectly involved in MSWM in Poland. The laws they enact mainly revolve on environmental views, although financial, managerial and the privatization aspects impact MSWM, too.

The ministries most involved in MSWM are:

- Ministry of Environmental Protection, Natural Resources and Forestry.
- Ministry of Physical Planning and Construction.
- Ministry of Health and Social Assistance.

The Ministry of Environmental Protection, Natural Resources and Forestry is responsible for formulation of environmental policies and strategies, preparation of legislation and guidelines, and monitoring and control works for to the protection of the natural environment.

The Ministry of Physical Planning and Construction is responsible for enacting laws related to municipal management, and the Ministry of Health and Social Assistance is responsible for the effects of MSWM on human health.

In addition to the three mentioned ministries, Ministry of Industry and Trade should be mentioned for initiation of the development of industries manufacturing equipment for waste management and utilization of secondary materials.

F.9.2 Provincial Level

The Provincial Government (Voivodeship) is the central figure in the Polish administrative system as executive body of the central Government.

1) The Department for Environmental Protection

The Department for Environmental Protection in the Provincial Government checks the observance of environmental protection regulations and prepares plans and programmes for environmental protection, including investment plans and environmental programmes enforcing the national policy at the provincial level.

Furthermore, the department is involved in the localization of waste facilities, the issuance of permits to industries for the pollution of the environment, and the decision and collection of pollution charges from industries.

Other duties of the department are:

- Decisions about charges for use of the environment.
- Collection of charges for use of the environment.
- Activities related to proper management of natural resources.
- Issue of statements concerning plans for change in the utilization of land.
- Issue of statements concerning planned disposal sites.

The charges for use of the environment are collected by the Department for Environmental Protection based on declarations from the industries.

The Provincial Chief Geologist has a central role in approval of location of disposal sites and waste utilities.

2) The Fund for Environmental Protection and Water Management

The above mentioned pollution charges and penalties for violation of regulations are directed to the Fund for Environmental Protection and Water Management. The Funds are divided into national and regional (provincial) categories and administered by the Department for Environmental Protection in the Provincial Government.

Generally, 60% of the Provincial Fund for Environmental Protection is appropriated to municipalities for local projects (the appropriated amount may cover 50% of the project investment).

The remaining 40% is transferred to the National Fund and although it may be used to support local projects, it is mainly used to support special investments, the realization of ecological education programmes and implementation of complex research.

The Provincial Fund collects and coordinates the applications to both funds. The Provincial Fund participates in the selection of projects to be supported by the National Fund, while decisions concerning use of the Provincial Fund are taken by the Provincial Government. The contribution from the fund may be up to 50% of the investment.

There are several criteria to be fulfilled to achieve support to a project. The effect (in reduction) of pollution of the environment is the main criterium, but also the time is an important criterium with respect to achieve immediate results. The decision to contribute to a project is based on the project's conformity with the Environmental Programme prepared by the Department for Environmental Protection.

For 1992 the Provincial Fund for Poznan Voivodeship has a budget of 100 billion Zl., of which 10 billion Zl. will be used for waste management project. In 1991, the fund contributed to 70 projects including 25 within solid waste management. A major part of the 25 projects were construction of disposal sites. In 1992, 29 projects for solid waste management have been assigned.

F.9.3 Poznan City

Fig.F.9.3-1 illustrates the bodies in Poznan Municipality involved in execution of municipal waste management.

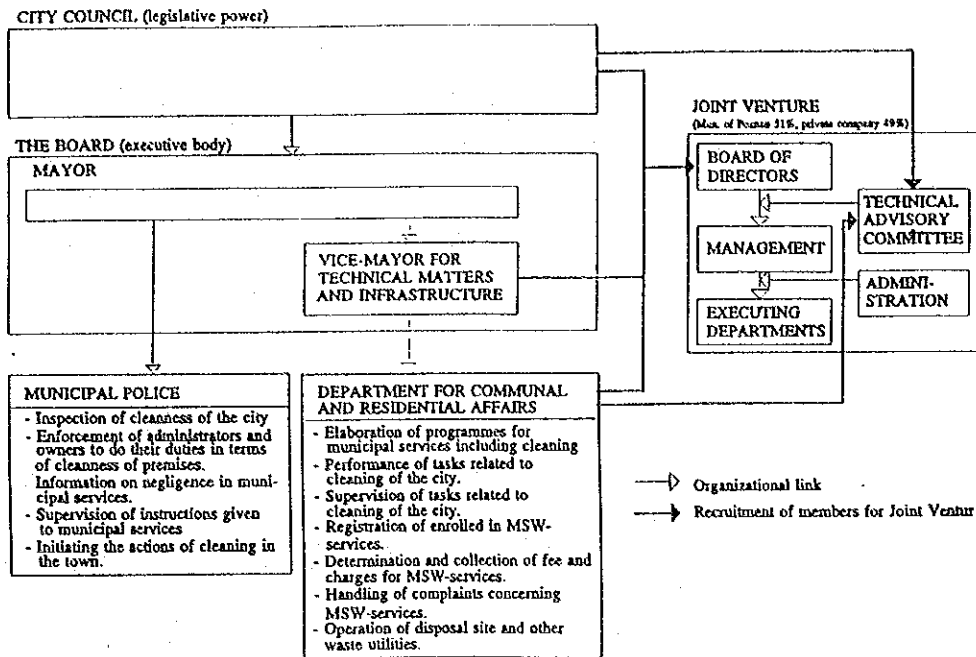


Fig.F.9.3-1 Municipal Waste Management in Poznan Municipality

1) The Department for Communal and Residential Affairs

The responsibility for execution of waste services is placed in the Department for Communal and Residential Affairs to which SANITECH is subordinated as an executive and accountable unit.

The department is responsible for carrying out in detail the municipal cleansing programs and their supervision through its 5 district offices in the city.

Until 1991, SANITECH was a state enterprise, but from 1991 the company was transformed into an accountable unit in the municipality administration.

SANITECH performs collection of municipal waste based on individual contracts with the land owners. Further, SANITECH performs operation of the disposal site in Suchy Las and street sweeping based on contracts with Poznan Municipality. The right to collect municipal waste is not exclusive as also private contractors are allowed to perform this service.

2) The Municipal Police

The Municipal Police has a controlling function over the cleanness of the city and thus, supervises the performance of landowners, SANITECH and private contractors. The Municipal Police may require that waste collection is introduced or improved if a satisfactory standard for cleanness is not obtained. Also, the Municipal Police acts in case of illegal dumping and in cases where the collectors have problems to gain access to waste containers.

The Municipal Police has 2 inspectors connected to each district office performing regular inspection in the district. In case of violence of the rules, the Municipal Police may issue a penalty of up to 200,000 Zl. It can take place up to three times, then the claim is handed to a Local Offence Court, which can issue penalties up to 1 mn. Zl. and after the third violence it may sentence to imprisonment for up to 3 months. It is, however, the normal procedure to hand over the case to the Local Offence Court after the first fine issued by the Municipal Police.

In near future the Municipal Police will be equipped with a special ecological vehicle allowing for emergency actions on the site in case of more serious pollution.

To complete the description of the municipal organization, additionally two departments should be mentioned.

3) The Department for Environmental Protection

This department is not directly involved in waste management, but should be mentioned for its role in localization of waste treatment and disposal facilities.

The department provides suggestions or opinions on possible sites for location of waste treatment and disposal facilities. The suggestions are based on the City Master Plan and the possessed knowledge about the City, mainly with respect to surface waters.

The department is under reorganisation. Some duties concerned control of industries have been taken over by the State Inspectorate for Environmental Protection, but it is expected that new laws concerning water management will give new duties to the department.

The Department for Environmental Protection files analysis and reports from inspection carried out by SANEPID and State Inspectorate for Environmental Protection. In case of emergency the department assists in the control.

4) The Department for Urban Development, Architecture and Construction Supervision

This department is among the others responsible for issuing construction permits and approvals for projects to be carried out in Poznan Municipality. The department also makes sure that requirements issued by authorities are fulfilled in the final project (eg. to check the observance of requirements given by national, regional and local authorities for a new landfill).

For projects within boundaries of Poznan Municipality the department carries out duties of the Regional Authority concerning issue of project approval and construction permits. See section F.13.6 for further information.

5) SANITECH

SANITECH was a municipally controlled enterprise executing various waste collection services, street sweeping, operation of landfill site, etc..

SANITECH's MSW collection services were based on individual contracts. MSW collection services, however were not only limited to SANITECH as private contractors are allowed to offer the same service, too.

SANITECH became a part of a new company in 1993, and the details are stated hereafter.

6) Rethman-Poznan Waste Management Co. Ltd.

In 1992, the municipality of Poznan negotiated the establishment of a limited liability company from SANITECH, by closing down the latter, with the German company, Rethman Recycling GmbH, as private investor. The new company's operation commenced in January 1993.

The Municipality's contribution to the company were the assets of the defunct SANITECH while the German contributed money and other assets (equipment etc.).

In accordance with the assets and other contributions made by both parties, the shares of the newly established company were distributed as follows:

- 51% to Rethman Recycling GmbH.
- 49% to Poznan Municipality.

According to the draft articles, 75% of the net profit for the first 10 financial years shall be re-invested in the company. The organization for the new company is shown below.

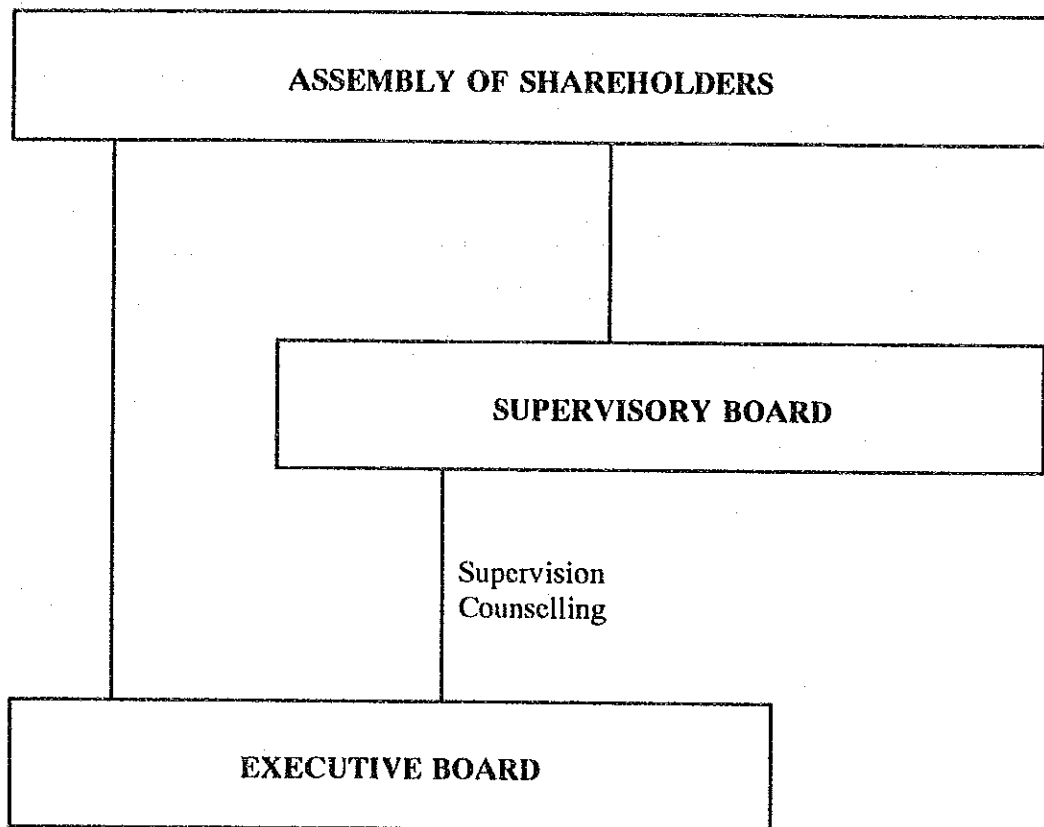


Fig.F.9.3-2 Organization of Rethman-Poznan Waste Management Co. Ltd. according to Draft Articles

According to the draft articles, the Assembly of Shareholders will be responsible for the following tasks:

- Investigate and approve reports prepared by the Executive Board (the Management) and the Supervisory Board, balance sheet, and the financial statement for the previous year.
- Decide on the division of profit and compensation of losses.
- Approve activities of the Executive Board and the Supervisory Board.
- Approve the annual operation plan of the company.

Except for extraordinary decisions, the Assembly of Shareholders can make decisions provided 2/3 of the share is represented and the decisions can be made with absolute majority.

The Supervisory Board is composed of five members appointed by the Assembly of Shareholders for a 4 year period:

- Two representatives from Poznan Municipality.
- Two representatives from Rethman Recycling GmbH.
- One representative from the company's personnel.

The tasks of the Supervisory Board are:

- Permanent supervision of the operations of the Executive Board including auditing the balance sheets and financial statements. The Supervisory Board will prepare an annual report with analysis and recommendations and submit it to the Assembly of Shareholders.
- Counselling for the Executive Board.

The Executive Board is composed by one or two members and it is appointed unanimously by the Assembly of Shareholders for an unlimited period of time.

The Executive Board represents the company in court and outside court and it makes decisions independently (taking full responsibility) in accordance with the scope of the annual operation plan for the company.

F.9.4 State Inspectorate of Environmental Protection

The State Inspectorate of Environmental Protection is recently transformed from a unit subordinated to the Provincial Government (Voivodeship) to a direct reference to the Ministry of Environmental Protection, Natural Resources and Forestry.

The Inspectorate operates at national and provincial level. The objectives of the Inspectorate are defined in Law of 20 July 1991 and include:

- Control of permission of using of the environment issued by the Department for Environmental Protection in the Provincial Government.
- Participation in localization procedures for waste disposal sites and waste utilities.
- Participation in commissioning of objects, which may have a negative impact on the environment and commissioning of equipment protecting the environment.
- Control of equipment protecting the environment.
- Taking decisions to stop activities violating the conditions for permission to use the environment.

The Inspectorate acts through Provincial Inspectors, who may:

- issue a demand for elimination of a violating pollution within a given time,
- issue a fine, and may
- stop the violating activity.

The State Inspectorate of Environmental Protection, Provincial (Voivodeship) Inspectorate issues certificates for industrial waste on the request of the industries. The purpose of the certificates is to determine the optimum way of disposal and allow operators of disposal sites to decide if they can fulfil the requirement and receive the waste or not.

The certificate includes:

- a) Determination of fee for "the use of the environment".

All industries must submit an annual report about their environmental impact (waste, waste water, emissions etc.). This report includes a record of amount of waste and based on this record and the classification, the industry pays a fee to the Provincial Fund of Environmental Protection and Water Management administered by the Department for Environmental Protection at the Provincial Government (see section F.9.2).

- b) Determination of the "Degree of negative impact on the environment".

This classification states the requirements to the disposal. The landfill operator takes the decision whether to allow the waste to the site or not depending on actual conditions on the site and its suitability to dispose of the waste. The landfill operator is not obliged to report on the receipt of the waste, but must keep a record for all waste received and must file a copy of the certificate.

Presently, there are problems with this classification as it takes place through Temporary Guidelines issued in 1980. In case of disagreement, the industries claim that temporary guidelines cannot be legal basis for a decision.

A new law determining the classification is expected.

F.9.5 State Sanitary and Epidemiological Inspectorate - SANEPID

SANEPID is an authority under Ministry of Health and Social Assistance. SANEPID operates at three levels:

- National level.
- Provincial level through Provincial (Voivodeship) SANEPID.
- Local level through Municipal SANEPID.

SANEPID's area of responsibility is impact on health including also occupational health. Concerning municipal solid waste, their authority covers all stages; storage, collection and transportation, and treatment and disposal.

SANEPID carries out inspection (eg. once per three months for Suchy Las landfill) and responds on complaints from citizens. Concerning cleanness of the city, they act in corporation with the municipal police in case of violence.

The provincial SANEPID acts in the procedure of approval of new waste facilities. In an early stage SANEPID provides requirements to the design (see section F.13.6).

The provincial SANEPID issues certificates for industrial waste for its disposal. This issuing of certificates is shared with State Inspectorate of Environmental Protection depending on the geographic area; eg. in Poznan it is State Inspectorate of Environmental Protection who issues the certificates.

At the provincial level there is a cooperation between SANEPID and the health department in the Provincial Government.

F.9.6 Inter-Municipal Cooperation

Inter-municipal cooperation on waste management is unknown in Poland as the former centralized system provided the coordination of tasks between municipalities and provided the funding through subsidises.

With the present decentralisation, an increased cooperation between municipalities could be expected:

- The main part of the municipalities are not capable (in terms of financial capability and in provision of sufficient waste amounts) to operate feasible services based on appropriate technology.

Inter-municipal cooperation could make the basic foundation for operation of feasible services including waste treatment and disposal facilities.

- Some bigger cities are forced to look for areas for disposal sites in neighbouring (rural) municipalities due to lack of space or localization problems within their own boundaries.

At present, localization of a disposal site may take place in a "deal" where access to land is reimbursed by money or provision of services, which the small municipality perhaps cannot afford otherwise (eg. a sewage system).

Local deals between municipalities on localization of waste treatment and disposal facilities may not necessarily secure the best solution viewed from an environmental point of view.

A broad cooperation involving a number of municipalities (eg. 5-10 municipalities) could optimize the services from an economic and environmental point of view.

Poznan Municipality cooperates with the neighbouring municipality Suchy Las about the disposal site in Suchy Las. The cooperation covers only the disposal site and is not formalised for a long period of time. With the present reluctance in local communities towards disposal sites the cooperation cannot be characterized as stable and it impose an uncertainty for Poznan Municipality in the planning.

F.9.7 Existing Improvements Plans

In July 1992 the Ministry of Environmental Protection, Natural Resources and Forestry terminated the project "Municipal Waste – Strategy for Waste Management and Applicable Methods for Collection and Treatment".

The project includes important recommendation for the future municipal waste management to be evaluated by the Ministry of Environmental Protection, Natural Resources and Forestry.

We refer to section F.15 for further information on the project.

F.10 Organization

This section presents the organization of the municipal solid waste management. Organizational aspects for the national and the provincial level are covered in previous sections and the presentation is emphasized on the local level for Poznan Municipality.

F.10.1 National Level

Refer sections F.9.1, F.9.4 and F.9.5 concerning administration and section F.13.2 concerning legislation.

F.10.2 Provincial Level

Refer section F.9.2.

F.10.3 Poznan Municipality

On 19 May 1992 the City Council of Poznan passed a regulation concerning waste removal. Based on the regulation, it is the duty of the owner and administrator to have and present invoices from firms specializing in collection or utilization of municipal solid and liquid waste. It means that the owner and administrator must:

- Sign a contract with SANITECH;
- Sign a contract with another contractor; or
- Provide documentation that the household has carried out a satisfactory disposal – in other words – that it can provide receipts from the disposal site.

In case a building has no registered owner or administrator, the municipality will arrange collection of the waste on behalf of the owner or administrator.

The new regulation includes a compulsory for disposal of household waste. However, with respect to keeping a certain, equal level of cleanness, the regulation is not sufficient. The individual household can carry out disposal on his own and the municipality will have difficulties in controlling the activity.

In theory, the new regulation may result in an unlimited number of collectors operating in the same area at the same time. It will secure competition. However, due to inefficient operation, it may result in a higher level of costs than if the same collector can serve an area completely. At present, the number of participating private collectors is low and a problem of the above kind is not registered.

Poznan Municipality has introduced a regulation on repair works in order to control the generation and disposal of construction waste. When construction companies apply for permission to use municipal road for access to a working site, the permission is followed by a request to sign contract with SANITECH on collection of the waste generated during the work.

F.10.4 Private Enterprises

At present, the involvement of private enterprises in municipal solid waste management is limited to recycling and collection of waste.

SANITECH engages private enterprises as sub-contractors for the waste collection and SURMET (a co-operative company with the intention of privatization) has a network of containers and operates reception and sorting facilities for almost all types of recyclable wastes.

Most likely, the growing private businesses in Poland will result in an increased number of private contractors operating within waste management. Worldwide, the waste management business is growing steadily despite that the sector necessitates considerable investments to keep the required level of technology and know-how.

The high inflation in Poland makes it difficult to raise capital for necessary investments for start of private enterprises. Many contractors recently started in waste management in Poland are relatively small; eg. haulage contractors starts with one or a few vehicles. Thus, it could be expected that the increased involvement of the private sector will be with smaller enterprises. The sector will experience fluctuations and probably experience a high frequency of bankruptcy.

F.11 Financial Situation

F.11.1 National Level

The state budget has been increasing rapidly because of hyper-inflation. The ratio of revenue to GDP was less than 40% in 1990. The balance was improved by cutting the subsidies for the expenditure.

Table F.11.1-1 The Changes of Financial Situation

	1985	1986	1987	1988	1989	1990
Revenue	4,043	4,899	5,851	10,089	31,109	196,241
% of GDP at current price	46.7	45.8	41.8	40.4	29.6	38.8
Expenditure	4,079	4,953	5,973	10,010	33,687	193,801
within subsidies (% of expenditure)	1,245 (30.5)	1,475 (20.8)	1,843 (30.9)	3,326 (33.2)	9,677 (28.7)	32,949 (17.0)
Balance	-36	-54	-122	+79	-3,578	+2,439

Source: Rocznik Statystyczny, 1991

The budget of 1992 was approved in the midst of June in 1992, though the fiscal year started in January. The approved budget is as follows:

Table F.11.1-2 State Budget 1992

Bill zł

Item	Amount
Revenue	337,650
tax revenue	267,580
sales (turnover) tax	114,900
income tax	133,680
wage growth tax	16,900
other taxes	2,100
current non-tax revenue	59,870
interest & dividends	12,500
NBP contributions	8,635
customs duty	24,200
contributions from Treasury-sector units	9,435
other revenue	5,100
privatization revenue	10,000
interest on foreign credit granted	200
Expenditure	403,149
subsidies to finance economic projects	24,062
product-specific subsidies	5,520
producer-specific subsidies	4,310
various subsidies	12,070
subsidies to enterprises' invest projects	2,162
social-insurance	81,700
Treasury sector's expenditure	232,551
spending of economic units	22,828
science	7,894
education	41,823
culture & the arts	3,042
health care, physical culture, sports, tourism, recreation	50,821
social welfare	25,652
civil service	8,804
courts and public prosecution	5,185
public security	11,963
national defence	24,148
costs of state-assets privatization & other expenditure	2,791
special purpose reserves	27,600
foreign debt servicing	13,095
settlements with banks, domestic debt services & guarantees	43,770
Council of Minister's general reserve	400
general reserve for communes (guminas)	7,571
Balance	-65,499

The changes in the political and economic situation in Poland, especially in the reconstruction of the local government, causes temporary confusion and difficulties in the methods of financing and in managing solid waste management services. Until the previous year, all kinds of investment for municipal management were appropriated from the state government budget through the Voivodeship. But recently, self-financing was imposed, though tax allocation has not been decentralized yet.

There are three ministries responsible for the solid waste management, but the expenditures they allocate for solid waste management are very small. Only a limited share was spent on the maintenance of state roads. The financial forecast for the year 1992 (obtained from the Ministry of Environmental Protection, Natural Resources and Forestry) is as follows:

- 3.4 bill. Zl – protection of water
- 0.4 bill. Zl – nature and forests
- 0.6 bill. Zl – geology
- 0.7 bill. Zl – others

The national fund for Environmental Protection and Water Management, which originates from the provincial (Voivodeship) funds for environmental protection and water management is 5.1 bill. Zl and covers the following:

- 2.10 bill. Zl – protection of water
- 1.40 bill. Zl – air protection
- 0.35 bill. Zl – waste management and land surface protection
- 0.50 bill. Zl – nature and forests
- 0.60 bill. Zl – geology
- 0.15 bill. Zl – others

F.11.2 Provincial Level

After the reconstruction of the local government in 1991, state government grants are given to communes (guminas) directly. The budget of the Provincial Government (voivodeship) is only for their work and inter-regional (guminas) projects. Therefore, the budget of provincial governments (voivodeship) is very limited (see below).

- 1991 about 1,700 bill. zl
- 1992 about 2,000 bill. zl

Increments are only appropriated to the budget for social welfare and health services.

The budget for communal investments is only 51 million zl in 1992. The budget for roads is 56 bill. zl. The changes in the budget for roads are as follows:

- 1990 77 bill. zl
- 1991 87 bill. zl

- 1992 56 bill. zl

Because of inflation and budgetary limitations, it is difficult to construct new roads at present.

The budget of Poznan Provincial (voivodeship) Funds for Environmental Protection and Water Management in 1992 allocated only 100 bill. Zl for 70 environmental protection and water management projects, and only 10 bill. Zl will be allocated for solid waste management. In 1991, only 2.1 bill. Zl was allocated for solid waste management.

There was another budget for road maintenance including the sweeping services for state and provincial roads within Poznan city. The budget was 63 bill. Zl in 1991, and 8 bill. zl was appropriated for road sweeping services.

F.11.3 Poznan Municipality

1) Money Flow for solid waste management in Poznan

Money flow for the solid waste management in Poznan in 1992 is summarized as Fig.F.2.3-1.

The characteristics of money flow for solid waste management are as follows:

- Solid waste management is executed mainly by "SANITECH", which is one of the budgetary units. The funds are mainly from collection and disposal services fees.
- The budget sources of Poznan Municipality are mainly local taxes and state tax such as income tax and sales tax. On the other hand, the subsidy offered by the State is very limited.
- Only 2.3% of the municipal budget is allocated for solid waste management and the compensation for Suchy Las disposal site.

These characteristics were made known after the local government was reformed.

2) Budget of Poznan Municipality

The budget of Poznan Municipality is shown in Table F.11.3-1.

There are some municipal enterprises, which get subsidy more than 500 billion Zl. About half of subsidy is for "Municipal Public Transportation Company", although

SANITECH has obligation to surplus more than 9.7 billion Zl to cover the payment to gumina Suchy Las.

3) Budget of SANITECH

The changes in the financial situation of SANITECH are shown in Table F.11.3-1.

Table F.11.3-1 Changes of Finance of "SANITECH"

unit:mill.zl

	1989	1990	1991		
			Jan. to July	Aug. to Dec.	Total
Revenue					
- Collection	965	14,109	10,725	13,512	24,237
- Cleansing	1,074	9,500	6,708	4,744	11,452
- Landfill,etc.	88	1,031	1,175	1,317	2,492
- Subsidies	1,952	679	814	256	1,070
- Other		133	19,422	603	603
Total	4,079	25,452		20,432	39,854
Expenditure					
- Collection	2,280	12,420	12,985	10,022	23,007
- Cleansing	1,102	7,352	6,423	4,085	10,508
- Landfill,etc.	33	603	345	532	877
- Other	3,415	542	19,753	886	886
Total		20,917		15,525	35,278
Balance	+664	+4,535	-331	+4,907	+4,576

notes: - Cleansing work includes the night-soil collection.
- Landfill,etc. includes technical and maintenance work and transport services.

The prices for waste collection and disposal services were raised after SANITECH became a budgetary unit of the municipality, as shown in Table F.10.3-2.

Table F.11.3-2 Old and New Collection Fee

Item	Old price	New price
Solid waste collection service	19,500	33,200
Tipping fee	5,000	20,000

The balance of SANITECH improved due to increase in prices.

Only the subsidies of the following cases were approved in 1991:

- land reclamation of disposal site 256 mill.zł
- purchase cost for containers 814 mill.zł

The comparison of revenue and expenditure showed the landfill division to be most beneficial, indicating a revenue 2.843 times its cost. The revenue estimated for the collection division, on the other hand, was 1.053 times its cost.

The cost according to services is summarised as Table F.11.3-3.

Table F.11.3-3 Cost according to SWM Services

	Collection	Disposal	Cleansing	Transport	Management	Total
Personnel cost (Wage)	1,508.5 (1059.5)	270.7 (151.4)	160.2 (109.2)	1,471.0 (612.7)	2,410	5,820.4 (1,932.8)
Materials (Fuel)	2,836.9	1,145.7	674.6	1,334.8 (756.2)	265.8	6,257.8 (756.2)
Maintenance		19.3		878.3		897.6
Division activities	310.6		551.5	460.0		1,322.1
Sub-total	4,656.0	1,435.7	1,386.3	4,144.1	2,675.8	14,297.9
Share of						
- Disposal	1,089.0	-1,095.7	6.7			0
- Transportation	2,452.4	13.9	1,595.9	-4,062.2		0
- Management	1,923.8	77.7	656.3	18.0	-2,675.8	0
Total (Rate %)	10,121.2 (70.8)	431.6 (3.0)	3,645.2 25.5	99.9 0.7	0.0	14,297.9 100.0
Waste treated (m ³)	537,071	69,457	3,310			
Unit cost (zł/m ³)	18,845	6,214	1,101,269			

The above-mentioned cost covers the period from August to December 1991 and does not include depreciation costs. The comparison of prices and costs showed high disposal fees, while the fee for waste collection was considered not sufficient enough to cover the replacement cost of old trucks.

The share of every resident in solid waste management expenses is estimated to amount to 0.5 - 0.6% of their average income per annum.

- The collection money of SANITECH in 1990 = 12,420 mill.zł/year

- The population who received collection services from SANITECH and paid the fee

$$(A-b \times A-C) = 375,000$$

where

A: The population of the city in 1990 = about 500,000

b: un-paid ratio = 10%;

non paying population = 50,000

C: The population receiving collection services from private enterprises = 75,000

- share of residents = 33,120 zl/capita/year
= 2,760 zl/capita/month
- income in 1990
 - . employees = 632,206 zl/capita/month
 - . retirees and pensioners = 570,698 zl/capita/month

The above estimates show that the implementation of SWM is dependant on service fees, with the exception of the cleaning work for public areas and investments for collection work which should be shouldered by the municipality.

F.11.4 Private Enterprises

The biggest enterprise conducting collection work is LEWAR which was established in November, 1991. The financial situation is summarized in Table 4.10.4-1.

Table F.11.4-1 Financial Situation of LEWAR

mill.zl/month

Item	Amount
Revenue	500
- Collection Service	500
Expenditure	350
- Personnel cost (30 persons)	160
- Disposal cost (250 truck x 450,000 zl/truck)	100 - 110
- Fuel cost	60
- Depreciation, etc. (20 % of evaluated assets)	28.3 - 29.3
- Special insurance	0.7
Profit	approx. 150

There are also other companies, but they are rather very new and small and their financial foundations are not well established yet. Nevertheless, these companies are expected to profit only if they reduce their fees to SANITECH's level.

F.12 Privatization

The democratization of the Polish system includes special attention to privatization of State-owned-Enterprises. Main reasons for privatization are introduction of competitive business and reduction of the centralised authority.

F.12.1 National Policy

The Polish Government encourages rapid development of private businesses, particular with participation of foreign investment and new technology.

Privatization of the more than 8,000 State-owned Enterprises is ongoing in Poland based on The Law on Privatization of State-owned Enterprises from 1990. The Government's goal is to achieve an ownership structure similar to that of countries in the European Communities (EC). The privatization law opens for the following two methods of privatization:

- Transformation into a joint stock 100%-Treasury-owned company, later sold to investors.
- Liquidation followed by:
 - . Sale of assets;
 - . Contribution of the assets into a new company owned by the Treasury and investors; or
 - . Purchase of the assets by management or employees.

Generally, large enterprises prefer privatization through transformation, while medium and small businesses prefer liquidation.

The shortage of savings in Poland constitutes a major obstacle to rapid ownership change and the time needed for privatization may be longer than assumed.

F.12.2 Status of Privatization

The Ministry of Ownership Change is responsible for the national policy on privatization and responsible for provision for the legal basis. A privatization/commercialization of municipal enterprises holding monopoly on waste service are included in the ongoing privatization.

The main obstacle for privatization of the municipal enterprises is the lack of experience in business management. A privatization necessitates a careful planning to fit the new environment.

F.12.3 Possible Private Operation

With a policy aiming at privatization, areas appropriate for private operation within solid waste management should be identified. In these consideration it is necessary to consider all aspects of private operation, including also:

- The quality of the service provided to the citizen.
- Introduction and preservation of competition to obtain a specified service for the lowest price (an obligation towards the citizens).
- The responsibility for protection of external environment on short as well as long terms.
- The ability to bear risk for extensive environmental damage caused by waste.

Especially, the liability aspect may call on hesitation in a rapid and widely privatization. Without clarified liability the public in most cases must bear expenses for damage on the environment even if the damage is caused by a private enterprise.

The aspects concerning private operation will be further evaluated in the Master Plan, here we will outline some preliminary considerations concerning areas appropriate for private operation:

- Collection of waste, however, with municipal supervision and municipal handle of matters involving the citizens (claims, exemptions, payment etc.).

- Recycling. The private recycling business has the expertise and is familiar with the often impenetrable market for recyclable materials. Thus, an increased public activity could be a coordinated effort between the municipal authorities and the private recycling business.

In many Western-European countries the cooperation with the private business has been neglected resulting in poor market conditions with no balance between the collected amounts, the processing capacity and market.

- Treatment and disposal. The liability aspect must be carefully considered for treatment plants and disposal sites. A public ownership could for that reason have preference, but it must be expected that Build - Operate - Transfer (BOT) projects will be an attractive solution for municipalities with insufficient financial capacity.

The legislation makes it possible for municipalities to enter in cooperation with private companies. This possibility may be widely used within municipal solid waste management.

For foreign contractors Poland is an attractive market as there is a need for services and the present contractors are less capable in technology and financing. For the municipalities the incentives are to allow for easier financing of investments and admittance to new technology.

For a municipality entering a closer cooperation with a private enterprise, eg. in the form of a joint venture, the items for consideration, presented in the beginning of this section, are important. A cooperation with a private company may limit the possibility to carry out bidding of projects and services and thus, the price level for the services may end to be too high. Also, when entering a joint venture it is essential that the partner is capable to secure the necessary development in the services and the technology.

In the formation of a joint venture, the municipality will contribute with equipment and buildings to the assets of the new company. The value for these items may be considerable and it necessitates considerations about the risk to enter without guarantees for the assets. In case of a liquidation of the partner, the municipality may be left back without the assets and put in a poor situation.

F.13 Public Cooperation, Legislation and Enforcement

F.13.1 Public Cooperation

Although it can be generally confirmed that environmental concern is growing and that environmental matters are expected to gain more importance in the eyes of the Polish citizens, it has not led to the acknowledgement of the necessity of increased financial contributions from the society and citizens to implement environmental protection measures.

As for recycling, the present market for recyclable materials provides the collector with a yield. With the present general living condition in Poland, the yield is very important regardless of the amount. It is also fundamentally used to operate a network of private centres where citizens can deliver recyclable materials.

Whether the public in Poland is minded for extended recycling programmes without the present economic incentive is uncertain and should be examined carefully in advance of implementation. In Western-Europe the motivation is kept without any economic benefit for the citizens.

F.13.2 Existing Laws and Regulations

In the following the basic laws and regulations concerning waste management are presented. In section 4.13.6 additional laws related to the approval procedure for waste treatment and disposal facilities are presented.

Law on Environmental Protection and Modelling

The basic law regulating the handling of waste is Law on Environmental Protection and Modelling of 31 January 1980 amended on 27 April 1989 and 10 May 1990.

The law defines that local administrative authorities (municipalities) must provide organizational and technical conditions necessary for the protection of the environment and for keeping the terrain tidy and in order.

The law advises establishment of protection zones around objects that are a nuisance to the surroundings. The responsibility for decision on protection zone is placed at the Provincial Government (Voivodeship).

Law on Protection of Environment against Waste

Law of Ministers' Council of 30 September 1980 concerning Protection of the Environment against Waste and other Impurities and Cleanness of the Towns and Villages.

This is the executive law of the Law on Environmental Protection and Modelling concerning waste management. It defines the duties of the municipalities and covers the following:

- Consider environmental protection tasks in preparation of development plans (town plans).
- Provide facilities for treatment and disposal and guarantee their proper operation.
- Define tasks to be provided by the municipal cleaning enterprises and guarantee the fulfilment of their duties.

Finally, the law defines the duties of owners and administrators of real estates in relation to the disposal of waste in non-developed parts and areas destined for public use and the equipping of the estate with facilities for waste storing and provision of a sanitary storage area.

Law on Charges for Use of the Environment

Law of Ministers' Council of 21 December 1991 concerning Charges for Use of Environment.

The law settles charges for 152 types of waste divided into 4 groups depending on the harmfulness.

Examples of waste in the four groups are given below:

Group I; 60 types of hazardous wastes, eg.:

- Waste containing mercury.
- Used galvanic baths.
- Waste containing strong acids and strong bases.
- Deposits from the preliminary treatment of municipal sewage and from the mechanical-chemical and chemical sewage treatment plants.
- Sanitary waste from hospitals and waste contaminated biologically.

Group II; 40 types of wastes. Some of the types in group I are also present in group II (with a lower content of harmful substance). Further, eg.:

- Oily sawdust.
- Waste from the pomiculture industry, production of mineral wool and water-soluble paints.

Group III; 52 types of wastes, eg.:

- Steelworks slag.
- Waste from demolition.
- Broken glass.
- Cable scrap.
- Waste from dairy, plastic and fruit-vegetable processing industries.

Group IV; 16 types of waste of the lowest grade of environmental hazard, eg. waste from timber industry and demolition waste.

The charges for disposal of waste included in the groups are for 1992:

- 250,000 Zl./tonne for group I.
- 100,000 Zl./tonne for group II.
- 40,000 Zl./tonne for group III.
- 20,000 Zl./tonne for group IV.

Every year a decree on charges is issued. For 1992 the decree caused many complaints from industries due to a considerable raise in the charges. Through a new decree, the charges for 1992 are reduced with 20% in consideration of the financial situation.

Law on Principles for Issue of Fines

Law of Ministers' Council of 23 December 1987 concerning the Amount, Principles and Mode of Issuing Fines for Offence of the Requirements of Environmental Protection.

The law defines that the Provincial Government issues fines for violation of rules concerning storage and disposal of waste. The daily fine is determined to 5% of the charge according to the above classification into 4 groups.

In certain cases of violation the fine may be doubled.

Law on Investments specially harmful to the Environment and Human Health

Law of the Minister of Environmental Protection, Natural Resources and Forestry of 23 April 1990 concerning Investments specially Harmful to the Environment and Human Health and the Conditions to be Included in the Environmental Impact Assessment.

The law states the necessity of preparation of an environmental impact assessment for investments considered highly hazardous for the environment and human health. An environmental impact assessment is necessary for projects with:

- Annual emission of pollutants to the atmosphere exceeding:
 - . 5,000 tonnes of dust and gasses on the country borders area and in areas ecologically endangered.
 - . 20,000 tonnes of dust and gasses in other areas.
- Production and disposal of sewage requiring purification...(the detailed requirements are not referred here).
- Production and storage of the group I wastes despite the quantity.

- Pollution, intrusion of the surface of the ground or change of the assignation of agricultural land or forests on areas bigger than:
 - . 50 ha. in areas ecologically endangered or in areas under special protection.
 - . 100 ha. in other areas.

Depending on the planned capacity, new municipal waste facilities may be included in the demand for an environmental impact assessment, eg. it is required for a future disposal site of 100 ha.

F.13.3 Proposal for Laws and Regulations

A new Law on Environmental Protection is under preparation. It is, however, not yet decided if the law will be one law or several separate laws, eg. on air pollution, on waste etc.

New Law on Environmental Protection

The new Law on Environmental Protection will bring the Polish legislation in accord with EC legislations. According to information on the drafted law, the principles underpinning the detail of the legislation are:

- Harmonious development – which seeks to ensure that waste management activity is advanced to achieve accord with other economic development.
- Protective measures – to ensure protection of the environment where conflicts in development arise.
- Rational balance – to ensure that resources are directed in ways which offer the best improvements for expenditure.
- Liability of producers – producers of waste must bear the responsibility for the proper disposal of the waste.
- Polluter pays principle – polluters must be responsible for results of his activity and pay accordingly.

The municipalities are required to provide organizational, technical and financial conditions which are necessary for the protection of the environment against waste and they are obliged to arrange collection of waste and their recycling. This duty does not require collection service for all areas of a municipality, but in general, the municipalities may issue binding regulations to fulfil their obligations.

Draft Law on Waste

A proposal for Law on Waste is under discussion. It shall be an independent legal law concerned with the rational handling of waste, and when in force, it will replace articles like the Law on Environmental Protection and Modelling.

The law states that the producer legally responsible for his waste. As for MSW, the law declares the Municipal head responsible for the producer. The producer is obliged to:

- Minimize the generation of waste.
- Carry out selective storage for the benefit of recycling.
- Prepare a report on disposal of waste generated for the Provincial Government and the State Inspectorate for Environmental Protection.
- Handle hazardous waste at the place of generation.
- File information about amounts and qualities of waste.

The transfer of the responsibility of households to the municipality will enable the latter to decide fully on the collection of waste (contractor, storage capacity, container type, frequency, etc.).

The law also introduces obligations concerning:

- Recycling of various types of waste including used engine and gear oil, car batteries, batteries, and all types of cells, metal carrying waste, glass and glass package waste, and paper and cardboard.
- Provision of return-system for outdated chemicals and packages carrying toxic chemicals.

Concerning municipal waste, the law obliges the Municipal Authority to provide conditions necessary for the proper management of municipal waste including provision of possibilities for selective collection and the further utilization.

One chapter is dedicated to landfill disposal. The chapter includes:

- Conditions and requirements that should be fulfilled for the proper management of a disposal site.
- The principles of separate landfilling of hazardous waste.

The draft proposal includes regulation concerning international waste handling in accordance with the intentions in the International Convention of Control of Transborder Movement and Disposal of Hazardous Waste, signed in Basel in 1989.

As a consequence of the proposed law, the categorization of waste into 4 categories as defined in Law concerning Charges for the Use of Environment, may be changed. According to the draft proposal, the Ministry of Environmental Protection, Natural Resources and Forestry in cooperation with other ministries can issue a law with categorization of waste including a list defining hazardous waste.

F.13.4 Enforcement

At present there is no legal demand for elaboration of waste management plans at local level, so it is difficult to observe a single project in context with the whole management system and thus it is difficult to enforce a national policy at local level.

The current procedure for approval of new waste utilities (see section 9.5.6) allows for influence from relevant authorities responsible for impact on environment and human health.

The Polish Authorities engaged in supervision and control generally carry out their duties with care until now. Violators are only persecuted or fined for severe crimes and importation of hazardous waste.

Self-control and self-reporting play an important role of the supervision and control system in many countries. To introduce such a step in Poland necessitates that confidence between the involved is build up. During the socialist system it was widely known that industries and investors corrected their reports to the authorities to apply to the demands and standards. Thus, to rely on self-control will be met with scepticism. It is, however, necessary to develop this subject to implement environmental consciousness to the industry and to make a cheaper control system based on spot tests.

While the control and supervision system seems generally appropriate, the transition of the Polish administrative system and the ongoing preparation of new legislation cause a lack in the enforcement.

As mentioned, there is a lack of enforcement of the national policies on solid waste management, mainly caused by incomplete legislation, but also implementation strategies including short-term goals are needed.

Further, there could be a better local/regional enforcement with regards to inter-municipal corporation and location of waste treatment and disposal facilities (eg. a regional planning of industrial waste utilities).

F.13.5 Existing Standards, Codes of Practice and Guidelines

The Law on Environmental Protection and Modelling of 31 January 1980 includes standards to be applied:

- Chapter 1; Land Surface Protection and Protection of Useful Minerals.
- Chapter 2; Protection of Waters and Marine Environment.
- Chapter 3; Protection of Atmospheric Air.
- Chapter 4; Protection of Fauna and Flora.
- Chapter 5; Protection of Landscape and Recreational Values of Environment.
- Chapter 6; Protection of Urban and Rural Green Areas.
- Chapter 7; Protection of Environment against Noises and Vibrations.
- Chapter 8; Protection of Environment against Wastes and Other Pollutants.

Further, the following decrees and standards are of importance:

- Decree of Council of Ministers of 30 September 1980 concerning protection against noise and vibrations.
- Decree of Ministry of Environmental Protection, Natural Resources and Forestry of 12 February 1990 concerning protection of air against pollutants.

- Decree of Ministry of Environmental Protection, Natural Resources and Forestry of 5 November 1991 concerning waters classification and conditions/quality of waste water being discharged into waters or into ground.
- Branch Standard PN-87/9103-09, Municipal Waste Treatment. Compost made of Municipal Waste.
- Branch Standard PN-87/9103-04, Methods for Evaluation of Waste Accumulation Factors.

SANEPID has a comprehensive set of standards used for their specification of requirements to activities imposing an impact on human health.

Finally, it is necessary to adapt to the general standards and codes of practice for civil engineering in the design.

F.13.6 Existing Procedures for Implementation of Investments with an Environmental Impact

This section will briefly outline the implementation and approval procedure for facilities imposing an impact on the environment, eg. a waste treatment and disposal facility. The exact procedure to be followed will depend on the type of investment and the conditions of the site considered.

In general, the implementation of waste treatment and disposal facilities is sensible for the local opinion and without the right presentation it may be very difficult to obtain land for these facilities. It is recommended at an early stage to ensure that the land can be taken over and that the project can find support in the local government (in the council and in the local public opinion).

Localization

The procedure for the localization of a project is defined in Law of Town and Country Planning of 12 July 1984. The process can be divided in three phases:

- 1) Issuing of localization indications based on an application from the investor (more than one site for location can be indicated).
- 2) Specification of the conditions and requirements for the localization indications.
- 3) Issuing the decision on localization.

The localization indications are issued by the Central Planning Office for projects of national importance, by the administration of the Provincial Government (Voivodeship) in case of regional importance, etc.

Concerning municipal waste treatment and disposal facilities, the Law concerning the Division of Projects as well as the Range, Principles and Procedure for Establishing the Localizations of 27 June 1985, defines construction of municipal and industrial waste disposal sites serving more than one municipality, as a matter of provincial importance.

Based on the localization indications, the investor select the appropriate site and initiate elaboration of the application for decision on localization. Conceptual design must be attached to the application and for elaboration of the design the investor carries out relevant surveys (eg. geological survey and survey of water quality) and collects appropriate data. The conceptual design must clarify the measures taken against impact on environment.

Requirements to the Facility

The application is distributed to all relevant authorities for their issue of requirements to the project (often referred to as opinions). The authorities involved include among others:

- The Provincial (Voivodeship) Chief Geologist in the Voivodeship Department for Environmental Protection.
- The State Inspectorate of Environmental Protection. Voivodeship Inspector.

- The Sanitary and Epidemiological Inspectorate (SANEPID).
- The Provincial (Voivodeship) Town Planning Office (for incorporation in the regional planning).
- The Provincial (Voivodeship) Authority for Roads and Bridges.

Depending on the actual conditions other authorities must be consulted for provision of their requirements, eg. authorities related to agriculture, railways, military and forest.

The issued requirements cannot be appealed, but there is a tradition for negotiation until all parties agree.

With the requirements collected the project is presented for the local government for decision on localization and with the decision in hand, the investor can proceed with detailed design.

Design

After termination of the detailed design, the investor applies to the Regional Authority for approval of the project and permission to construct.

The Regional Authority checks that all requirements are adopted in the detailed design and for this checking they may require some of the authorities to carry out check of the design and it may consult specialists.

When the checking has ended and the Regional Authority has ensured that all requirements are incorporated, the project can be approved, the construction permit issued and the construction can start.

During the construction the Regional Authority makes inspection on site, typically 1-3 times depending on the type of construction.

In case of projects located in Poznan Municipality, the role of Regional Authority is attended by the Department for Urban Development, Architecture and Construction Supervision in Poznan Municipality Administration.

F.14 Existing Policy and Standards in the European Communities (EC)

The waste policy and directives passed by the European Communities (EC) are of interest for Poland as Poland intends to apply for membership of the EC. In forchard of a membership it may be beneficial to adapt to policies and standards of the EC to smoothen the entry.

F.14.1 Driving Factors for the EC Policy on Waste Management

The waste management plays an important role in the economy as a whole in EC. In 1988 the waste industry employed over 3 million persons throughout the Community with a turn over of more than 200 billion ECU. In the US, waste management is considered the fourth sector of greatest importance in the coming years.

The EC-Commission passed in 1989 a policy on waste management aiming to clarify principles for the future efforts in EC and the Member States including identification of general priorities for the period forward to year 2000.

The need for an EC-policy on waste management is motivated in the mutual, complex relation between waste management and several other sectors including industrial and commercial sectors. Also, the introduction of the Single Market in 1993 gives reasons for a common policy. It is stated that without the EC-policy on waste management there may be a reduction in the environmental quality and there may be distortion of the competition in the Single Market.

F.14.2 The EC-Waste Policy

The Rome Treaty, the foundation for the EC, put forward three objectives related to the environmental policy:

- 1: To preserve, protect and improve the quality of the environment.
- 2: To protect human health.
- 3: To secure utilization of natural resources in thoughtfulness and rational way.

Further it is stated that the environmental policy in the EC shall be based on the polluter-pays principle.

The current EC policy prepared by the Commission in 1989 and supported and further emphasized by the EC-Council in 1990 is developed through four short-term environment action programmes issued successively since 1973. The current policy is:

1: Prevention

This policy has a twofold objective:

- . Technology based prevention. Development of clean technologies to perfect non-polluting manufacturing processes.
- . Product based prevention. Market of products making the smallest possible contribution by their manufacture, use or final disposal, to increasing the amount or harmfulness of waste and pollution hazards.

2: Recycling

When waste has derived, recycling is considered the best method to minimize or delete the negative environmental impact of the waste.

The Commission calls on investigation of possible supportive actions (deposit-systems, taxes etc.) to ease the problems faced by the recycling industry.

3: Optimization of the final disposal

Landfill disposal and incineration are the most common disposal methods in EC, but both methods include pollution of the environment. Thus, a strengthening of the standards for landfills and incineration plants is considered essential in the EC policy.

4: Control of transport of waste

This strategy concerns transport of hazardous waste and dangerous goods regulated in several EC-Directives.

5: Rehabilitation of contaminated sites

Contaminated sites are considered a threat to mankind and environment and it is foreseen that tremendous funding must be spent on cleaning of sites. The Commission calls on development of technologies for localization of contaminated sites, cleaning, decontamination and reestablishment.

F.14.3 The EC-Directives

EC has passed several directives related to waste management and presently other directives are proposed. In the following the main directives related to municipal waste management are presented:

- **Council Directive of 15 July 1975 on waste (75/442/EEC) amended 18 May 1991 (91/156/EEC)**

A framework directive designed to align the legislation in force in the Member States to a high level of environmental protection.

The Directive requires the Member States to establish an integrated and sufficient network of treatment and disposal facilities so the EC as a whole can provide treatment and disposal of all waste generated in the EC. The network shall be established by considering of the best available technology and reasonable costs involved.

The Directive requires the Member States to prepare a plan for the waste management.

The Directive requires the Member States to take steps to encourage the prevention, recycling and processing of waste, the extraction of raw materials and energy and any other process for the reuse of waste.

The Directive requires the Member States to ensure that any holder of waste hands it over to a collector or to a disposal undertaking.

All utilities involved in treatment and disposal must be approved by the national authority. The approvals may be issued for a limited period of time and may be supported by conditions and obligations.

Approved utilities must carry out detailed registration of waste supplies.

The utilities approved must be sufficiently controlled.

- **Council Directive of 27 June 1985 on containers of liquids for human consumption (85/339/EEC).**

The aim of the Directive is to achieve a reduction in and a better exploitation of containers of liquids for human consumption in household waste.

The Directive calls on Member States to ensure that new refillable containers offered for sale bear a clearly and durable indication specifying that the container concerned is refillable.

The Directive's application proved to be highly unsatisfactory as only a few of programmes proposed by the Member States were deemed to comply with the Directive.

Amendments of the Directive is expected.

- **Council Directive of 8 June 1989 on the prevention of air pollution from new municipal waste incineration plants (89/369/EEC).**

The Directive introduces strict standards concerning design and operation of municipal waste incineration plant. Application to the emission limits in the Directive necessitate special attention on flue gas purification equipment for acid gasses.

The Directive includes specific regulations for -- among others:

- . Emission limit values for total dust, heavy metals, hydrochloric acid, hydrofluoric acid and sulphur dioxide (the competent (national) authorities shall lay down emission limits for other pollutants when considered appropriate).
- . Minimum temperatures and presence of oxygen during combustion.
- . Continuously measuring of total dust, CO, oxygen and HCl and periodically measurements of heavy metals, HF etc.
- . Installation of auxiliary burners.

The Directive requires the competent authorities to lay down further conditions for measurements (measurement programmes), maximum permissible period of any technically unavoidable stoppages etc. Also the competent authority shall ensure that the stack height is calculated in such a way as to safeguard human health and the environment.

- **Amended Proposal for a Council Directive on civil liability for damage caused by waste (COM(91) 219 final - SYN 217).**

A prime objective of the Directive is to apply to the "polluter pays" principle. The aim of establishing a uniform system of liability within the Community is to ensure, firstly that victims of damage caused by waste receive fair compensation and, secondly, that Industry's waste-related costs resulting from environmental damage are reflected in the price of the product or service giving rise to the waste.

The Directive, which covers all waste with few exceptions, defines that the producer of waste shall be liable under civil law for the damage and injury to the environment caused by the waste irrespective of fault on his part. The liability is in force until disposal is ensured under prescribed conditions (a producer may make a contract with a carrier transferring the liability to the carrier). When the waste is disposed of properly, the disposal agent is liable.

The producer shall not be relieved of liability by the sole fact that he holds a permit issued by the public authorities.

The liability of the producer arising from the Directive may not be limited or excluded in relation to the injured person by any contractual provision limiting his liability or exempting him from liability.

- **Proposal for a Council Directive on Disposal of Waste (Com (91) - SYN 335)**

A proposal for landfilling strategies and unified rules is presented for the EC-Council. The proposal aims at a high level of protection of ground water and soil. It is mentioned that landfills should work for a good reputation in general and in the neighbourhood and thus respect all regulations necessary to establish that image.

The proposal classifies waste according to origin (household waste and industrial waste) and character (hazardous waste, non-hazardous waste and inert waste). Landfill sites are categorized according to the three classes of waste.

All three categories must fulfil specified requirements, eg.:

- . Location
- . Roads and areas use for operation.
- . Fencing.
- . Landscaping.
- . Signs and information.
- . Control with waste supplies.
- . Control of ground and surface water and leachate handling.
- . Protection of soil and ground water including requirements to permeability coefficients.
- . Control of gasses.
- . Prevention of nuisances.
- . Control of stability to prevent collapse.

According to the proposal it is possible to dispose more than one of the mentioned categories if the disposal takes place in separate stages and that each stage fulfils stated requirements.

Appendix 3 to the proposal includes criteria and procedures for reception of waste at landfills. Waste which cannot fulfil the requirements can only be disposed of in a special landfill. It is specified that the following types of waste cannot be disposed of:

- . Liquid waste unless it is compatible with the solid waste disposed of.
- . Waste which may act explosive and inflammable in the conditions on the site.

- . Infectious waste from hospitals, clinics etc.

The directive proposal prohibits dilution of waste before and under landfill operation. It is stressed that co-disposal only can take place if positive interactive processes between the co-disposed wastes will occur. It is further stressed that only waste compatible with household waste should be accepted for co-disposal. Also, in appendix 3 to the proposal, examples of waste suitable and unsuitable for co-disposal are mentioned.

Further, the proposal includes regulations for:

- . Procedures for control at reception of waste, eg.:
 - * Control of waste certificates.
 - * Visual inspection of the waste.
 - * Registration and annual report to authorities.
- . Procedures for control etc. during operation and subsequent treatment.
- . Procedure for closing of a landfill, eg.:
 - * Final cover.
 - * Supervision and control of surface water, gas and leachate leaks, and the quality of ground water.

After closing of the landfill, the operator (owner) is responsible for maintenance, supervision and control for 10 years unless otherwise stated by the authorities.

- . Liability. The operator is responsible for damage on or deterioration of the environment regardless of failure or negligence by him.
- . Disposal fees. The disposal fee must cover all expenses related to the disposal.
- . Performance security. The operator must submit a performance security covering estimated costs for closing of the landfill and the followed cost for control and supervision.

The EC Member States must establish one or several funds to ensure funding of expenses to prevention of pollution and remedial of damages caused by landfills. The funds must be made available by the operators disregarded the performance security.

F.15 Review of Existing Plans and Studies

In 1991 the Ministry of Environmental Protection, Natural Resources and Forestry initiated the project "Municipal Waste – Strategy for Waste Management and Applicable Methods for Collection and Treatment". The project is financed by the European Communities (EC) under the PHARE-programme.

The project includes important recommendations for national and local authorities concerning the municipal waste management. Thus, a comprehensive summary of the findings are referred in the following.

Key Issues

The project draws the attention to several key issues, among others:

Legislation, Regulation and Enforcement.

- There is a need to ensure that required standards are achieved for preparation and operation of waste management facilities. Activities should be monitored and people who fail to comply with conditions should be subject to enforcement procedures.
- Procedures relating to obtaining land use permits for waste management purposes appear to be insufficiently strong to overcome objection.
- There is a necessity to provide clear guidance for municipalities with respect to their duties and powers and what level of service is expected.

Organization and Management.

The small size of most municipalities in Poland means that they have insufficient resources to plan and operate waste collection and disposal services.

Financing.

- The present fee systems does not raise enough funds to finance municipal services.
- The current method of paying for collection by quantity does not encourage the use of proper means of disposal and many householders do not complete agreements with the municipalities.
- There are major problems related to the funding of capital projects. Money is not readily available from central government and municipalities are insufficiently developed to raise loans.

Levels of service, health and safety

- There is a concern that standards of collection and disposal do not provide for sufficiently high standards of safety, protection of the environment and acceptability in the neighbourhood.
- The collection service is not sufficiently wide, especially in rural areas. A certain level of service will be necessary if illegal dumping is to be controlled.
- Privatization of municipal enterprises is being carried out but there is a need for further commercialisation to ensure that they are sufficiently well prepared for a future business environment.

Technical Issues.

There are various aspects of both collection and disposal which require attention, especially if it is intended to achieve EC standards in the future. In some cases current practice involves danger, it is often polluting and is frequent unsightly.

Recommendations concerning the National Policy for Poland

The project proposes recommendations for a national policy for municipal solid waste management. The recommendations are concentrated on areas where the greatest return can be achieved.

It should be noted that the recommendations are proposals given to the Ministry of Environmental Protection, Natural Resources and Forestry for consideration in formulation of the future national policy and preparation of new legislation.

The recommended policies are:

Improvements to standards of service, collection:

- In towns, collection services will be available to 100% of the population by the year 2000.
- In rural areas, a regular service to allow the safe and proper disposal of household wastes will be available to 80% of the population by the year 2000.

Improvements to standards of service, treatment and disposal:

- Uncontrolled landfilling (dumps) will be phased out by the year 2000.
- Standards for new facilities will be improved in line with the requirements of relevant EC directives with a view to being harmonized with EC standards within 10 years.

Implementation of effective Regulation

- Where necessary, planning legislation will be strengthened to limit the development of waste management facilities to suitable sites where pollution potential and possible danger to the public can be minimised.
- All current and future waste treatment and disposal operations will be licensed.
- Licence conditions will be enforced by a new regulation authority.

Stronger land use consent procedures

- Strengthened procedures for land use/development permits will be introduced to ensure that decisions are made in the best interest of the population as a whole.
- Strengthened acquisition procedures will be introduced to allow municipalities to compulsory purchase sites for certain types of development, including those for waste management, which are to the benefit of the community as a whole.

Separation of responsibilities to avoid conflicts of interest

- Regulation of all waste treatment and disposal activities will be the responsibility of the State under strengthened powers. Waste management licences will be issued and their conditions enforced at the regional level of the Voivodeships.
- Municipalities will remain responsible for the municipal waste service.
- Municipal waste services will continue to be carried out by the MPOs in the interim period until competitive bidding is introduced. Following competitive bidding, the service will be carried out by the successful bidder, be they MPO or private contractor (here the term MPO is used for the municipal enterprise responsible for waste collection etc.).
- Steps will be taken to make MPOs separately accountable, both financially and managerially, from the Municipality.

Grouping of smaller authorities to ensure adequate resources

- All municipalities will be required to produce a waste management plan describing the arrangements it has made, either singly or jointly with other authorities, for the proper and safe management of municipal wastes for which it is responsible. These plans will be submitted to Government for approval within three years.
- Where, following discussions with the appropriate municipalities, satisfactory arrangements cannot be agreed, Government will assume the responsibility for making the arrangements.

Financing of municipal waste management

The national policy should require:

- Realistic charges for household, commercial and industrial waste services given by municipalities.
- These charges to include the full costs of the operation, its administration and services, and the loans and bank charges arising from the investments made to carry out the service.

- The institution of accountancy procedures and systems to enable accurate comparisons to be made between different courses of action.
- Early guidance from the central government on the future funding of municipal services including waste management and the likely levels of central government support.
- Early guidance from central government on the acceptable methods by which municipalities may raise funds for capital projects including municipal bonds, bank loans and private investments. Government policy towards guaranteeing such to municipality commitments.
- Training for municipal finance officers and MPO managers in the management of municipal funds and debts.

Commercialisation of municipal waste services

- Continuing commercialisation of municipal waste services building on the steps already taken by the MPOs.
- Guidance from central government to the municipalities on the commercial operation of municipal waste services and other enterprises with particular emphasis on accountancy procedures, development of charges, management accounts and evaluation of financial options.
- Guidance from central government on the management principles in the running of a successful municipal enterprise with special emphasis on planning, motivation of staff, communications, delegation of responsibilities, measurement of performance and management control systems.

Charging for municipal waste services

- Waste collection and disposal charges to householders will be indirect charges made as part of a general property based local tax which may also include for the cost of other municipality services.
- Initially charges to householders through the indirect property based local tax will be an empirical calculation of waste arisings based on the number of inhabitants, size of the property or other reasonable parameters. In future years waste generation related charges may be introduced.

- Where municipalities carry out waste collection and disposal services for commerce and industry, a full direct charge shall be made for these services. This will be related to the type and quantity of wastes handled and the frequency of the service.

Waste reduction and recycling

- Steps will be taken to encourage the development of markets for recycled materials within Polish industry.
- The concept of recycling credits will be taken up by Government and municipalities will be encouraged to make appropriate payments to organisations involved in recycling linked to savings in collection and disposal costs.
- Considerations will be given to the implementation of measures regulating the use and import of certain types of packaging which may prove difficult to recycle.
- Active measures will be taken to promote reusable packaging systems.

Public education

- Government will implement a programme of public education on environmental issues by;
 - . providing press releases on relevant issues;
 - . providing technical and policy inputs to appropriate television programmes;
 - . encouraging public debate of environmental issues.
- The subject of the environment, including issues on waste management, will be incorporated into school curricula.

Professional training

- A fast implementation of waste management training to existing professionals in allied disciplines and line managers already in control of the services. This will be achieved initially by short intensive conversion courses.

- The planning and implementation of longer term formal qualifications in waste management for the next generation of managers will be started as soon as practicable.
- Special training for those employed in waste regulation and enforcement of the law will be provided as a matter of urgency.
- Training will be extended to superiors and technicians working in waste management.
- The concept of "the fit and proper person" will be introduced in site licensing as a legal requirement to ensure that the operation of sites and facilities is carried out by competent personnel.

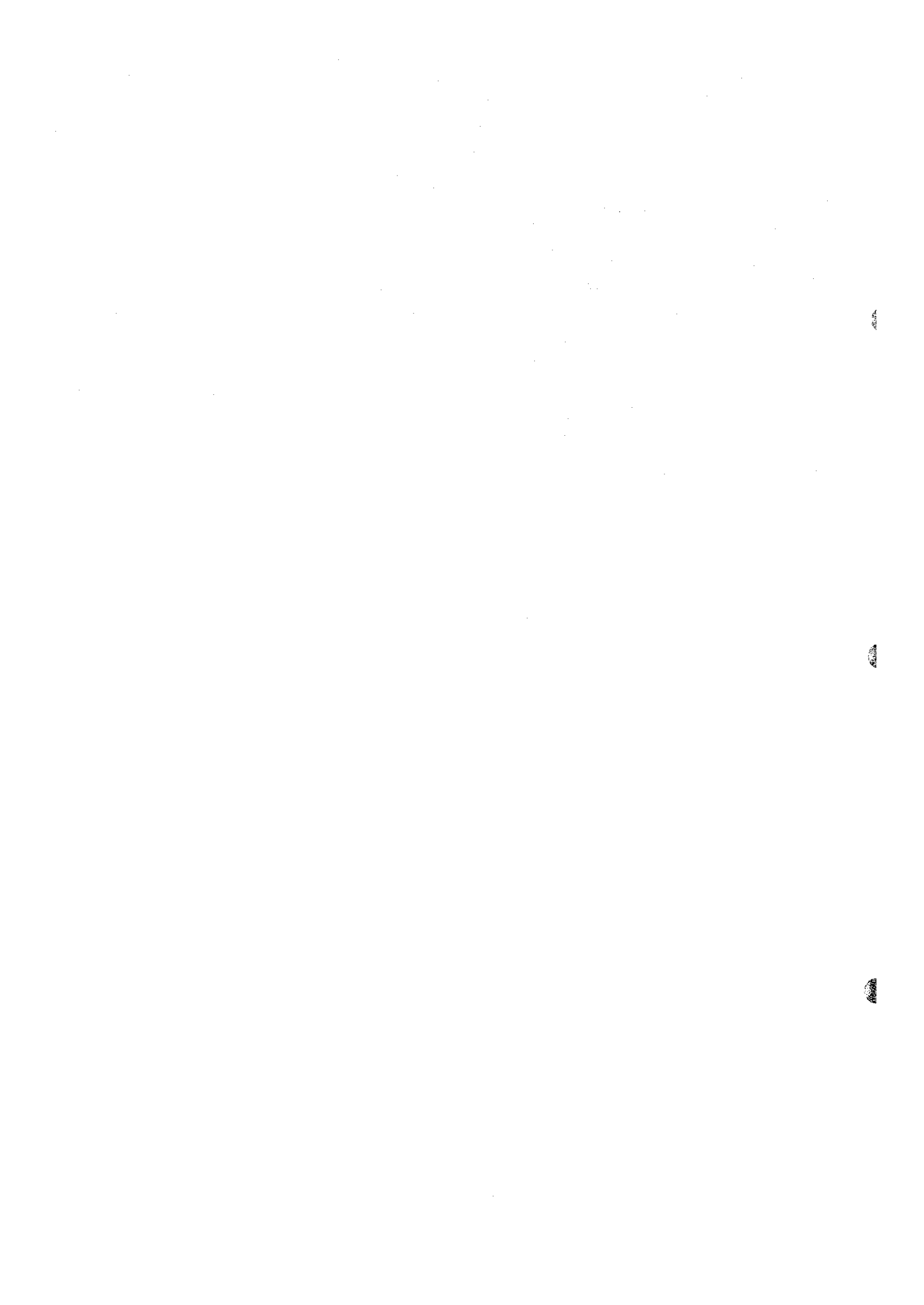
Also, the Warta River Master Plan Project concerning integrated environmental protection for the Warta River, may contribute with interesting recommendations for improvement of the waste management. The project, financed by the PHARE programme, will be terminated in the autumn 1992.

ANNEX G

EVALUATION OF PRESENT MSWM

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ANNEX G EVALUATION OF PRESENT MSWM

This chapter describes the current issues and problems identified throughout the study and makes preliminary recommendations for preparation of the further studies.

G.1 Technical System

G.1.1 Collection and Haulage

- 1) According to the public opinion survey results, the main complaint on the present SMW is the irregular collection service.

The present waste collection system, in which waste is collected in accordance with the individual waste collection frequency contract by household, is only possible if the waste collection and haulage capacity exceed greatly the amount of waste generated, because the collection schedule in this system is not determined on the basis of the efficiency of the operation of waste collection. In this system, collection trucks may service the same street every day to collect waste from different frequency customers. The efficiency of this system is very low.

In fact, SANITECH is collecting waste from customers at the same frequency, not corresponding to the contract collection frequency, because their collection and haulage capacity does not have enough room. This policy of non-fulfilment of the contractual obligations leads customers to cancel the contract or decrease collection frequency.

- 2) Dust chutes have been observed to always have insanitary problems in new apartment building areas.

The dust chute system should be prohibited. The convenience obtained from dust chutes is estimated to be quite small. On the other hand problems created by dust chutes such as insanitary problems are quite serious. With the people's cooperation, elevators will be utilized to discharge waste and dust chute system will be prohibited. Moreover, since the latter is one of the main obstructions in the introduction of a source separation of waste, it shall be terminated.

- 3) The waste discharge system of old apartment building areas is worse than in other areas.

Many old apartment buildings are located in the town centre, and in contrast to the former days, offices, shops etc., are located in these buildings now. Cleaning and garbage disposal works are left to the guardians. It seems to be difficult to obtain people's cooperation for waste control.

In addition, people tend to be unconcerned about waste discharge manners as the container yard is ordinarily at the back yard which is not visible from the outside.

- 4) It is observed that soil, home renovation waste, ash, etc. are disposed into dustbins in detached and semi-detached areas. This attitude lowers the efficiency of waste collection. This discharging manner should be improved with the introduction of an incineration plant or a composting plant.
- 5) A collection system for bulky waste has not been established yet. Generally, with a little tip, people give their bulky wastes to the SANITECH collectors for disposal. But since the compactor truck is not capable for carrying this kind of waste, accidents occur and work efficiency is lessened.

G.1.2 Road Sweeping and Public Area Cleansing

1) Road Sweeping

The roads of Poznan city are very clean and tidy and no urgent problems have been found except for the limited budget appropriated for this service. However, the Road City Authority endeavour to minimize costs by introducing various methods such tendering. Efforts to introduce such new systems should be continued and completed while the existing road sweeping machineries are still fully capable. At present only half of SANITECH's road sweepers are working, due to decrease in contracted work.

It is recommended that the capability of the Road City Authority to supervise contractors' works shall increase. The tender system lowers the contract price, but at the same time it also leads to lower work quality. In order to minimize the costs without lowering the work quality, expenditures for supervising works

should be increased. It is indispensable for sound management to observe and keep the balance of costs and work quality.

2) Public Area Cleansing

There are many parks and public squares in Poznan City and they are always maintained in tidy and clean condition, therefore is no need to introduce new measures.

However, the Green Areas Authority, which is directly executing most of the cleansing work at present, can be expected to increase its percentage of subcontracting. In each case, it is recommended as well that the capability of the Green Areas Authority to supervise contractors' works should increase.

G.1.3 Final Disposal

- 1) The existing Suchy Las disposal site is operated 24 hours a day. Night operation is not only dangerous but also has the following problems;
 - difficulty to carry out proper landfill operations
 - difficulty to judge the sort of waste
 - poor working conditions
- 2) Suchy Las disposal site receives all kinds of waste because it is the only disposal site for Poznan City. This situation makes it more difficult to obtain land use consensus from residents.
- 3) The access road to the existing Suchy Las disposal site was constructed as a temporary road, as the site was primarily intended for temporary use. However, it has been utilized for more than 7 years, and the 1 km temporary road, which now has a rough surface, is damaging to all collection trucks.
- 4) The amount of waste carried in the Suchy Las disposal site is not monitored by weight. This makes it too difficult to understand the actual situation of SWM and to take timely countermeasures.

Sealing of an access road with a smoother surface should be considered, since access roads are used by all collection vehicles. This countermeasure would be effective on reducing overall expenditures of SWM, due to a decrease in operation and maintenance costs for collection vehicles.

- 5) Plenty of waste is blown and scattered around the surrounding areas of the disposal site creating insanitary conditions, because earth covering operations are not properly timed. Fire occasionally results from this as well.
- 6) Business proposals on Municipal Solid Waste Management.

The Poznan Municipality has received business proposals concerning collection, recycling and disposal of waste. The proposal includes participation of private companies in the planning and operation of the activities.

With the present economic situation of municipalities in Poland, business proposals, which may relieve the municipality of heavier investments and operations, are attractive offers.

"Profit", however, is the precept of the proposal and would, therefore, oblige the population served to pay.

It is important that the municipality carefully considers the proposal; not only in the light of the short term benefit, but the long term aspects as well must be evaluated.

First of all it should be considered if the private company has the necessary financial strength, as well as technological capabilities and the will to further develop them.

Full overview of the economy involved, including the obligation to participate with funding for investments and operations.

Full overview of the economy involved , including the obligation to participate with funding for investments and operations.

Full overview of the consequences to the waste flow. If payment is connected to a guarantee of waste supply, the municipality must be sure it can fulfil the obligation. To enter guarantee concerning the waste composition or how it will appear after collection is risky.

Full insights in determining the protection level for the environment and human health.

Satisfactory assurance of the liability aspect. In case of agreement on a private operated landfill, the operator should issue a guarantee to cover to cover his obligations to close down the landfill in a proper manner.

In a situation, where the municipality contributes with assets in a cooperation with a private company, it should be secured that these assets may not be lost in case of liquidation.

G.1.4 Recycling

- 1) The recycling system has already been established but does not function sufficiently yet.

According to the public opinion survey result, nearly all interviewees answered that they are willing to cooperate in recycling. However, materials such as glasses are not reused as they are not directly profitable to the people. In order to promote the recycling activity of reusable materials which are not directly profitable to people, it is essential to educate people on the importance of environmental protection.

- 2) Reusable materials such as steel cans, aluminium cans and cartons, especially the latter, are increasing but not recycled due to the absence of a plant in Poznan.

G.1.5 Equipment owned by SANITECH

- 1) Many containers are stolen, missing or hidden, SANITECH is responsible for the maintenance of the containers and, therefore provides the customers with these. The cost of this provision is a burden to SANITECH.
- 2) Most trucks are very old and repair costs are very high.
In order to minimize the actual operation cost and maintenance of machineries, the repair cost and depreciation must be also taken into account. It is necessary to establish a calculation system in order to judge the optimum time to sell or dismantle the machine. It can be considered that buying new machines is more economical than using the existing old machines.
- 3) The 1.1 m³ communal containers are not well structured, difficult to handle and not durable, especially the wheels and lid. The majority of this type of container not only makes collection work difficult but also creates unsanitary conditions.
- 4) 110 l dustbins are also observed to be non durable and inconvenient.

G.2 Institutional System

The following conclusions are made based on the evaluation of the present institutional system of MSWM in Poznan:

General Conclusions

- 1) Incomplete legislation and absence of administrative and managerial tools at local level hinder proper MSWM with regard to:
 - Enforcing compulsory household collection
 - Enforcing competitive bidding of waste services
 - Financing of waste services, raising of loans for investments.

- 2) Many Polish municipalities are ineffectual in providing an appropriate MSWM (and other public services as well) due to insufficient public backup. Only limited experience can be observed in inter-municipal cooperation as a tool to form appropriate financially capable units.

Further, the municipalities generally have difficulties in obtaining loans, thereby eliminating the possibility to carry out feasible, but fully invested heavy projects.

- 3) The tradition of public subsidization inherited from the former socialist system causes very low financial contributions from the users for public services. This results in inefficient and expensive services and lack in public interest in the services (a service is assessed by the fees charged).

- 4) It is very difficult to overcome opposition and obtain land for new waste facilities. Further, it is anticipated that the area where localization takes place will receive a compensation for the resulting nuisances. These obstacles may lead to inappropriate localization of waste facilities based on deals between bigger and smaller municipalities.

- 5) There is a general lack of experience in competitive bidding and the supervision carried out in the construction of facilities is poor leading to frequent deviation from design.

Conclusions related to Poznan Municipality

- 6) MSW-services in Poznan are generally carried out in a satisfactory way.

SANITECH is incorporated in the municipal organization as an unit accountable to the Department for Communal and Residential Affairs, which supervises its activities.

In January 1993, SANITECH will be closed down and a new company will be formed from it. This company will be a joint venture between the municipality and foreign investor. Poznan Municipality will possess 49% of the shares and the foreign investor 51% and majority in decisions.

Despite the municipality's involvement in the new company, it is forced to reorganize the organization to secure municipal control over MSWM including decisions related to compulsory municipal services, as majority of the shares is owned by the private company.

- 7) The newly introduced municipal waste regulation allows the citizens to choose freely from among the contractors in the market.

Therefore, several contractors may end up serving the same street depending on the individual contracts, leading to unnecessary use of transportation, too expensive and diversified services.

- 8) The drafted Law on Waste states the responsibility of the Municipality in municipal waste management and the selection of a collector.

Although Poznan Municipality is involved in the new collection company formed from the defunct SANITECH, it must consider competitive bidding as a tool to provide the citizens in future with the best services their money can buy.

- 9) The fee for the provided waste service is collected by the collector (SANITECH or private contractor).

The future fee collection system must be reorganized under municipal ordinance in order to provide an unified services to the citizen. Also, a municipal control over the prices must be exercised to prevent racketeering or fluctuations in prices ending in poor services.

- 10) Fees are collected based on individual contracts between the contractor and the landowners. In future, more simplified charging must be evaluated, eg. by implementation of a reasonable number of standardized services (eg. one standard service for a family living in a detached housing area defining the type of dust bin (eg. 100 litre) and collection frequency (eg. once a week)).
- 11) Containers and dust bins are provided to the users by SANITECH, however, the users do not sufficiently maintain them in sanitary condition.

In order to enforce maintenance and manifest an improved cleaning service, as well as adopt a self financed MSWM, users should provide their own containers.

- 12) Generally, construction wastes constitute the majority of illegally dumped waste mainly dumped by small construction companies without waste storage and transportation facilities other than trailer and vans.

Poznan Municipality has taken several important steps to enforce waste services at construction sites to prevent illegal dumping. These should be required in the application and granting of all construction permits, thus expanding the services to new building construction areas.

- 13) Some commercial activities are misusing the public waste collection system. Eg. shops are benefitting from public dust bins, thus, saving money for their own service.

Similar to the strengthening of waste handling through construction permits directed towards construction waste, a strengthen towards commercial waste through trade permissions could be advantageous. Proper disposal of waste should be an integrated element in every commercial activity. Based on an evaluation of the institutional system preliminary recommendations are advanced.

G.3 Environmental Status

The preliminary statements and recommendations related to environmental aspects are proposed through the environmental survey, site reconnaissance, and information of hearing.

1) Waste discharge aspect

Suppression of municipal waste discharge volume

Suppression of municipal waste discharge volume reduces waste management cost and improve the environment.

So far, Poznan City has not produced many disposable materials. Recently, supermarkets and other convenient stores are on the increase in Poznan City. More excessive packaging or disposable materials can be seen at these stores.

The first prerequisite to suppress municipal waste discharge volume is not to discharge utilizable materials as waste. In order to achieve this citizens should assume a firm attitude by refusing acceptance of any unnecessary materials and pick up utilizable materials. Such reformation of conscious will not be attained by approaching individuals.

Therefore, it is necessary to consider public relations activities in order to suppress municipal waste discharge volume. Public relations activities should involve the concerned authorities and includes concrete ideas to suppress the municipal waste discharge volume

The second prerequisite is that manufactures minimize the waste portions from their products and retrieve as much materials which can be utilized for their production from discharged waste.

So far, there are some recycling systems involving empty bottles in Poznan City. It is desired for the recycling system to strengthen in the future. A system which is advantageous for consumers, such as buying-back of emptied bottles and cans, should be enforced.

Illegal Dumping of Municipal Waste on Open Spaces

The amount of illegal waste is probably small compared with the total waste generation in Poznan City. But it constitutes not only an aesthetic problem but also some risks of soil contamination because it is likely that the waste contains some harmful substances.

As for urgent counter measures of illegal waste dumping, it is advisable to enforce a more strict control, for example placing a bulletin board with heavy fine warnings located at illegal dumping places. The issues and recommendations of illegal waste dumping is also mentioned in other sections.

Poor Controlled Dust Chute of Apartments

Some co-operative apartment are equipped with dust chutes in Poznan City today. However dust chutes are generally poorly controlled. The dust chute is used as the

only municipal waste dumping pit so that waste is piled up and scattered around the gate.

In the case of apartments and other buildings equipped with dust chutes, the responsibility of the owners for control of dust chutes should be made clear. If the waste should overflow from the outlets, some strict measures should be applied according to the ordinance.

2) Final Disposal Aspect

Lack of Environmental survey and current information there have not been any recognitions of significant negative impacts in the Suchy Las disposal site. If no environmental problems, in particular, water pollution, offensive odour and scattering of waste will occur in the near future.

In Suchy Las disposal site, full consideration should be paid to the effect on the surrounding environment. In particular, it is advisable to continue the water quality monitoring survey around the disposal site.

Aesthetic Problem of the surface Landfill

In the Such Las disposal site, the surface of the landfill is only covered with soil. The landscape of the site is unattractive because of the incomplete covering of the waste

Therefore, each block upon completion of the landfill should be covered with a thick overlay not only to hide the waste but also to reduce the leachate effluent.

Furthermore, in the near future, when the landfill is completed, planting of seeds should be done, especially over the overlaying surface of embankment and slope of waste mound, to increase the strength of the slope surface.

Planting not only improves the landscape of the landfill site but also prevents scattering of waste from the surface of the landfill, in addition to strengthening the overlaying surface.

No Disposal Facility to Mitigate Gas Bleeding

Municipal waste landfill produces gas in the process of decomposition, which contains CO^2 and CH^4 principally, and a small quantity of NH^3 H^2s and CO . Apart

from the toxicity of these components, the most serious problem in the landfill site is the accumulation of flammable gases inside the landfill layers which diffuses to the land surface on some occasion and may cause a fire.

However, some counter measures should be taken to prevent fires. It is recommended that a gas bleeding facility be provided in order to reduce accumulation gases in the waste layer.

3) Management Aspect

Lack of Measures Related to the Worker Safety and Health

The present work on environmental conditions related to municipal waste is inferior. The use of unstable bulldozers carries great risks for landfill workers. Also, waste in the landfill site is intergrated with some unconfirmed substances including hazardous wastes. (refer to Photo 5.1.6-2)

Therefore, in order to prevent labour disasters and to improve safety and sanitary work conditions through the whole process of the municipal waste work, the present status and the existing problems should be reviewed and safety control measures should be implemented.

Labourer safety and health measures are desired to be considered from viewpoints of not only prevention but also establishment of sanitary and pleasant work environment.

4) Whole Stage Aspect

Citizen Co-operation of the Municipal Waste Discharge

As for the municipal waste disposal of Poznan, since collection, transportation, intermediate treatment and final disposal should be conducted under the responsibility of the Poznan municipalities, it is possible to improve the waste management by the efforts of not only the municipalities but also other authorities.

However, municipal waste discharge is created by citizens who are not under the direct control of the authority. The habit of scattering of the waste will never be changed only by means of strengthening the regulations or performing strict surveillance. Hence, some problems of waste discharge contain matters which cannot be solved within the power given to the municipality regardless of its efforts.

It may be possible to increase the number of collection workers and to observe all areas of municipal waste collection. But if such a program is adopted, it will not only result in a vast increase in costs but also encourage scattering of the waste by the citizens.

Consequently, the way in which municipal waste is managed depends on environmental awareness of the residents. In other countries, most problems related to discharge of municipal waste are caused by low environmental awareness and lack of responsibility by those causing such problems.

The municipality has to encourage the citizens to improve environmental awareness in order to solve problems related to municipal wastes. Municipal waste problems cannot be finalized if they are manipulated only from a managing standpoint.

The authorities concerned are requested to clarify what the overall administration should do to motivate environmental awareness. Many problems of municipal waste are related to social issues and systems, for example decision making, social conflict, poverty, etc., which may not be solved in a short time.

The concerned authorities should organize public relations and education programs for citizens related to waste management. If all authorities do not participate in making efforts, a satisfactory effect cannot be expected. Among them, the municipality is requested in particular to make its role in the overall administration clear and perform it step by step.

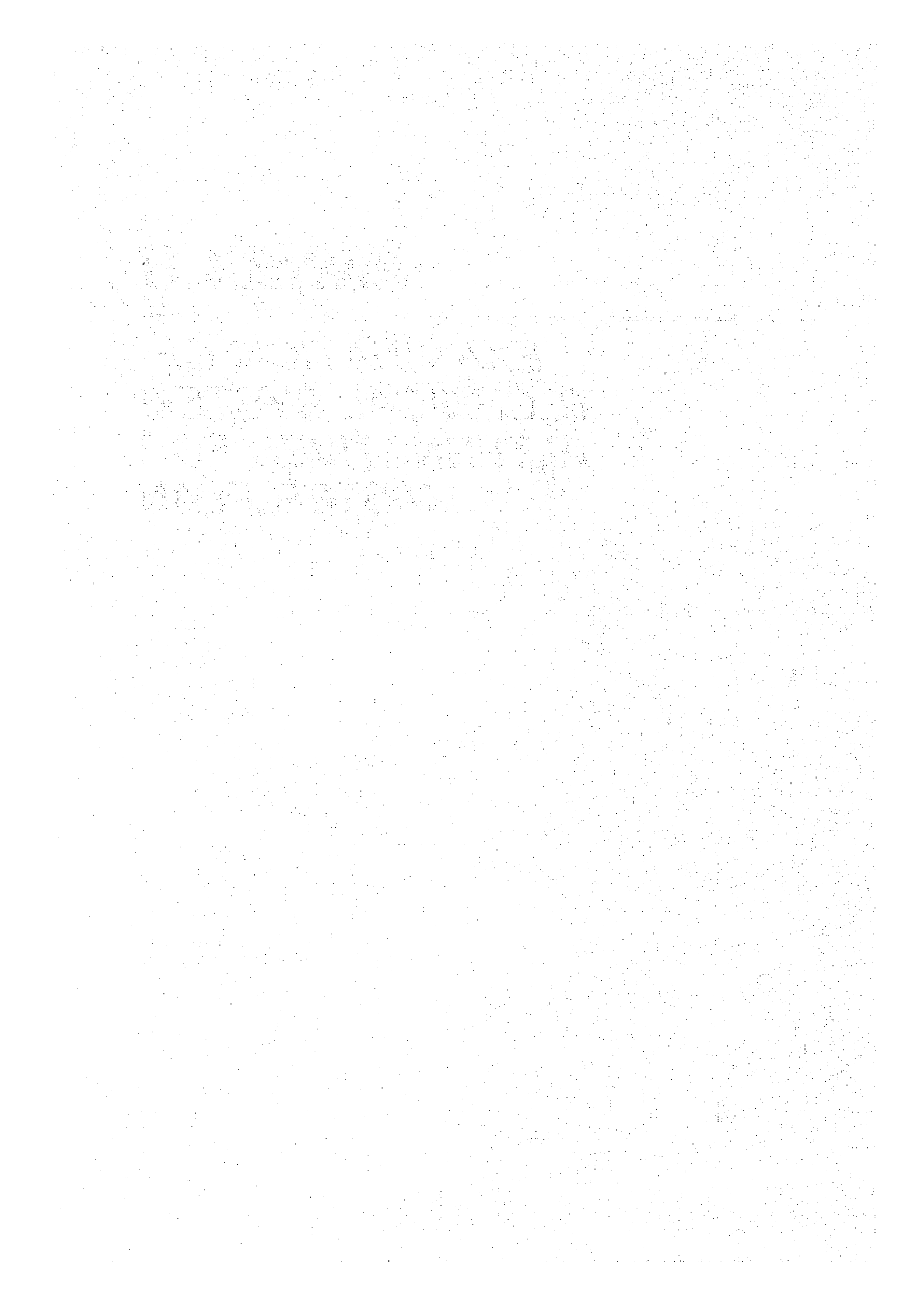
As for the public relations activities with residents, the following program should be considered as an example.

" MALTA ECOLOGY MARATHON "

for the encouragement of the citizen's environmental awareness.

ANNEX H

EXAMINATION OF TECHNICAL SYSTEM ALTERNATIVES FOR MASTER PLAN



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