

Annex 3

Present Solid Waste Management

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3 Present Solid Waste Management

3.1 Present SWM in Adana GM

3.1.1 Present Waste Stream

The following figure presents the waste stream in the greater municipality of Adana.

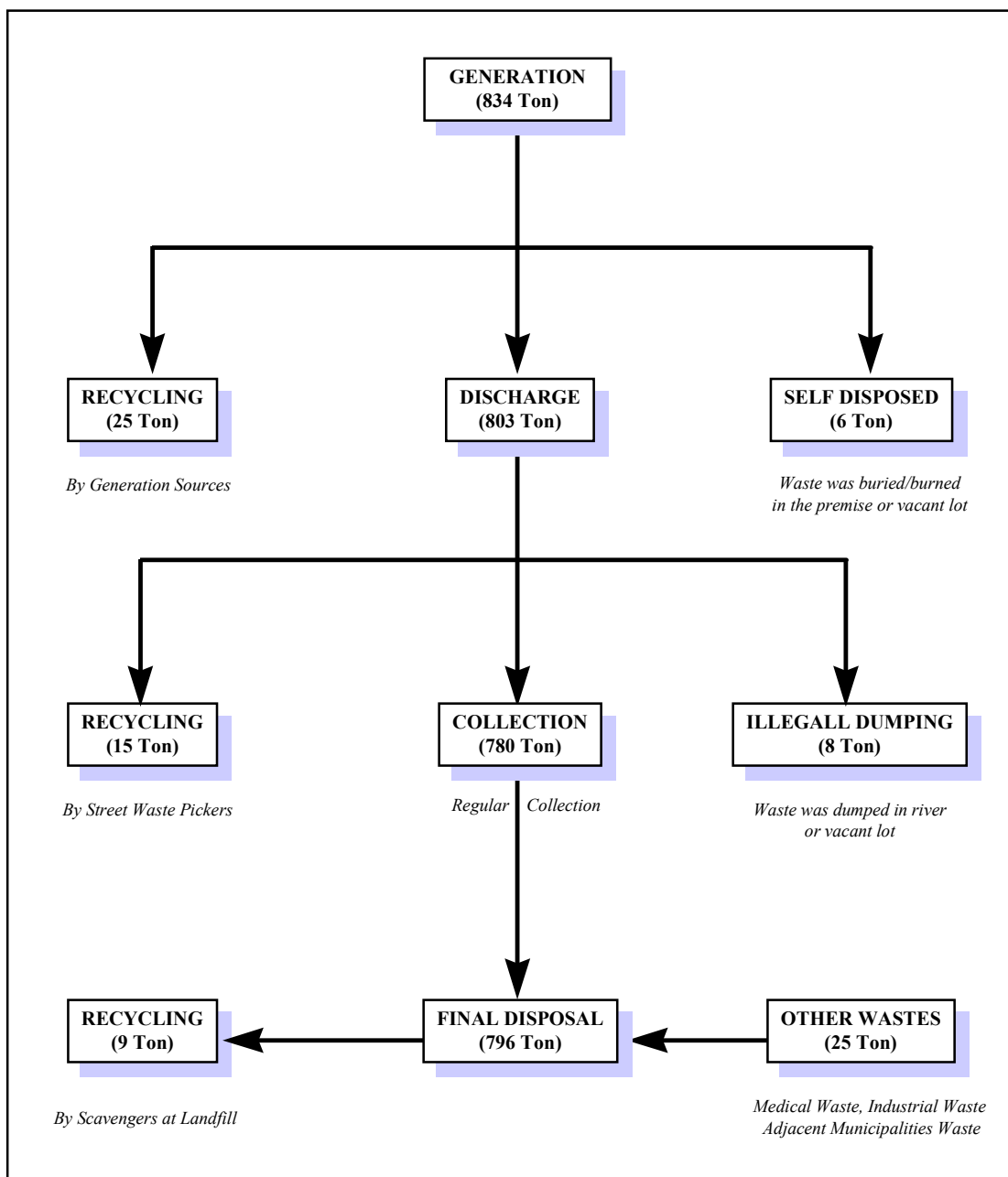


Figure 3-1: Present Waste Stream in Adana GM

3.1.2 Technical System

The Greater Municipality of Adana is responsible for solid waste management activities through the “Cleansing Department” of the “Directorate for Urban Development and Environmental Protection” within the city. The Cleansing Department of the Greater Municipality is responsible for the cleansing of main streets, treatment and disposal of solid wastes, where the district municipalities of Seyhan and Yuregir are responsible for the collection and transfer of municipal wastes and also cleansing of the streets.

a. Discharge and Storage

Solid wastes in Adana are produced in households, commercial and industrial premises, institutions, hospitals and on the streets. Data necessary to identify the storage and collection system of Adana highlighted during the discussions with the district municipalities are given in Table 3-1.

Table 3-1: Adana Storage and Collection System

Data	Seyhan DM	Yuregir DM
Population (1997 Census)	800,000	320,000
Service Area	11,550ha	3,500ha
Households Served	251,450	90,000
Waste Generation Amount	800-1000t/d	350t/d
Household Waste	70% of total waste amount	70% of total waste amount
Market Waste	20t/d	10t/d
Commercial Waste	-	15% of total waste amount
Medical Waste	1t/d	-

Source: Seyhan and Yuregir DM

When discussing the waste storage in Adana, two systems are being identified:

- Communal system
- Curbside system

Communal storage is where a number of dwellings, sometimes commercial, use one common container. The average container size in this system in Adana is 0.2 - 0.8m³, and the type of containers used is often standard wheeled containers, and some stationary cubicles.

Curbside storage is a system where residents place their own containers onto the footway. The average container size in this system in Adana varies from 20 lit. bins to 800 lit. wheeled containers. The types and capacities of the storage receptacles which are used in Adana are given in Table 3-2.

Table 3-2: Types and Capacities of Waste Containers in Adana

Storage Units	Seyhan DM	Yuregir DM
Wheeled containers	400 lit., 800 lit.	not used
Barrels	200 lit.	200 lit.
Cubicles	200-400 lit.	200-400 lit.
Bins	20 lit.	20 lit.

The number and ownership of waste storage receptacles in Adana are given in the table below.

Table 3-3: Quantity and Ownership of Waste Containers in Adana

Data	Seyhan DM	Yuregir DM
Number of containers		
wheeled containers (400 lit.)	unknown	not used
wheeled containers (800 lit.)	unknown	not used
barrels	1500	2500
cubicles	300	600
bins	unknown	unknown
Ownership of containers		
wheeled containers (400 lit.)	household	-
wheeled containers (800 lit.)	household	-
barrels	municipality	municipality
cubicles	municipality	municipality
bins	household	household

Seyhan and Yuregir District Municipalities own the barrels and cubicles, while the wheeled containers are owned by households.

b. Collection and Haulage

Seyhan and Yuregir District Municipalities are responsible of the collection of solid wastes in Adana. Cleansing Departments of these district municipalities make their own plans and programmes in order to manage the collection and cleansing activities.

Collection of solid wastes is carried out on collection district basis in Adana. Seyhan District Municipality covers 22 collection districts (11 *mahalles* in north Seyhan and 11 *mahalles* in south Seyhan), and Yuregir District Municipality covers 6 collection districts (28 *mahalles*).

b.1 Collection System

Existing collection system within the municipal districts of Adana is a mixture of the following three methods:

- Communal collection

In this system, solid waste deposited in communal containers shared by a number of dwellings or commercial premises is collected by collection vehicles. This system is mostly applied in high and middle-income residential areas, commercial, and market areas in Adana. This system mostly uses standard wheeled containers (400-800 lit.) and some cubicles. While loading the waste into the collection vehicle, deposits on the ground are manually swept and placed into the truck.

- Curbside collection

The places where the curbside collection system is applied are apartment/buildings that place their own containers by the curb. These containers are carried over to the collection vehicle by the municipal collection worker for discharge, and then returned back to the collection point. This system is applied in high and middle income residential areas in Adana. The system uses standard wheeled containers, some cubicles, and 20 lit. barrels. The significant amount of street litter is also disposed of into the vehicle manually by the collection worker.

- Door-to-door collection

This collection system is applied in middle and low income residential areas – in *mahalles*, especially in *gecekondur areas* – where waste collection workers collect the container from within the perimeter of the household, discharge the waste into the collection vehicle, and returns the container back to its original place. Barrels (820 lit.) and bins are used in this collection system. The significant amount of street litter is also disposed of into the vehicle manually by the collection worker.

Waste collection is carried out daily (single shift) in Adana. Only Yuregir District Municipality has night shifts with 5 collection vehicles operating. The working hours adopted for the municipal collection system in Adana is given in Table 3-4.

Table 3-4: Adana Collection System Working Hours

Data	Seyhan District Municipality	Yuregir District Municipality
Operation hours	South: 0700 - 1500 North: 1500 - 2300 Main Streets: 2300 - 700	0700 - 1600 Night shift: 1500 - 2300
Collection frequency	Daily (except Sundays)	Daily (except Sundays)

When formulating the national strategy for solid waste management in Turkey, it is necessary that proper attention is given by the municipalities on the avoidance of generating unnecessary waste, waste minimisation, source separation, and recycling.

There are no recycling activities in Adana which is planned or executed by the district municipalities, except for a high degree of informal scavenging. There is also no transfer system, hence vehicles haul waste directly after collection to the disposal site.

b.2 Routing

An efficient collection system cannot be established without defining the collection vehicle route, which is fundamental for the effective use of both workforce and equipment.

During the Time and Motion Survey executed in Adana, it is understood that the routes to be followed by the collection vehicles during trips are not properly defined. There is a route which is mainly clarified by the cleansing department associated by the driver, but it has been observed that oftentimes the route is changed according to the driver's discretion.

b.3 Privatisation

The district municipalities of Seyhan and Yuregir manage solid waste activities using their own manpower, vehicular and spatial resources, and availabilities. The municipalities indicate no intention to privatise the collection services, although Seyhan has privatised its street sweeping service. In addition to their vehicular resources, both district municipalities seasonally lease tractor trailers for collection on a contractual basis and in accordance with terms agreed upon with the respective owners of the trailers.

There are strict anti-privatisation intention and conservative approach in the management of public services within the cleansing departments of these district municipalities. These cleansing departments have articulated that monitoring and

control of their own operations as well as evaluation of work performance and service levels could be implemented more efficiently than when services are privatised or contracted out. Municipal officials also indicate that, although the administration is aware of the fact that an in-house personnel would mean a threefold increase in remuneration expenses compared to the expenses when services are contracted out to a private company, they do not prefer privatisation due to the enormous damping rates in bidding, which they see as a factor that downgrades the service level.

b.4 Equipment and Labour

- Equipment

Adana has a mechanised solid waste collection system, with a collection fleet that ranges from tractor trailers, open lorries, and compaction vehicles of different capacities.

Both Seyhan and Yuregir use their own manpower and vehicles. In addition, due to inadequate planning and the number of collection vehicles available, they also lease compaction vehicles and tractor trailers. The type and capacity of the collection fleet of Seyhan and Yuregir are given in the following table.

Table 3-5: Collection Fleet of Seyhan and Yuregir District Municipalities

Vehicle Type & Capacity	No. of Vehicles	
	Seyhan DM	Yuregir DM
Compaction truck (16m ³)	-	24
Compaction truck (12m ³)	24	11
Compaction truck (6m ³)	20	-
Tractor trailer (4m ³)	4	-
Lorry (10 ton)	-	1
No. of Trips	2	2

The type and capacity of collection vehicles leased by Seyhan and Yuregir are given in the table below.

Table 3-6: Collection Vehicles Leased by Seyhan and Yuregir District Municipalities

Vehicle Type & Capacity	No. of Vehicles	
	Seyhan DM	Yuregir DM
Compaction truck (8m ³)	10	-
Compaction truck (6m ³)	3	-
Tractor trailer (6m ³)	-	46
No. of Trips	2	2-3

- Labour

The Adana Greater Municipality Cleansing Department, which is linked to the Directorate for Urban Development and Environmental Protection, carries its function with its employees composed of 1 director, 1 deputy director, 1 secretary, 2 supervisors, and 1 driver. The main collection function of the

department is the sweeping of main roads (boulevards) and cleansing of parks within the city of Adana.

The Cleansing Department of Seyhan District Municipality manages solid waste with mobile and office staff of its own. The employees of the Cleansing Department are organised under 3 sections, which are supervised by a manager and 3 deputy managers, of which 2 is responsible of 2 collection districts and 1 of vehicles and administrative issues. Street and park cleansing in Seyhan is fully privatised to a private contractor. The staff of the cleansing department is given in Table 3-7 below.

Table 3-7: Seyhan Cleansing Department Labour Force

Position	No. of Staff
Manager	1
Deputy Manager	3
Supervisor	2
Chief Driver	3
Driver (Collection)	122
Driver	17
Collection Worker	342
Administrative Staff	10
Total	500

The Cleansing Department of Yuregir District Municipality prefers to manage solid waste using its own mobile and office staff. The employees of the cleansing department are organised under 14 sections supervised by a manager and deputy managers. The municipal staff of the cleansing department is shown in Table 3-8 below.

Table 3-8: Yuregir Cleansing Department Labour Force

Position	No. of Staff
Manager	1
Deputy Manager	2
Supervisor	7
Driver	30
Collection Worker	118
Street Sweepers	30
Logistical Personnel	18
Administrative Staff	26
Total	232

All employees of the cleansing department, including the manager, are contracted by the municipality under labourer status. The collection team for leased tractor trailers are appropriated from the employees of the municipality. The collection team in both district municipalities are composed of one driver and two collection workers.

c. Public Area Cleansing

Public area cleansing and street sweeping are one of the most visible of all municipal waste collection services. Consciously or not, residents allow their opinions on the

effectiveness of street sweeping programs, influence their assessment of the credibility of their municipal leaders and local officials. Visitors instinctively rate municipalities based on their external conditions, i.e., cleanliness. Dirty cities do not attract foreign investors. These opinions should be positively used to stimulate the residents to build a better city.

Street sweeping programs were conducted mainly to remove litter and dirt so that streets appear presentable, and traffic will not create dust. Specifically, in some areas, regular street sweeping is necessary to prevent sewers from becoming clogged. Dust is also recognised as a potential pollutant.

Public area and street wastes arise from three main sources in Adana:

- Natural wastes which were including the dust blown from unpaved areas and infrastructural works, decaying vegetation and fallen leaves, etc.
- Road traffic wastes which were including the motor vehicles deposits, rubber and mud, and sometimes spills from vehicles.
- Pedestrian wastes which include the litter dropped by pedestrians or swept onto the footways by shopkeepers, markets, etc.

The Cleansing Department of Adana Greater Municipality is linked to the Directorate for Urban Development and Environmental Protection. It is responsible for the cleansing and sweeping of main roads, boulevards. The department pursues a considerably privatised model and supervises the cleansing and street sweeping activities commissioned to the contractors, namely Tugce and As Ertas Cleansing Companies, which are separately active in the service areas of the Seyhan and Yuregir districts, respectively.

Table 3-9: Manpower of Private Companies Contracted by the Adana Cleansing Department

Qualification	Manpower	
	Tugce Co., Ltd. (Seyhan)	As Ertas Co., Ltd. (Yuregir)
Drivers	50	25
Sweepers	250	100

The cleansing of other streets, roads, and public areas is the responsibility of district municipalities. Seyhan carries out this responsibility through Ileri Co., Ltd., a private contractor, with 250 workers for street sweeping operations, as well as cleansing of periodically set up local market places with the support of the municipal vehicles.

Contrary to the Seyhan District Municipality, Yuregir District Municipality prefers to carry out solid waste collection and transfer, and street cleansing using its own manpower, vehicular and spatial resources, and availabilities. The municipality allocates 350 labourers for street cleansing.

The cleansing of streets and public areas by Adana Greater Municipality, Seyhan and Yuregir District Municipalities is accomplished by mechanical plants. The equipment used for public area cleansing is shown in Table 3-10.

Table 3-10: Public Area Cleansing Equipment

Municipality	Equipment/No.
Adana GM	Vacuum Street Sweeper (8) Street Washer (2)
Seyhan DM	-
Yuregir DM	Street Washer (2)

d. Recycling

The study team conducted surveys on the recycling system in the target area, including a survey on the informal recycling activities carried out at present. The surveys were carried out by distributing questionnaires and interviewing relevant authorities. The details of the survey are shown in section 2.5.2, *Survey on Recycling System*.

Based on the results of the survey the team concluded the recycling rate in Adana GM is **5.9 %** as shown in the table below. According to the table the recycling at generation sources through “Eskici”, etc. shares more than 50 %.

Table 3-11: Recycling Amount in Adana GM

Items	Recycling Amount
unit: ton/day	
A. Recycling by the Private Sector	
1. Consumers/Generation Sources	25
2. Street Waste Pickers	15
3. Scavengers at the Dumpsite	9
Sub-total (A)	49
Recycling by the Public Sector	0
Sub-total (B)	0
Total (A + B)	49
Estimated SW Generation	836
Recycling Ratio (%)	5.9 %

e. Intermediate Treatment

There is no particular intermediate treatment method observed to be or have been adopted in the study area.

f. Final Disposal

This section of the report describes the present landfill that serves the Greater Municipality of Adana. The landfill is located in “Sofulu”. This section also identifies the technical and operational problems.

f.1 Location and City Planning

The landfill is located at Old Kozan Road in the municipality of Sofulu as shown in Figure 3-2. It is located approximately 10 km north of the Adana City Centre. The landfill covers an area of approximately 20 ha on the western side of a valley. Huge gravel quarries are operated on the opposite side of the valley.

The city planning (Adana Master Plan, 1996) for the site and its surroundings is presented in Figure 3-3.

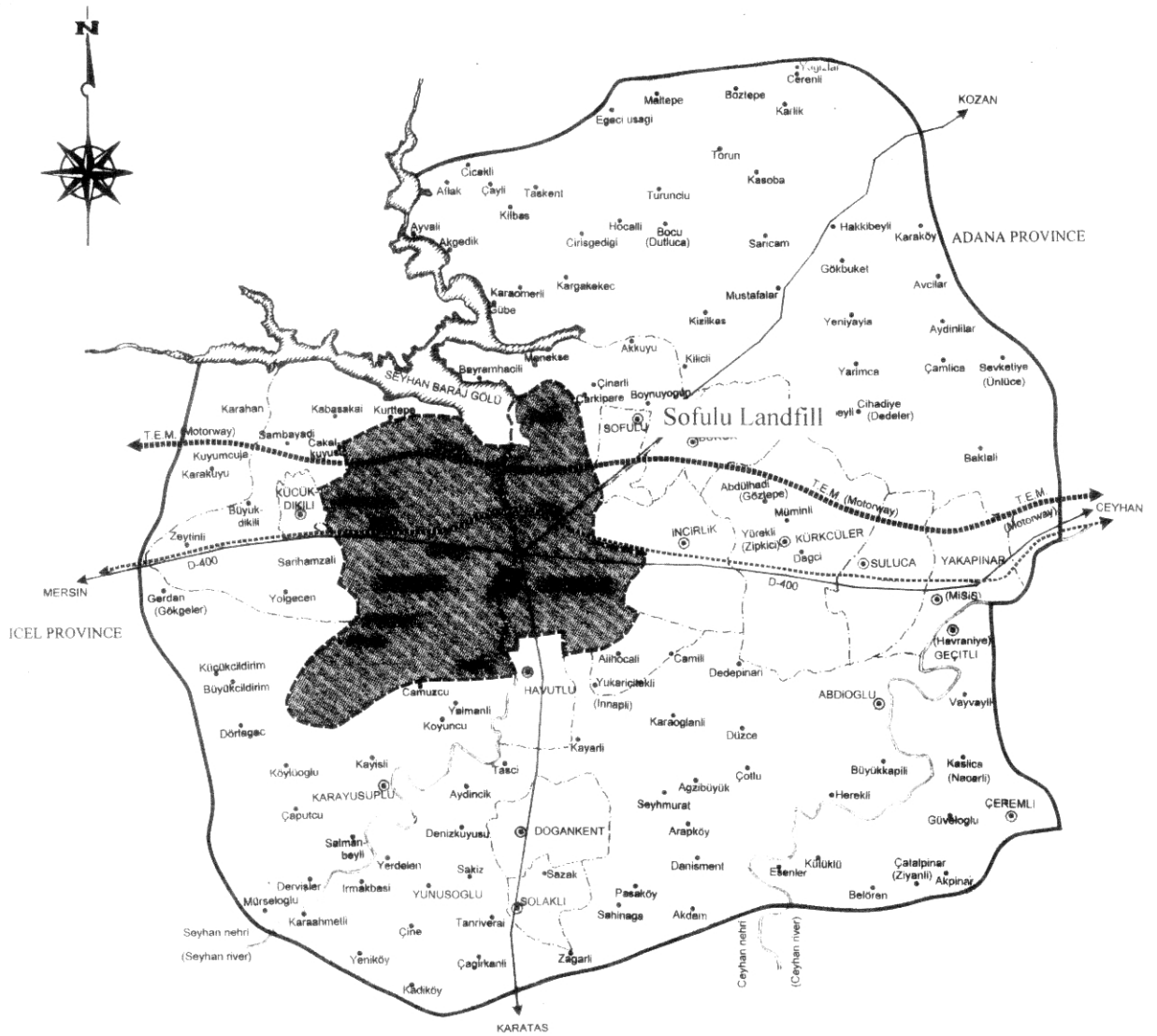


Figure 3-2: Location of the Sofulu Landfill Site



Figure 3-3: City Planning for Areas Near the Sofulu Landfill Site (1:25,000)

f.2 Hydrogeological Conditions at the Site

In 1997 the project called “Rehabilitation of Open Dump Sites” undertaken by IULA-EMME (International Union of Local Authorities, section for the Eastern Mediterranean and Middle East Region) carried out provisional hydrogeological investigations for the surroundings of the Sofulu Landfill. The results of the investigations are summarised as follows.

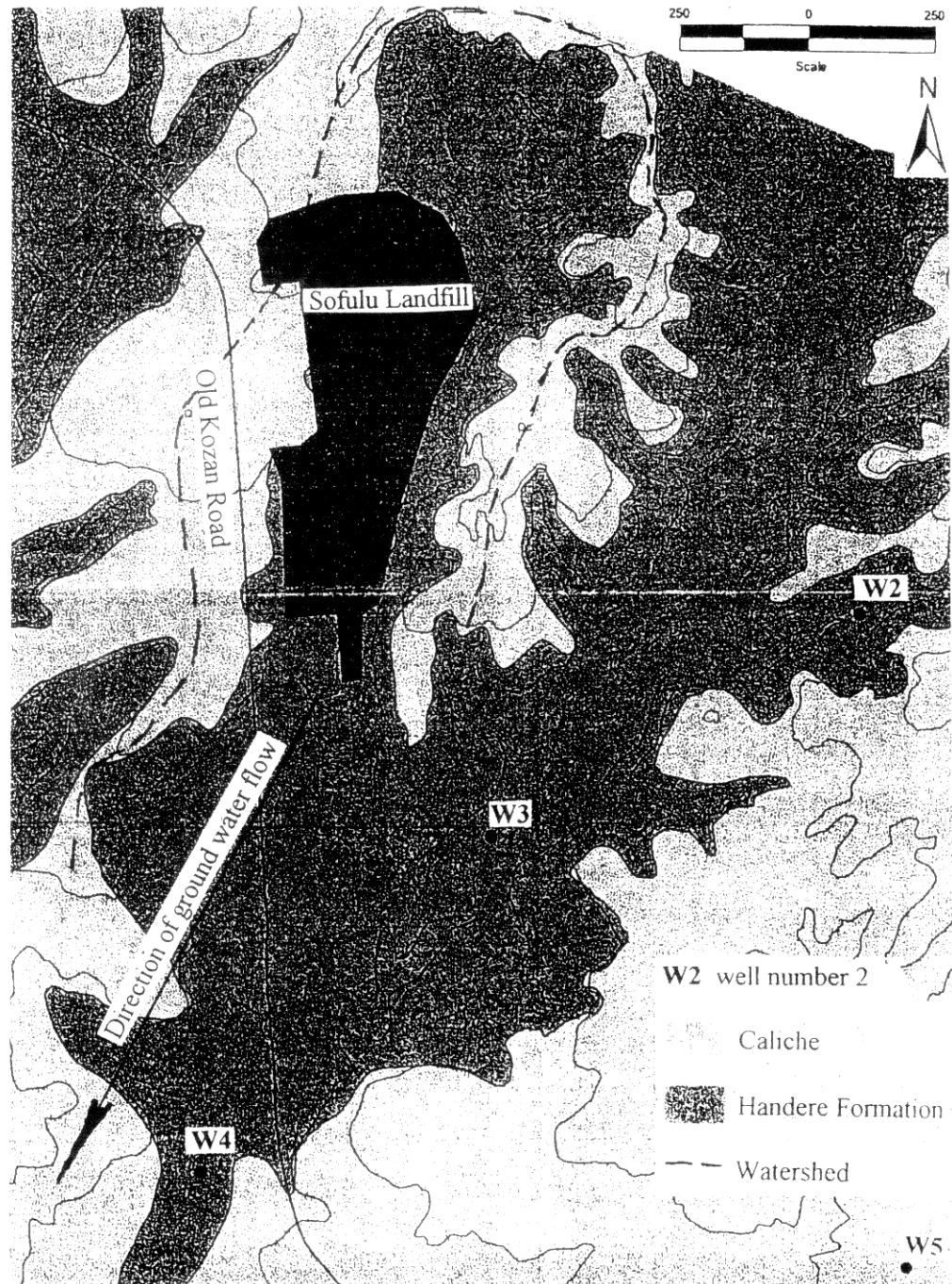


Figure 3-4: Geological Description of the Sofulu Landfill Site

The Sofulu landfill site is located in a valley comprising a drainage basin of approximately 1km².

The bedrock called “Handere Formation” is exposed on more than 2/3 of the surface of the drainage basin, and the remaining part is overlain by up to 7m thick calcite deposits that consist of calcium carbonate ions. The age of calcite deposits is Quaternary. The “Handere Formation” consists of a conglomerate of sandstone, mudstone, and marl. The thickness of the formation ranges between 120m and 700m. Its age is Pliocene.

The “Handere Formation” serves as an aquifer for the area. The permeability of the conglomerate (“Handere Formation”) is assessed at 10⁻² to 10⁻⁴ cm/sec.

As shown in Figure 3-4 above and specified in Table 3-12, a number of wells tapping the “Handere Formation” are located south of the landfill.

Table 3-12: Specifications for Wells South of the Landfill

Well No.	Ground Elevation (m)	Depth	Water Level (m)	Date of Measurement
W-2	102	~15 m	4.40	1997-07-30
W-3	87	~25 m	2.95	1997-07-30
W-4	74	~25 m	11.95	1997-07-31
W-5	82	~30 m	9.30	1997-07-31
W-6	66	~40 m	35.60	1997-07-31

The water levels in the wells indicate that the direction of the groundwater flow is SSW towards the Seyhan River. It is concluded that the groundwater resources south of the Sofulu Landfill can be used for irrigation purposes. However, they cannot be used for drinking unless a comprehensive monitoring programme of boreholes south of the landfill is undertaken.

A project to develop a drinking water source in the Taurus Mountains for the city of Adana from year 2000 is urgently required.

f.3 Layout of the Landfill

Dumping on the site started in 1990 when a landfill site in Gunesli was abandoned. However, no precautions whatsoever were taken to protect the environment. The landfill is operated as a simple dump and people has been complaining for many years, main reason being that the landfill is always smoking. When wind direction is towards the Mediterranean Sea people living in the city centre of Adana can smell the landfill. The layout of the landfill is presented in Figure 3-5.

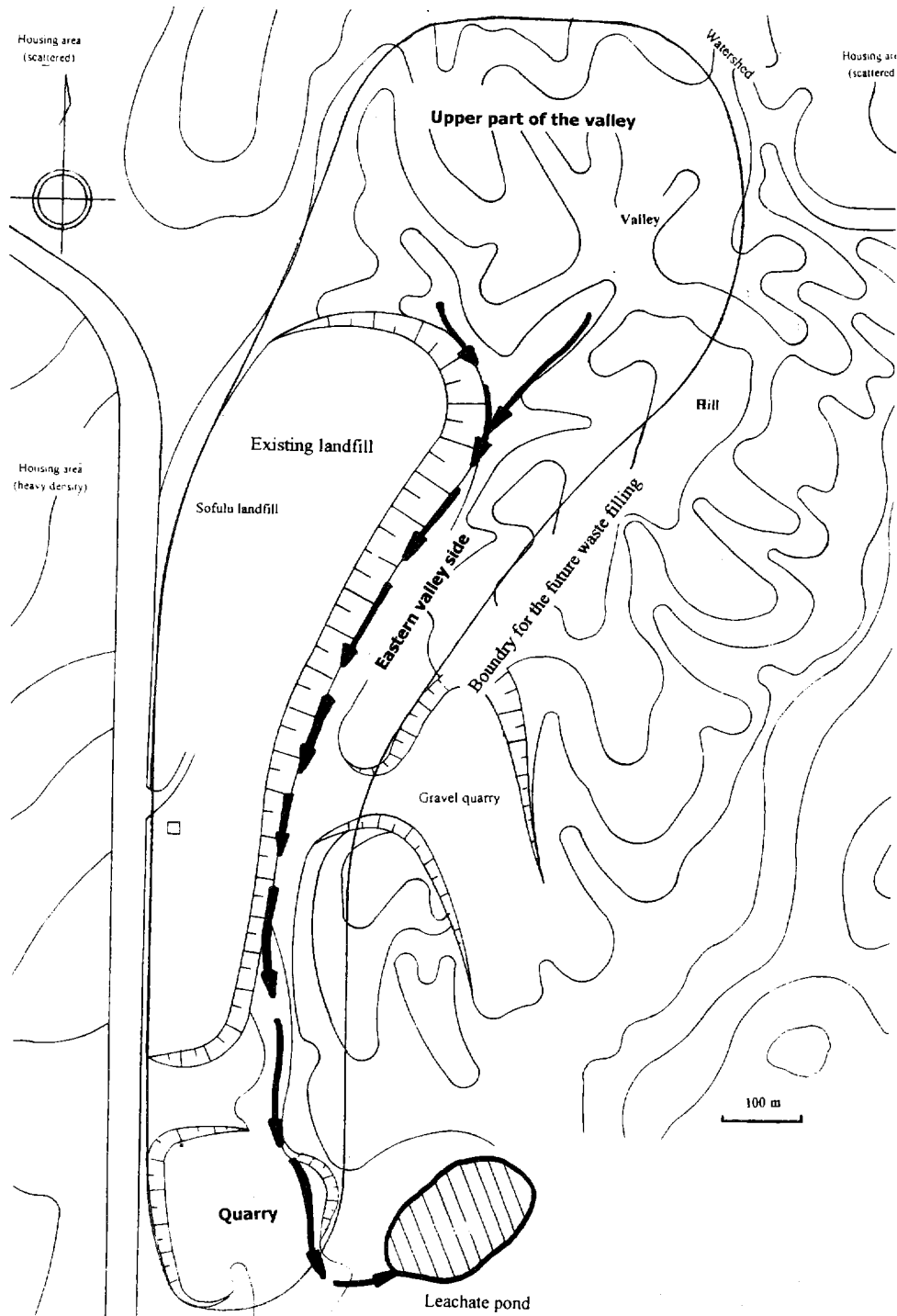


Figure 3-5: Layout of the Present Landfill

From the figure it appears that a guardhouse is constructed at the entrance to the site. No other facilities have been provided, such as:

- Fence
- Weighbridge
- Facilities for the staff
- Workshop for maintenance of landfill equipment
- Leachate treatment facilities

A more than 1km long waste front, very steep and in some places more than 10m high is always smoking/burning, causing bad smells not only to people living near the landfill, but also to people near the City Centre of Adana. Because the waste front is so steep it cannot be covered with soil. It is always smoking.

The landfill is situated on the western side of a valley. However, not at the upper part of the valley that is occupied by farmland. Run-off water from the upper part of the valley is penetrating into the landfill and creating an unnecessary large generation of leachate.

At the bottom of the valley is a stream with water that is a mixture from leachate and clean run-off water from the upper part and the eastern side of the valley. Leachate from the stream is collected in a pond south of the landfill; but no facility has been constructed to prevent leachate from percolating into the ground. No precautions for control of gas from the landfill has been constructed.

f.4 Organisation and Manpower

Part of the organisation chart for the Greater Municipality of Adana covering the Department of Environmental Protection is presented in Figure 3-6.

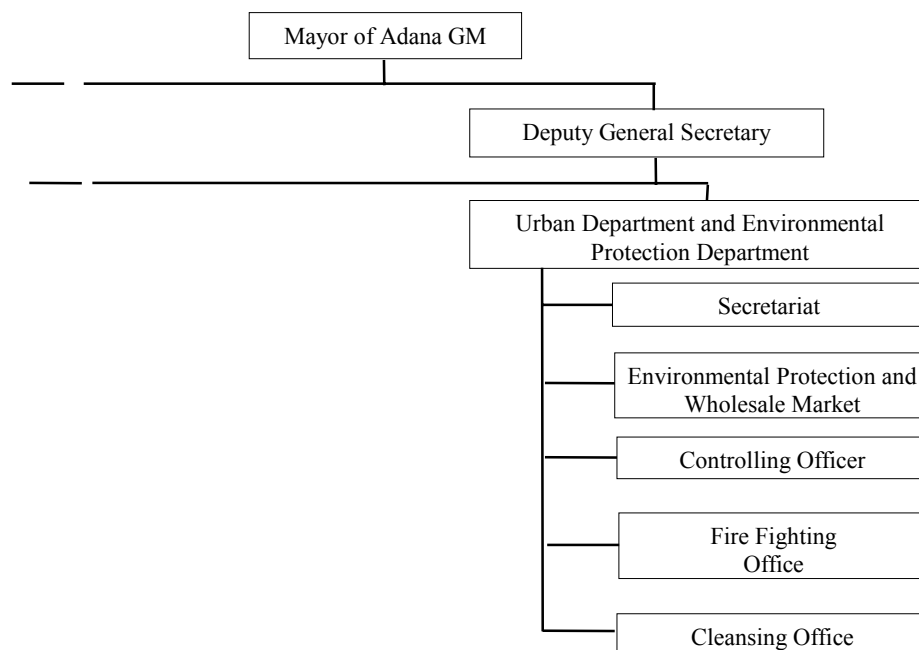


Figure 3-6: Part of the Organisation Chart of Adana GM

The control and management of Sofulu landfill is undertaken by the Cleansing Office of Adana Greater Municipality. The Municipality has awarded a contract on operation of the landfill to a private contractor. The contract has a validity of 1 year; but can be prolonged subject to negotiations. The contractor has employed personnel as follows at the landfill:

- 1 manager
- 6 operators of landfill equipment

f.5 Operation of the Landfill

In accordance with the waste collection, the landfill is operated 6 days a week, and on Sundays ½ day. The landfill is operated by a private contractor and the following equipment owned by the contractor is normally available on the landfill:

- 2 bulldozers
- 1 excavator
- 3 tractors with trailers
- 1 water tanker

Furthermore, the Municipality and the private contractor allow scavengers to operate on the landfill without any money being pay by the scavengers to the municipality or to the contractor. The number of scavengers on the landfill varies between 15 to 40 scavengers.

Daily unloading of collection trucks takes place on a selected but very big area. The waste heaps are not levelled by a bulldozer on the same day. It can take days before the scavengers that are employed by the private contractor have completed picking. When the scavengers have finished, the bulldozers normally dump the waste over the steep waste front, where it cannot be covered by soil. Sometimes the waste heaps are levelled by the bulldozer and covered by soil; but the works are not carried out until days after the waste was unloaded.

A big part of the landfill area (1000m x 200m) is covered with waste heaps that have not been levelled by a bulldozer and are not properly covered with soil. The waste heaps are burning and smoking. The present operation of the landfill can merely be characterised as simple dumping.

f.6 Waste Transported to the Landfill

The landfill is serving the Greater Municipality of Adana comprising the District Municipalities of Yuregir and Seyhan, a population of approximately 1.2 million in 1997. As no weighbridge has been installed at the landfill, no record on the received quantity of waste is available.

In order to determine the final disposal amount at the landfill site in Sofulu, the team observed the number of incoming vehicles for 1 week, from September 9-16, 1998. Based on the results of the observation the final disposal amount was assumed at 862 t/day.

Waste is taken from the following sources:

- Households
- Commercial establishments (offices, shops, etc.)

- Streets

Furthermore, hospital waste is disposed of in selected areas of the landfill. The private contractor informed that private industries are allowed to dump waste on the landfill free of charge. The contractor informed that hot industrial waste from a factory called "Marsa" caused the landfill to burn.

f.7 Materials Sorted out by Scavengers

Materials sorted out by scavengers are presented in the following table, which also indicates the present prices and the final buyers of the materials, based on one of the 5 scavenger bosses, Mr. Shaban, operating on the landfill.

Table 3-13: Materials Sorted out by Scavengers at Sofulu Landfill and Prices (1998 September, US\$ 100 = 27.8 million TL)

	1997(ton/month)	TL/kg (1998)	Revenue in 1997 (1998 prices)
Metal	80	8,000	7,680 mill. TL
Soft metal	10	80,000	9,600 mill. TL
Plastic	40	32,500	15,600 mill. TL
Plastic (PET)	20	35,000	8,400 mill. TL
Glass	80	5,500	5,280 mill. TL
Card board	30	12,000	4,320 mill. TL
Bone	10	15,000	1,800 mill. TL
Total			52,680 mill. TL

As can be seen from the table, the revenue from scavenging on the landfill is quite considerable, approximately US\$ 190,000/year.

f.8 Leachate Generation

f.9 Financial Data

Financial data on income from operating the landfill were obtained from the Municipality as presented in the following table.

Table 3-14: Financial Data

	US\$ 1 to TL	Income (TL)	Operation Costs (million TL)
1998 10 months	284,480	0	85,403
1997	180,655	0	60,104
1996	97,306	0	12,035
1995	50,803	0	8,631
1994	35,200	0	2,247

The Municipality does not have any income from receiving waste from the private sector and from the sale of recyclable materials sorted out by scavengers.

f.10 Summary of Deficiencies

Main deficiencies are summarised as follows:

- The present waste front along the maturation area is very steep, and in some places more than 10m high. Because it is so steep the waste front cannot be covered with soil. **The Landfill is always smoking**, causing bad smells not only to people living near the landfill, but also to people near the city centre of Adana.
- A big part of the landfill area (1000m x 200m) is covered with waste heaps that have not been levelled by a bulldozer and are not properly covered with soil. The waste heaps are burning and smoking.
- The landfill is situated on the western side of a valley. However not at the upper part, and no facilities have been constructed to divert clean run-off water. Thus, an unnecessary big quantity of leachate is generated, and at the bottom of the valley is a stream with water that is a mixture from leachate and clean run-off water.
- No proper facilities are available for collection and treatment of leachate. Leachate from the stream is collected in a pond south of the landfill; but no facility has been constructed to prevent leachate from percolating into the ground.
- Operation procedures are very inappropriate. Daily unloading of collection trucks takes place on a selected but very big area. The waste heaps are not levelled by a bulldozer on the same day. It can take days before the scavengers have completed picking. When the scavengers have finished, the bulldozers normally dump the waste over the steep waste front, where it cannot be covered by soil. Sometimes the waste heaps are levelled and covered by soil; but the works are not carried out until days after the waste was unloaded. The operation of the landfill can merely be characterised as simple dumping.

The mentioned deficiencies reflect very uncontrolled conditions.

f.11 Conclusion

Rehabilitation works for the landfill are urgently required. A whole city is suffering due to smoke from the landfill. The works will be very difficult and expensive because:

- The waste front at the bottom of the valley is very steep and in some places more than 10-15 m high. It is always smoking because no soil coverage can be provided for such a steep waste front.
- No proper facility has been constructed for the collection and treatment of leachate.

Even if Sofulu landfill is closed when a new landfill has been developed on a new site, the rehabilitation works at Sofulu landfill will remain. The rehabilitation works at Sofulu landfill could be carried out in a cost effective way, if the works are combined with the continued operation of the landfill for another maybe 10 years (subject to detailed evaluations during the course of this study). The provisionally proposed boundary of the extended landfill is shown in . A detailed proposal for the rehabilitation works will be presented during the course of this study.

The main task for securing the continued operation of the Sofulu Landfill is that new procedures for operating the landfill are introduced:

- A precondition for proper landfill operation is that an access road is constructed to the bottom of the valley.
- Since scavenging obstructs proper landfill operation, but contributes with a considerable income to scavengers, due consideration must be taken to the issue of how to avoid scavenging on the landfill or how to combine scavenging with proper landfill operation.

The groundwater south of the Sofulu Landfill:

- Can be used for irrigation purposes only.
- Cannot be used for drinking unless a comprehensive monitoring programme of wells and boreholes is undertaken.

A project that will develop a drinking water source at the Taurus Mountains for the City of Adana from 2000 is urgently required.

f.12 Recommendations

It is recommended that some urgently required rehabilitation works of the landfill are undertaken as soon as possible. Further it is recommended that the site be operated as a landfill for another maybe 10 years (subject to detailed evaluations during the course of this study). The recommendation is subject to:

- New procedures for operating the landfill are introduced.
- The construction of residential areas close to the landfill site are postponed.

As the revenue from scavenging on the present landfill is rather high, due consideration must be taken to the issue of how to avoid scavenging or how to combine scavenging with a proper operation of the landfill. The Municipality should consider how to generate income from disposal of waste from private companies.

g. Operation and Maintenance of Vehicles and Equipment

Seyhan and Yuregir have central workshops where general repair and maintenance of vehicles and equipment are carried out on a regular basis. Major repairs are forwarded to private workshops. The workshop area is also used for washing and parking of vehicles.

Daily inspection is the responsibility of the drivers. Periodical inspection of all vehicles, tire repair, lubrication, daily washing and disinfection are handled in the workshop as well.

There is no preventive maintenance for equipment. A preventive maintenance program would certainly ensure the sustainable use of the equipment.

h. Medical SWM

h.1 Regulation on Control of Medical Wastes

There are five regulations that cover waste generated by hospitals: the Solid Waste Control Regulation, Regulation on the Control of Medical Waste, Hazardous Waste

Regulation, Radioactive Waste Regulation, and the Water Pollution Control Regulation. In accordance with the regulation prepared pursuant to the Environmental Act (Law 2872 of 8 September 1983), infectious and hazardous waste should be handled separately. However, the results of the survey on medical institutions and the observations carried out in the final disposal site indicate that medical waste management conditions in Adana GM do not comply with the regulation issued.

h.2 SWM in Medical Institutions

Twenty-eight medical institutions in Adana GM were interviewed to survey medical waste management conditions. The survey result is outlined as follows.

h.2.1 Waste Storage in the Departments (at points of discharge)

Out of those surveyed, sixteen hospitals do not generate hazardous wastes (including X-ray solutions). Six hospitals reportedly use X-ray solutions.

Eleven percent of the surveyed hospitals mix general waste with infectious waste, and another 11% mix infectious waste with hazardous waste. All the rest (82%) comply with the law, i.e., they separate infectious waste, general waste, and hazardous waste, at the point of discharge.

h.2.2 Storage of Infectious and Hazardous Wastes at the Central Collection Point

Almost all 25 hospitals (89.3%) maintain the storage system used in the department at the central collection point. The remaining 3 (10.7%) subsequently mix infectious and hazardous wastes with general waste even though they were discharged separately in the departments.

The most preferred storage container for infectious wastes at the central collection points is a 275 lit. metallic container with a lid and a lock. Seven (25%) of the hospitals surveyed use this container.

The next common storage container is a metallic container of the same capacity with a lid but without a lock. Five of the medical institutions surveyed use this container. Three of the institutions were found to use 400 lit. metallic containers with a lid and a lock, while another three were found to use the same type of containers with a lid but without a lock.

One hospital (3.6%) stores infectious waste in 50 lit. plastic containers and another one (3.6%) has a special air-conditioned room with a drainage system that it uses for storage; these storage conditions are in accordance with the law.

Two hospitals (7.1%) leave their infectious waste outside either in plastic bags or in an uncovered truck. All hospitals (6, 21.4%) that produce X-ray solutions use plastic water barrels for storage. Four hospitals (14.3%) use lead containers to store radioactive waste.

h.2.3 Treatment of Infectious and Hazardous Wastes Prior to Discharge

Almost all hospitals (27, 96.4%) do not treat their infectious waste prior to discharge. The only one hospital that responded to do so treats infectious waste by burying them in open pits.

Of the twelve hospitals producing hazardous waste, ten do not carry out treatment prior to discharge, while the remaining two leave radioactive waste until they are collected by the Turkish Institute of Atomic Energy (TIAE) or leave radionuclides in lead containers until discharge.

The municipality is responsible for the removal of infectious waste from 27 of the surveyed hospitals. Only one of the surveyed hospitals is responsible for the removal of its own infectious waste.

The TIAE is responsible for the removal of hazardous (radioactive) waste from three of the surveyed hospitals (18.8%, 3 of 16 hazardous waste producers). The rest of the responsibility lies with the municipality, hospitals, and private contractors.

Half of the surveyed hospitals (14) receive collection services for infectious waste at a frequency of five to six times a week. Others receive the services twice a week, once a week, once a day, twice a month, or three to four times a week.

h.2.4 Handling, Storage, Treatment, and Recycling

The most preferred storage container for general waste at the central point of discharge is the 275 lit. metallic container with a lid and a lock; 15 hospitals surveyed use this container. The next is the 400 lit. metallic container with a lid. Two of the surveyed hospitals have specialised locked rooms for the storage of general waste.

The municipality is responsible for the removal of general waste from 26 of the 28 hospitals surveyed. Only one of the surveyed hospitals is responsible for the removal of its own waste.

Twenty-one of the surveyed hospitals receive waste collection services twice a day. Eight have a recycling system for paper and glassware, and 2 of these hospitals carry out their own recycling.

Of the remaining 6 that have a manual separation system, two manually separate general and infectious wastes.

h.2.5 Final Disposal

Infectious waste collectors dispose of the plastic bags containing infectious wastes at the disposal site in Sofulu randomly without cover soil. Because the wastes are uncovered they are very accessible to scavengers and animals, and expose them to higher risks of contacting contagious diseases.

h.2.6 Financial Obligations

Under the law, medical institutions are financially obliged to support the management of infectious waste, hazardous waste, and general waste, but only 50% pay for their infectious waste services, 64% for their hazardous waste services, and 64% for their general waste services. On average, hospitals pay 778353 TL per day, which is equivalent to approximately 8433 TL/kg for infectious waste.

The tariffs for general waste are set by the central government as the Cleansing Tax; the Greater Municipality allocates the category to the hospitals, which pay the Cleansing Tax according to the number of beds. Seyhan Municipality collects the Cleansing taxes from Yugeir and Seyhan, for they provide waste collection services in both municipalities.

h.2.7 Staff Training and Administration

Out of the 28 hospitals, over 82% have written instructions on the separation and management of medical waste, including the definition/classification of infectious waste and hazardous waste and the special requirements for their handling. The staff are trained at least once in more than 93% of the hospitals, with 65% responding that training is conducted frequently. However, nearly eleven percent of the hospitals replied that the staff do not wear protective clothing when handling infectious waste and hazardous waste. And 7% responding that waste pickers gain access to manually sort general waste that has been mixed with infectious waste.

Nearly two thirds of the hospitals replied that they keep written records on the management of infectious waste, and, of those that generate hazardous waste, 50% keep records on the management of hazardous waste, and over 93% of the hospitals do not keep records on the management of general waste.

Table 3-15: Summary of the Present Medical Waste Management by Hospitals in Adana

Waste Type	Discharge Point	Central Collection	Treatment & Recycling	Disposal
Infectious	Majority of hospitals separate infectious waste from general waste; although some mixing with hazardous waste. Seven percent mix with general waste.	Some mixing with general waste, although almost all hospitals maintain the separation practices from the discharge point. Not all the hospitals have secure central storage areas; waste pickers have access to manually sort the waste. Most popular containers are 257 lit., medium sized with a cover. Only one hospital has a storage area as designated by law.	Almost no treatment of infectious waste onsite. No indication that infected glassware (if recycled) is autoclaved, washed, or disinfected. One hospital practices open burial of infectious waste.	Collected by a special vehicle by Seyhan Municipality, which takes the waste directly to the disposal site. Openly dumped at Sofulu landfill together with domestic waste. Animals and waste pickers have open access to rummage through the waste.
Hazardous	Not produced by 57% of the hospitals. If produced, is either separated or mixed only with infectious waste. No mixing with general waste.	Radioactive materials are stored separately. No manual separation.	Separate storage for radio nucleotides. Otherwise, no treatment internally.	Radio nucleotides collected by the Turkish Atomic Institute. Chemicals either discharged with infectious waste, with domestic waste, or otherwise discharged to the environment via the wastewater system. Four hospitals give private companies their hazardous waste.
General	Very little separation of glassware and paper. Sometimes mixed with infectious and hazardous waste	Most popular containers are 257 lit., medium sized with a cover. Manual separation carried out by hospital workers in most hospitals, and by waste pickers in some.	No treatment indicated; over 70% do not recycle their waste. Recycled items are crushed glass and paper. Manual sorting of general waste by waste pickers at the central storage area reported by some hospitals.	General waste is collected by the municipality almost everyday as part of the normal collection service. Open dumping at Sofulu landfill.