

Chapter 18

MODEL RECLAMATION PROJECT
FOR SPASSKAYA

CHAPTER 18 MODEL RECLAMATION PROJECT FOR SPASSKAYA

18.1 REQUIRED PROJECT COMPONENTS

To mitigate negative impacts on the environmental quality due to accumulated waste on the site, the dumping site of Spasskaya shall be closed and reclaimed in a proper manner.

Main project features are moving the dumped waste, grading and compacting the waste with cover soil, and construction of facilities to improve the existing conditions. The total reclaimed land area is estimated at 3.9 hectares.

The required work and facilities to reclaim the Spasskaya site are outlined as follows.

18.1.1 Preparatory Earthwork

Scattered wastes have to be firstly collected in a designated area or trench, and subsequently the dumpsite will be graded and compacted. This work will reduce the area covered by waste. A large amount of waste is still exposed in a depression in the north of the site. Scattered waste should be moved to this area and covered with soil.

Simultaneously, the northwestern slope of the site should be banked or excavated to align the final slope with the inner flow.

In both areas, the cover material should be graded and compacted to prevent surface water from ponding.

18.1.2 Leachate Retention Pond

The leachate collected from the leachate drainage facilities during rainfall and snow melting periods should be totally contained in the leachate retention pond. To avoid pollution of the groundwater by leachate stored in the pond, a liner system comprising of a clay layer and a synthetic membrane should be provided.

Waste dumped in the site is not a large amount and new waste will not be allowed after reclamation work. Treatment facilities are therefore not included since leachate generated on this site is unlikely to be contaminated to a great degree.

The location of the pond will be the lower side of the dumping area to the north of the slope to make discharge of effluent from the pond to the river easier.

18.1.3 Leachate Collection and Drainage Facilities

At the bottom of the depression area, leachate collection and drainage pipes should be prepared to collect and drain the leachate before infiltrating it to the ground. Currently, production of leachate cannot be observed in the site. Most of the surface water discharged through the waste seems to flow into the river or infiltrate to the ground.

18.1.4 Rainwater (Surface Water) Collection Gutter

The surface water should be discharged through gutters to reduce the amount of leachate. The catchment area is assumed to be an area between the northern part of Spasskaya Street and the top of slope of the existing dumping site.

18.1.5 Gas Exhaust Equipment

Gas exhaust equipment should be provided to extract gas generated by decomposition of organic materials in the waste and reduce the amount of leachate. The equipment is composed of a perforated PVC pipe covered by crushed stones contained by a wire basket.

18.1.6 Access Road

To approach the retention pond after closure of the site, an access road should be made from the existing public road, Spasskaya Street. The existing site road to the lower side will be buried, so that a new road should be constructed along a small path passing from east to north of the site. The road length is estimated to be 195m.

18.2 DESIGN OF THE FACILITIES

18.2.1 Calculation and Determination of Facility Dimension

1) Access Road

The planned access road will not be used for transporting waste. Therefore, a design width of 6 m is sufficient.

2) Leachate Collection Facility and Gas Exhaust Equipment

Pipe diameter of the leachate collection pipes is set at the minimum diameter for such pipes, i.e., 200 mm. (The flows of leachate are small but this minimum diameter is required to prevent silting). The calculation details are described in Chapter 11, Section E of Supporting Report, and layouts of the leachate collection pipes and the gas exhaust equipment are shown in Chapter 11, Section E of Supporting Report.

3) Leachate Retention Pond

(1) Quantity of Leachate

The quantity of leachate is related to the meteorological parameters such as precipitation and evaporation. The site for reclamation is, however, quite small covering only 2 ha or so. It is thus assumed that the maximum rainfall of consecutive five days is applied for estimation of the leachate quantity.

The maximum five-day precipitation was recorded at 85.1 mm in May 1993. The seepage coefficient is assumed at 0.5. The area for leachate collection covers 1.1 ha. Therefore, the leachate quantity is calculated as follows:

$$Q = 0.5 \times 0.0851 \times 11,000 = 468 \text{ m}^3$$

(2) Volume of Retention Pond

From the above calculation, the capacity of the leachate retention pond should be at least 470 m³.

4) Rainwater Drainage

Drainage area covered by each channel or gutter and its length are estimated based on the topographic map. The Flow Capacity (Q') of the channel must be larger than the Rainwater Runoff (Q). The calculation details and layout of the rainwater drainage are shown in Chapter 11, Section E of Supporting Report. The width and depth of gutter is designed to be 300 - 450 mm.

5) Landscaping

Tree planting and lawn installation should be considered to improve the surrounding environment. Gardening with trees will be carried out along the boundary line formed by concrete walls along the south of the site. A space alongside the access road will also be planted with trees.

The slope generated by banking and excavating will be covered with turf to protect the slope as well as to improve the outward appearance.

18.2.2 Summary of the Facility

Quantity of the major facilities to be designed and constructed are summarized in Table 18.2.1.

Table 18.2.1 Summary of the Designed Facility

Facility	Item	Quantity	Remarks
Cover Soil	Grading	9,075 m ²	Thickness: 50 cm
	Compacting	18,150 m ³	
Retention Pond	Design volume	470 m ³	
	Liner laying	232 m ²	
	Clay laying	140 m ³	Thickness: 60 cm
Leachate Collection and Drainage	Perforated PVC pipe φ200mm×1	135 m	Covered with crushed stone
Rainwater Collection and Drainage Gutter	Width: 300mm Depth: 300mm	405m	
	Width: 350mm Depth: 350mm	160m	
	Width: 450mm Depth: 450mm	370m	
Gas Exhaust Equipment	Extraction well	5nos.	
Access Road		195m	
Fence	Net fence	198m	H=1.6m
Gate		1	
Landscaping	Gardening w/tree	60nos.	

18.2.3 Layout of the Facility

Layout plan and cross section of the Spasskaya site are designed as shown in Figures 18.2.1 and 18.2.2, respectively.

18.3 CLOSURE AND RECLAMATION SCHEDULE

The closure and reclamation work for the Spasskaya site will be undertaken in fiscal year 2003, after the design and engineering of the work is completed in 2002.

18.4 PROJECT COST ESTIMATE

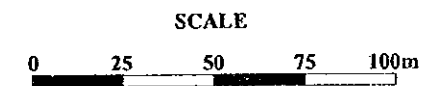
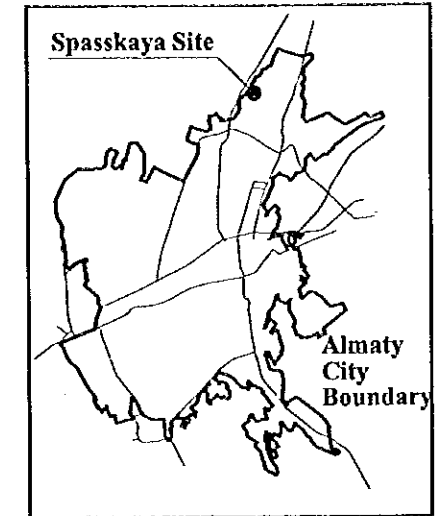
The total cost for reclamation work for Spasskaya including design and engineering is estimated at KZT207,997,000 (US\$1,808,670). Major work items and itemized costs are shown in Table 11.4.2, Chapter 11, Section E of the Supporting Report. The annual expenditure for the work is shown in Table 18.4.1.

Table 18.4.1 Schedule of Annual Expenditure for Model Reclamation Project for Spasskaya

Year	Cost (thousand KZT)		
	Engineering*	Reclamation Work	Total
2000			0
2001			0
2002	9,905		9,905
2003		198,092	198,092
Total	9,905	198,092	207,997

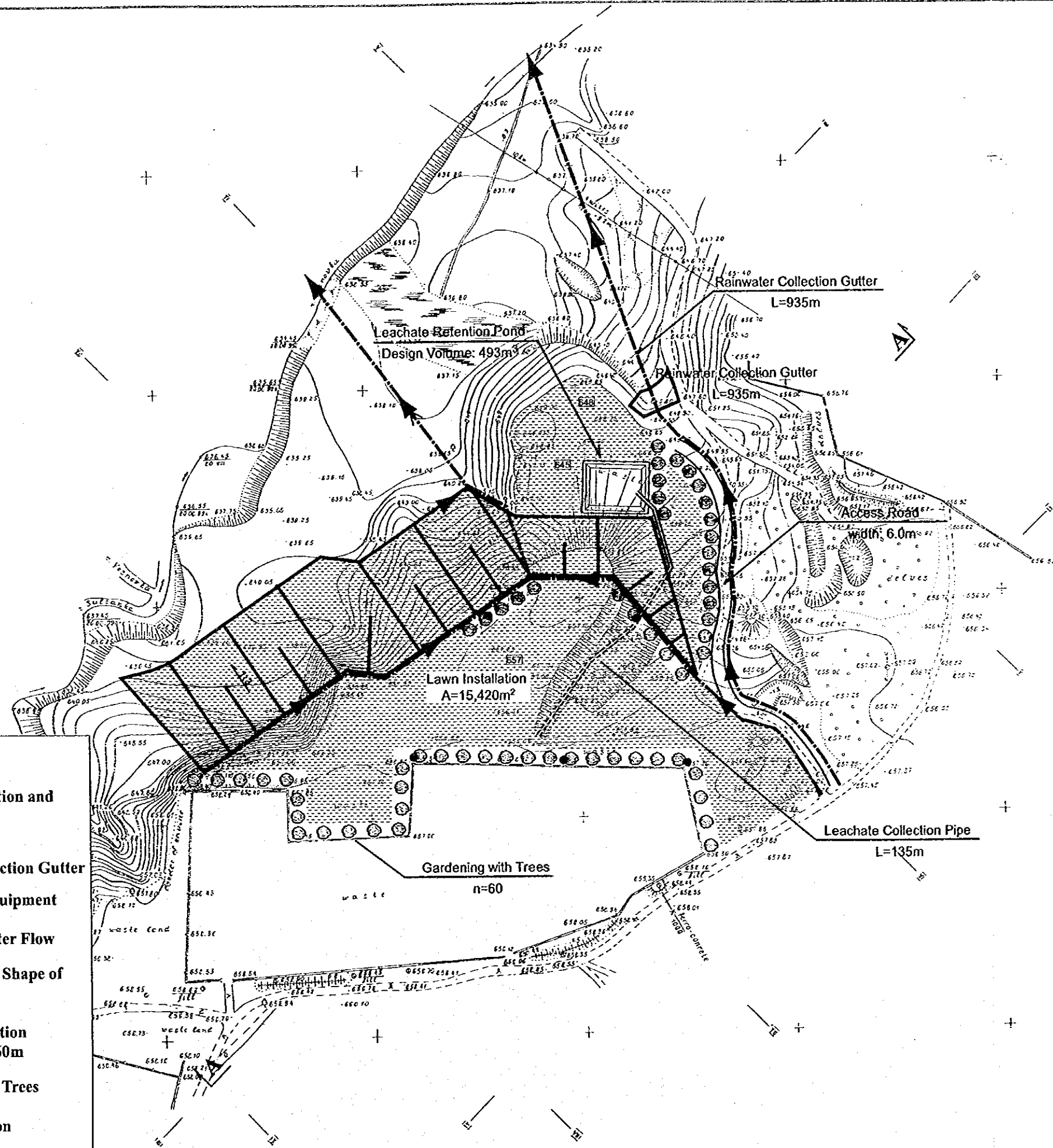
Note: * Engineering cost is estimated by applying 5% of the cost for reclamation work.

LOCATION MAP



LEGEND

- Leachate Collection and Drainage Main (TYPE D)
- Rainwater Collection Gutter
- Gas Exhaust Equipment
- Direction of Water Flow
- Design Finished Shape of Reclamation
- Design Reclamation Elevation, ex. 860m
- Gardening with Trees
- Lawn Installation



THE REPUBLIC OF KAZAKHSTAN
MINISTRY OF NATURAL RESOURCES AND
ENVIRONMENT PROTECTION
ALMATY CITY GOVERNMENT

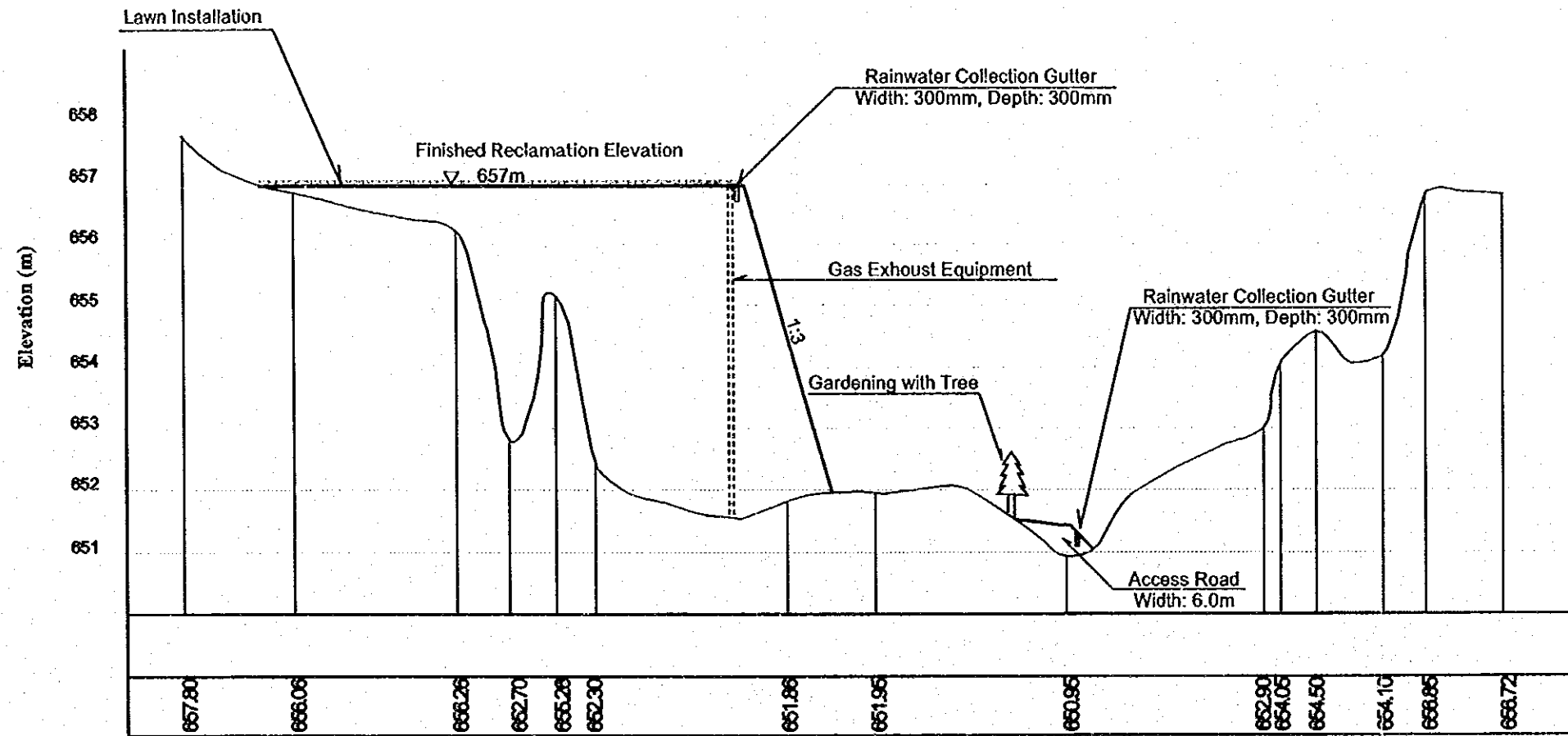
THE STUDY ON SOLID WASTE MANAGEMENT FOR
ALMATY CITY IN THE REPUBLIC OF KAZAKHSTAN

Figure 18.2.1
Layout Plan of Model
Reclamation Project for Spasskaya

SCALE	1 : 2000
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JAPAN INTERNATIONAL COOPERATION AGENCY

A-A



Horizontal 1/1000
Vertical 1/100

THE REPUBLIC OF KAZAKHSTAN MINISTRY OF NATURAL RESOURCES AND ENVIRONMENT PROTECTION ALMATY CITY GOVERNMENT	
THE STUDY ON SOLID WASTE MANAGEMENT FOR ALMATY CITY IN THE REPUBLIC OF KAZAKHSTAN	
Figure 18.2.2 Typical Cross Section of Model Reclamation Project for Spasskaya	
SCALE	H 1 : 1000, V 1:100
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Chapter 19

**COST OF
PRIORITY PROJECT**

19.2 BASIC OPERATION AND MAINTENANCE COST

1) Cost Estimation Assumptions

- a. Price As of May, 1999
- b. Depreciation
- Life time of equipment
 - Collection and other vehicle 8 years
 - Large container 5 years
 - Small container 3 years
 - Heavy equipment 8 years
 - Remaining value of equipment 0%
 - Life time of facilities (for estimation of depreciation)
 - Transfer station 20 years
 - Disposal site Up to full capacity
 - Amenity center 20 years
 - Remaining value of facilities 0%
- c. Maintenance and repair cost of equipment
- Vehicle and heavy equipment 40% of initial cost/life time
- d. Maintenance and repair cost of facilities
- 1 to 3% of construction cost/year
- e. Major unit price
- Fuel
 - Gasoline 40 KZT/liter
 - Light oil 25 KZT/liter
 - Personnel
 - Site manager 19,900 KZT/month
 - Technician, Supervisor 18,000 KZT/month
 - Driver 12,000 KZT/month
 - Worker 10,000 KZT/month

(Note : Personnel cost including 21% of social Tax after deduction of pension fund.

2) Basic Operation and Maintenance cost

Actual operation of solid waste collection and management of facilities will be contracted out. Contract out cost will consist of basic operation cost and other costs including profit and VAT. Basic operation cost in year 2005 will be 730.4 million KZT as shown in Table 19.2.1. Total expense of Waste Authority is described in Chapter 20.

Table 19.2.1 Basic Operation and Maintenance Cost

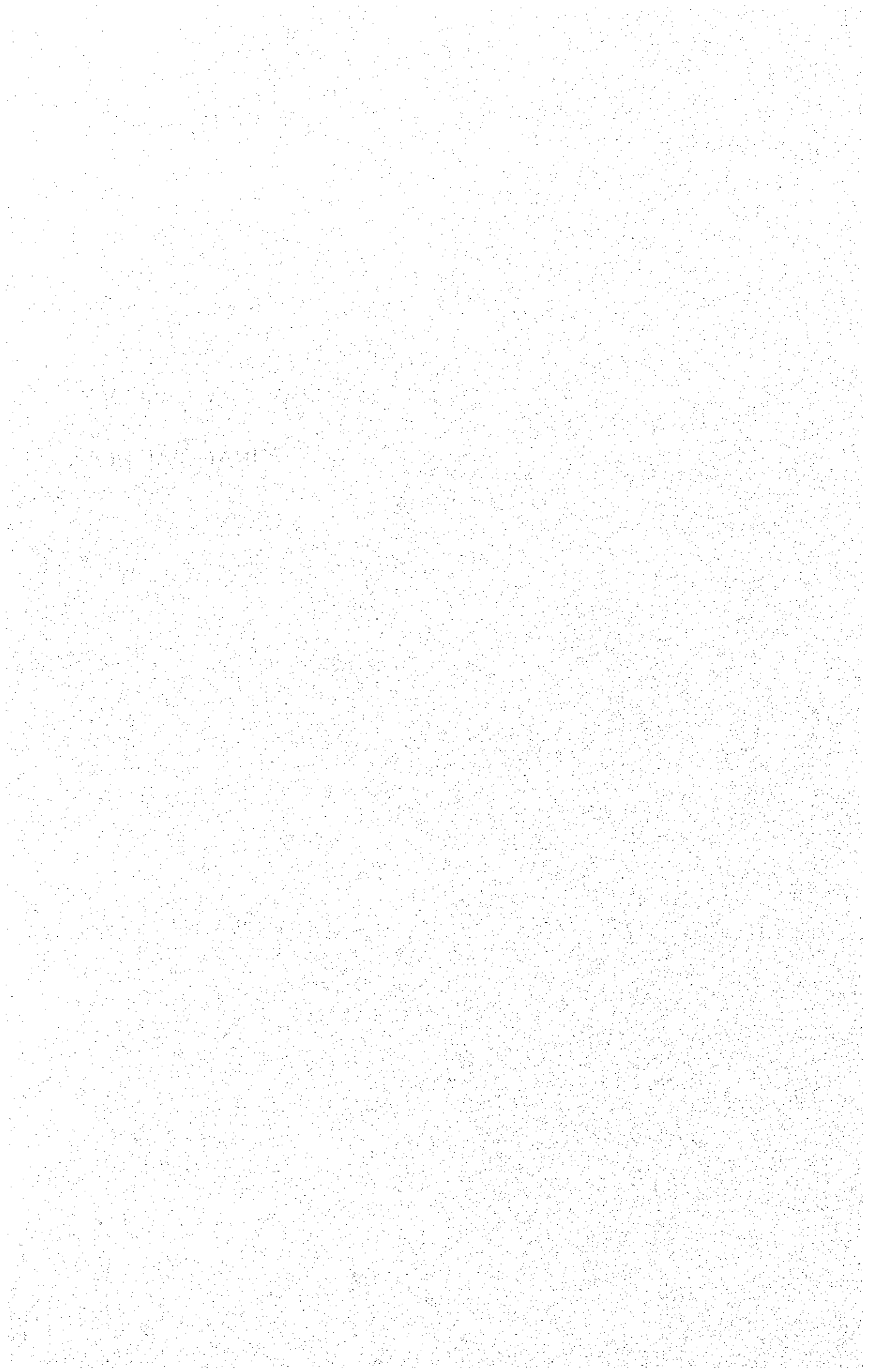
(unit : million KZT)

	Basic operation cost ⁽¹⁾	Remark
Waste authority	15.3	Head office cost only
Collection	331.1	including depreciation
Transfer stations		
West	122.5	including depreciation
Spasskaya	70.3	including depreciation
Disposal site	191.2	including depreciation
Recycling	0.0	
Total	730.4	(6.4 million us\$)

Note: (1) This cost includes personnel, fuel and lubricants, maintenance and repairs, depreciation and miscellaneous costs

Chapter 20

FINANCIAL PLAN



CHAPTER 20 FINANCIAL PLAN

20.1 INVESTMENT PLAN

Based on the implementation schedule described in Chapter 13, the Urgent Improvement Project will be implemented in year 2002 and the Second Priority Project in year 2003. Total investment cost of the priority project is estimated to be KZT 4,138.0 million including VAT as shown in Table 20.1.1.

Table 20.1.1 Investment Schedule of Priority Projects

Unit: KZT million

Item	2000	2001	2002	2003	2004	2005	Total
	Urgent Improvement Project			Second Priority Project			
I Construction							
(1) West T/S	0.0	398.3	0.0	0.0	0.0	0.0	398.3
(2) Spasskaya T/S	0.0	0.0	289.9	0.0	0.0	0.0	289.9
(3) Karasai D/S	0.0	0.0	874.5	0.0	0.0	0.0	874.5
(4) Rehabilitation	0.0	0.0	0.0	198.1	0.0	0.0	198.1
Sub-total	0.0	398.3	1,164.4	198.1	0.0	0.0	1,760.8
II Procurement							
(1) Collection	0.0	330.6	478.1	0.0	0.0	0.0	808.7
(2) Transfer Station	0.0	307.5	153.7	0.0	0.0	0.0	461.2
(3) Disposal Site	0.0	248.8	0.0	0.0	0.0	0.0	248.8
(4) Waste Authority	0.0	4.6	0.0	0.0	0.0	0.0	4.6
Sub-total	0.0	891.5	631.8	0.0	0.0	0.0	1,523.3
III Engineering	0.0	64.5	89.8	9.9	0.0	0.0	164.2
Total	0.0	1,354.3	1,886.0	208.0	0.0	0.0	3,448.4
IV. VAT (20%)	0.0	270.9	377.2	41.6	0.0	0.0	689.7
Grand Total	0.0	1,625.2	2,263.2	249.6	0.0	0.0	4,138.0

20.2 FINANCIAL SOURCES

20.2.1 Financial Sources for Investment

Three financing options have been considered for the Urgent Improvement Project and the Second Priority Project:

- Case A: Whole priority project is financed by loan
- Case B: Urgent Improvement Project is financed by grant and Second Priority Project by loan
- Case C: Whole priority project is financed by loan with conditions different from that of Case A

It should be noted that international loans will not cover the total investment cost. It is assumed that 30% of the investment cost is financed by local sources (which include the budgets of the Central Government and the City Government). Financing needed from

each source is summarized below. Note that this financing covers only the cost of the projects net of VAT. In line with normal practice for international aid projects, it is assumed that the Republican Government will accept responsibility for VAT payable on this project.

Table 20.2.1 Financial Sources for Priority Project

		Urgent Improvement Project		Second Priority Project	
		KZT million	US\$ million	KZT million	US\$ million
Cases A and C	International Loan	948.0	8.2	1,465.8	12.7
	Local Loan	406.3	3.5	628.2	5.5
Case B	Grant	1,354.3	11.8	-	-
	International Loan	-	-	1,465.8	12.7
	Local Loan	-	-	628.2	5.5

20.2.2 Terms and Conditions of Long-term Loans

In view of the present financial status of the Governments of Kazakhstan and Almaty City, the following terms and conditions have been assumed for the loans which finance the Priority Project.

Table 20.2.2 Terms and Conditions of Loans

Loan	Source	Interest rate (real, %)	Repayment period (years)	Grace period (years)
Long-term loan (Foreign) - 70%	International aid agency	8	20	0
Long-term loan (Local) - 30%	Local loan agency	8	20	0
Short-term bridging loan	Local loan agency	15	1	0

Note: US Dollar base using fixed exchange rate of USD 1= 115 KZT

To determine the sensitivity of the priority project to loan conditions an additional case (C) has also been examined.

Table 20.2.3 Case C Loan Conditions (all loan)

Loan	Source	Interest rate (%)	Repayment period (years)	Grace period (years)
Long-term loan (Foreign) - 70%	International aid	10	10	2
Long-term loan (Local) - 30%	Local loan agency	10	10	2
Short-term bridging loan	Local loan agency	15	1	0

20.3 IMPLEMENTATION OF NEW CHARGES

20.3.1 Charges for Households

The results of the financial projection (refer to Section 9.8 Financial Plan) indicate that the following tariff (with cross-subsidy) should be charged for domestic waste services if finance is provided by a long-term loan with an interest rate of 8%. For details of the cross subsidy, refer to Section 14.2 Tariff and Cross Subsidy.

Table 20.3.1 Charges for Households

Date	Rate
July, 2000	55.89 KZT/person/month
April, 2002	75 KZT/person/month

20.3.2 Charges for Other Users

Waste service charges for other users are summarized in the following Table based on the results of the financial projection (Section 9.8 Financial Plan) which assumes an interest rate of 8% for the long-term loan.

Table 20.3.2 Charges for Other Users

Date	Commercial (KZT/ton)	Medical (KZT/ton)	Transfer Stations (KZT/ton)	Disposal Site (KZT/ton)
July, 2000	2,508.9	2,508.9	875	385
April, 2002	3,900.0	3,900.0	1,750	770

20.4 FINANCIAL PROJECTION

The objective of the financial projection is to determine the conditions required for sound and sustainable operation of SWM services.

20.4.1 Assumptions and Conditions for Financial Projection

1) General

The following assumptions have been made in the financial projection

- Projection Period: 2000-2010
- All assumptions of the M/P Study for the year 2006 onwards have been adopted.
- All projections have been made in constant (1999) prices to allow for inflation.

2) Investment Cost

Investment for construction, procurement of vehicles and other purposes is assumed to follow the most effective procurement schedule.

3) Revenue

Revenues of the Waste Authority are estimated on the assumption that:

- (1) The Waste Authority is established in January 2000. Full scale operations commence on 1 April 2000, after three months for development of systems. During this preparation period, fee collection rate is still 70% as before.
- (2) Domestic waste tariff is increased to 55.89 KZT/person/month in July 2000. The cross subsidy is introduced on the same date. Fee collection rate is increased to 90%.
- (3) Domestic waste tariff is increased to 75 KZT/person/month in April 2002 and 90 KZT/person/month in January 2008. Fee collection rate remains 90%.

4) Taxes

It is assumed that the Waste Authority is exempt from VAT and corporate income tax. It is assumed that any VAT payable on the capital investments is paid by the Government.

20.4.2 Results of Financial Projection

Projections for the three cases are:

Case	Financing Sources	Tax Treatment
A	Loan (Case A)	VAT and Corp. Income Tax excluded
B	Loan + Grant (Case B)	VAT and Corp. Income Tax excluded
C	Loan (Case C)	VAT and Corp. Income Tax excluded

Details of financing cases and loan conditions are given above in Section 20.2.

1) Income of the Waste Authority

Clearly, Case B is preferable. In this case, the Authority is profitable every year. This profit may be applied to debt reduction or equipment replacement.

The full income statements for the Waste Authority in cases A, B and C are shown in Tables 20.4.1, 20.4.2 and 20.4.3.

2) Cash Flows of the Waste Authority

Net liabilities for all of the three cases are compared in Figure 20.4.1. Outstanding debts consist only of long-term loans. In no case is there a shortage of funds in the project period.

Case B is the preferred financial arrangement, though all cases seem viable. In this case cash assets of the Authority exceed total debt from 2008 onwards. In Cases A and C the gross debts of the Authority exceed cash assets throughout the projection period. The Waste Authority should be viable if it is exempted from VAT and corporate income tax. Details of cash flows for Cases A, B and C are shown in Tables 20.4.4, 20.4.5 and 20.4.6.

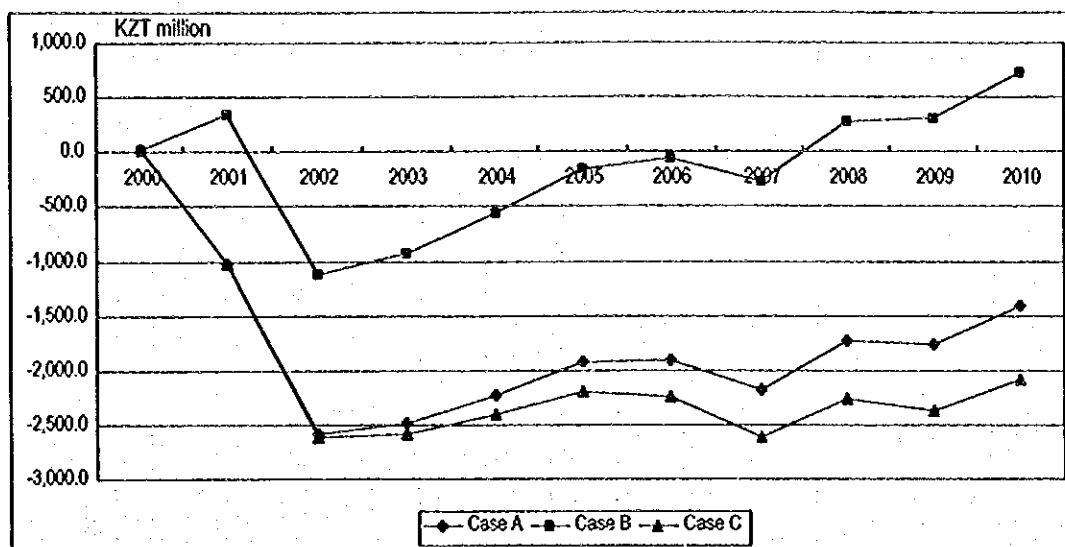


Figure 20.4.1 Changes of Net Debt

20.5 ENCOURAGEMENT OF PRIVATE COMPANIES' INVESTMENT

To encourage private companies to invest in new vehicles, some measures should be taken. When evaluating tenders, the vehicle leasing fee deemed to be charged to bidders who intend to use Authority owned vehicles will be calculated using a deemed interest rate of 15%. The deemed leasing fee should be higher than the actual investment cost paid by contractors who make wise investment decisions for vehicle acquisition. It is expected that tenderers who plan to use their own vehicles can win the tender.

Table 20.4.1 Income Statement of the Waste Authority (Case A)

Unit: KZT million; 1999 price

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Total
I Revenue												
a Charges	299.0	810.2	1,137.2	1,187.6	1,198.7	1,206.8	1,221.8	1,237.7	1,504.3	1,523.0	1,542.1	12,868.5
1 Domestic	198.4	490.9	619.0	663.5	665.9	668.3	674.3	680.4	823.8	831.1	838.4	7,153.9
2 Commercial	87.0	267.9	421.5	426.6	433.0	438.2	445.8	454.8	556.5	565.8	576.5	4,673.6
4 Medical	5.9	18.1	29.5	29.5	30.7	30.7	32.0	32.0	38.4	40.0	40.0	326.9
5 T/S Charge	5.1	22.4	45.4	46.0	46.6	47.1	47.1	47.7	57.9	58.6	59.3	483.4
6 D/S Charge	2.5	10.9	21.8	22.0	22.5	22.5	22.5	22.8	27.6	27.6	27.9	230.6
II Expense	281.7	511.5	970.7	1,241.4	1,245.7	1,232.5	1,219.5	1,261.4	1,304.6	1,304.9	1,363.3	11,997.2
a O&M of State Comp	11.5	11.5	14.8	14.8	14.8	14.8	14.8	14.8	14.8	14.8	14.8	156.4
1 Personnel	5.4	5.4	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	62.0
2 Public Relations	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	11.0
3 Fuel & Lubricant	0.0	0.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	18.0
4 Maintenance & Repair	0.0	0.0	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	2.1
5 Others	1.4	1.4	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	20.0
6 Overhead	3.8	3.8	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	43.4
b Commission for Fee Collection	7.5	20.3	28.4	29.7	30.0	30.2	30.5	30.9	37.6	38.1	38.6	321.7
c Contract Cost (VAT included)	201.4	402.9	582.9	484.6	484.6	484.6	484.6	562.5	605.1	612.9	639.6	5,545.8
1 Collection	167.5	335.1	412.2	276.4	276.4	276.4	276.4	344.8	344.8	344.8	371.5	3,426.2
2 Transfer Station	16.6	33.2	119.7	136.1	136.1	136.1	136.1	136.1	136.1	143.8	143.8	1,273.9
3 Final Disposal Site	17.3	34.6	51.0	72.2	72.2	72.2	72.2	81.6	81.6	81.6	81.6	717.9
4 Recycling	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	42.6	42.6	42.6	127.8
d Ownership Cost	0.5	1.0	12.3	28.5	28.5	28.5	28.5	26.7	29.5	29.9	30.9	244.9
1 State Comp	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4
2 Collection	0.0	0.0	4.1	9.9	9.9	9.9	9.9	7.7	7.7	7.7	8.8	75.6
3 Transfer Station	0.5	1.0	5.7	7.4	7.4	7.4	7.4	7.4	7.4	7.8	7.8	66.9
4 Final Disposal Site	0.0	0.0	2.5	11.2	11.2	11.2	11.2	11.6	11.6	11.6	11.6	93.7
5 Recycling	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.8	2.8	2.8	8.3
e Other Operating Cost	54.4	63.2	70.6	73.4	73.7	74.1	74.6	76.4	76.9	77.4	77.9	792.6
1 Environmental Payment	8.6	17.3	24.8	27.5	27.8	28.2	28.7	30.5	31.0	31.5	32.1	287.9
2 Illegal Dump Site Reclamation	45.9	45.9	45.9	45.9	45.9	45.9	45.9	45.9	45.9	45.9	45.9	504.6
f Depreciation	6.3	12.6	153.4	356.6	356.6	356.6	356.6	333.9	368.4	373.3	386.8	3,060.9
1 State Company	0.0	0.0	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	5.2
2 Collection	0.0	0.0	50.7	123.5	123.5	123.5	123.5	96.6	96.6	96.6	110.1	944.7
3 Transfer Station	6.3	12.6	71.0	92.1	92.1	92.1	92.1	92.1	92.1	97.0	97.0	836.4
4 Final Disposal Site	0.0	0.0	31.1	140.4	140.4	140.4	140.4	144.6	144.6	144.6	144.6	1,171.3
5 Recycling	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	34.5	34.5	34.5	103.4
g Long-term Interest	0.0	0.0	108.3	253.8	257.5	243.7	229.9	216.1	202.3	188.5	174.7	1,874.9
1 Foreign	0.0	0.0	75.8	177.7	180.2	170.6	160.9	151.3	141.6	132.0	122.3	1,312.5
2 Local	0.0	0.0	32.5	76.1	77.2	73.1	69.0	64.8	60.7	56.6	52.4	562.5
h Tax	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1 VAT												0.0
2 Corporate Income Tax												0.0
II Net Income	17.3	298.7	166.4	-53.8	-47.0	-25.7	2.3	-23.7	169.7	188.2	178.8	871.2

Table 20.4.2 Income Statement of the Waste Authority (Case B)

Unit: KZT million; 1999 price

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Total
I Revenue												
a Charges	299.0	810.2	1,137.2	1,187.6	1,198.7	1,206.8	1,221.8	1,237.7	1,504.3	1,523.0	1,542.1	12,869.5
1 Domestic	193.4	490.9	619.0	663.5	665.9	668.3	674.3	680.4	823.8	831.1	838.4	7,153.9
2 Commercial	87.0	267.9	421.5	426.6	433.0	438.2	445.8	454.8	556.5	565.8	576.5	4,673.6
4 Medical	5.9	18.1	29.5	29.5	30.7	30.7	32.0	32.0	38.4	40.0	40.0	326.9
5 T/S Charge	5.1	22.4	45.4	45.0	46.6	47.1	47.1	47.7	57.9	58.6	59.3	483.4
6 D/S Charge	2.5	10.9	21.8	22.0	22.5	22.5	22.5	22.8	27.6	27.6	27.9	230.6
II Expense	281.7	511.5	682.4	1,138.5	1,148.2	1,140.4	1,132.9	1,180.1	1,258.8	1,264.4	1,298.3	11,217.1
a O&M of State Comp	11.5	11.5	14.8	14.8	14.8	14.8	14.8	14.8	14.8	14.8	14.8	156.4
1 Personnel	5.4	5.4	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	62.0
2 Public Relations	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	11.0
3 Fuel & Lubricant	0.0	0.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	18.0
4 Maintenance & Repair	0.0	0.0	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	2.1
5 Others	1.4	1.4	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	20.0
6 Overhead	3.8	3.8	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	43.4
b Commission for Fee Collection	7.5	20.3	28.4	29.7	30.0	30.2	30.5	30.9	37.6	38.1	38.6	321.7
c Contract Cost (VAT included)	201.4	402.9	582.9	484.6	484.6	484.6	484.6	562.5	605.1	612.9	639.6	5,545.8
1 Collection	167.5	335.1	412.2	276.4	276.4	276.4	276.4	344.8	344.8	344.8	371.5	3,426.2
2 Transfer Station	16.6	33.2	119.7	136.1	136.1	136.1	136.1	136.1	136.1	143.8	143.8	1,273.9
3 Final Disposal Site	17.3	34.6	51.0	72.2	72.2	72.2	72.2	81.6	81.6	81.6	81.6	717.9
4 Recycling	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	42.6	42.6	42.6	127.8
d Ownership Cost	0.5	1.0	12.3	28.5	28.5	28.5	28.5	26.7	29.5	29.9	30.9	244.9
1 State Comp	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4
2 Collection	0.0	0.0	4.1	9.9	9.9	9.9	9.9	7.7	7.7	7.7	8.8	75.6
3 Transfer Station	0.5	1.0	5.7	7.4	7.4	7.4	7.4	7.4	7.4	7.8	7.8	66.9
4 Final Disposal Site	0.0	0.0	2.5	11.2	11.2	11.2	11.2	11.6	11.6	11.6	11.6	93.7
5 Recycling	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.8	2.8	2.8	8.3
e Other Operating Cost	54.4	63.2	70.6	73.4	73.7	74.1	74.6	76.4	76.9	77.4	77.9	792.6
1 Environmental Payment	8.6	17.3	24.8	27.5	27.8	28.2	28.7	30.5	31.0	31.5	32.1	287.9
2 Illegal Dump Site Reclamation	45.9	45.9	45.9	45.9	45.9	45.9	45.9	45.9	45.9	45.9	45.9	504.6
f Depreciation	6.3	12.6	153.4	356.6	356.6	356.6	356.6	333.9	368.4	373.3	386.8	3,060.9
1 State Company	0.0	0.0	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	5.2
2 Collection	0.0	0.0	50.7	123.5	123.5	123.5	123.5	96.6	96.6	96.6	110.1	944.7
3 Transfer Station	6.3	12.6	71.0	92.1	92.1	92.1	92.1	92.1	92.1	97.0	97.0	836.4
4 Final Disposal Site	0.0	0.0	31.1	140.4	140.4	140.4	140.4	144.6	144.6	144.6	144.6	1,171.3
5 Recycling	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	34.5	34.5	34.5	103.4
g Long-term Interest	0.0	0.0	0.0	150.9	160.0	151.6	143.2	134.8	126.5	118.1	109.7	1,094.8
1 Foreign	0.0	0.0	0.0	105.6	112.0	106.1	100.3	94.4	88.5	82.7	76.8	766.4
2 Local	0.0	0.0	0.0	45.3	48.0	45.5	43.0	40.5	37.9	35.4	32.9	328.4
h Tax	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1 VAT												0.0
2 Corporate Income Tax												0.0
II Net Income	17.3	298.7	274.8	49.1	50.5	66.4	89.0	57.6	245.5	258.6	243.8	1,851.3

Table 20.4.3 Income Statement of the Waste Authority (Case C)

Unit: KZT million; 1999 price

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Total
I Revenue												
a Charges	259.0	810.2	1,137.2	1,187.6	1,198.7	1,206.8	1,221.8	1,237.7	1,504.3	1,523.0	1,542.1	12,868.5
1 Domestic	198.4	430.9	619.0	663.5	655.9	668.3	674.3	680.4	823.8	831.1	838.4	7,153.9
2 Commercial	87.0	267.9	421.5	426.6	433.0	438.2	445.8	454.8	555.5	555.8	576.5	4,673.6
4 Medical	5.9	18.1	29.5	29.5	30.7	30.7	32.0	32.0	38.4	40.0	40.0	326.9
5 T/S Charge	5.1	22.4	45.4	45.0	46.6	47.1	47.1	47.7	57.9	58.6	59.3	483.4
6 D/S Charge	2.5	10.9	21.8	22.0	22.5	22.5	22.5	22.8	27.6	27.6	27.9	230.6
II Expense	281.7	511.5	597.8	1,311.6	1,333.0	1,320.1	1,288.5	1,344.4	1,439.4	1,424.5	1,432.3	12,884.8
a O&M of State Comp	11.5	11.5	14.8	14.8	14.8	14.8	14.8	14.8	14.8	14.8	14.8	156.4
1 Personnel	5.4	5.4	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	62.0
2 Public Relations	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	11.0
3 Fuel & Lubricant	0.0	0.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	18.0
4 Maintenance & Repair	0.0	0.0	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	2.1
5 Others	1.4	1.4	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	20.0
6 Overhead	3.8	3.8	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	43.4
b Commission for Fee Collection	7.5	20.3	28.4	29.7	30.0	30.2	30.5	30.9	37.6	38.1	38.6	321.7
c Contract Cost (VAT included)	201.4	402.9	582.9	484.6	484.6	484.6	484.6	562.5	606.1	612.9	639.6	5,545.8
1 Collection	167.5	335.1	412.2	276.4	276.4	276.4	276.4	344.8	344.8	344.8	371.5	3,426.2
2 Transfer Station	16.6	33.2	119.7	136.1	136.1	136.1	136.1	136.1	143.8	143.8	143.8	1,273.9
3 Final Disposal Site	17.3	34.6	51.0	72.2	72.2	72.2	72.2	81.6	81.6	81.6	81.6	717.9
4 Recycling	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	42.6	42.6	42.6	127.8
d Ownership Cost	0.5	1.0	12.3	28.5	28.5	28.5	28.5	26.7	29.5	29.9	30.9	244.9
1 State Comp	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4
2 Collection	0.0	0.0	4.1	9.9	9.9	9.9	9.9	7.7	7.7	7.7	8.8	75.6
3 Transfer Station	0.5	1.0	5.7	7.4	7.4	7.4	7.4	7.4	7.4	7.8	7.8	66.9
4 Final Disposal Site	0.0	0.0	2.5	11.2	11.2	11.2	11.2	11.6	11.6	11.6	11.6	93.7
5 Recycling	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.8	2.8	2.8	8.3
e Other Operating Cost	54.4	63.2	70.6	73.4	73.7	74.1	74.6	76.4	76.9	77.4	77.9	792.6
1 Environmental Payment	8.6	17.3	24.8	27.5	27.8	28.2	28.7	30.5	31.0	31.5	32.1	287.9
2 Illegal DumpSite Reclamation	45.9	45.9	45.9	45.9	45.9	45.9	45.9	45.9	45.9	45.9	45.9	504.6
f Depreciation	6.3	12.6	153.4	356.6	356.6	356.6	356.6	333.9	368.4	373.3	386.8	3,060.9
1 State Company	0.0	0.0	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	5.2
2 Collection	0.0	0.0	50.7	123.5	123.5	123.5	123.5	96.6	96.6	96.6	110.1	944.7
3 Transfer Station	6.3	12.6	71.0	92.1	92.1	92.1	92.1	92.1	92.1	97.0	97.0	836.4
4 Final Disposal Site	0.0	0.0	31.1	140.4	140.4	140.4	140.4	144.6	144.6	144.6	144.6	1,171.3
5 Recycling	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	34.5	34.5	34.5	103.4
g Long-term Interest	0.0	0.0	135.4	324.0	344.8	331.3	298.9	299.1	307.1	278.1	243.7	2,562.5
1 Foreign	0.0	0.0	94.8	226.8	241.4	231.9	209.2	209.4	215.0	194.7	170.6	1,793.7
2 Local	0.0	0.0	40.6	97.2	103.5	99.4	89.7	89.7	92.1	83.4	73.1	768.7
h Tax	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1 VAT												0.0
2 Corporate Income Tax												0.0
II Net Income	17.3	298.7	139.3	-124.0	-134.3	-113.3	-66.7	-106.7	64.9	98.6	109.8	183.7

Table 20.4.4 Cash Flow of the Waste Authority (Case A)

Unit: KZT million; 1999 price

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Total
I Cash Inflow	299.0	2,164.5	3,023.2	1,395.6	1,198.7	1,206.8	1,221.8	1,237.7	1,504.3	1,523.0	1,542.1	16,316.9
a Charge Revenue	299.0	810.2	1,137.2	1,187.6	1,198.7	1,206.8	1,221.8	1,237.7	1,504.3	1,523.0	1,542.1	12,888.5
1 Domestic	198.4	490.9	619.0	663.5	665.9	668.3	674.3	680.4	823.8	831.1	838.4	7,153.9
2 Commercial	87.0	267.9	421.5	426.6	433.0	438.2	445.8	454.8	558.5	565.8	576.5	4,673.6
4 Medical	5.9	18.1	29.5	29.5	30.7	30.7	32.0	32.0	38.4	40.0	40.0	326.9
5 T/S Charge	5.1	22.4	45.4	45.0	46.6	47.1	47.1	47.7	57.9	58.6	59.3	483.4
6 D/S Charge	2.5	10.9	21.8	22.0	22.5	22.5	22.5	22.8	27.6	27.6	27.9	230.6
b Subsidy	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
c Loan	0.0	1,354.3	1,886.0	208.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3,448.4
1 Long-term Loan Disburse	0.0	1,354.3	1,886.0	208.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3,448.4
Foreign	0.0	948.0	1,320.2	145.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2,413.9
Local	0.0	406.3	565.8	62.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1,034.5
2 Short-term Loan Disburse	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
II Cash Outflow	275.4	1,853.2	2,771.1	1,254.9	1,106.6	1,071.7	1,382.5	1,687.4	1,217.5	1,726.2	1,362.4	15,708.8
a Expense for Business Operation	275.4	498.9	709.0	631.0	631.7	632.2	633.1	711.4	763.9	773.0	801.8	7,061.4
1 O&M of State Comp	11.5	11.5	14.8	14.8	14.8	14.8	14.8	14.8	14.8	14.8	14.8	156.4
Personnel	5.4	5.4	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	62.0
Public Relations	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	11.0
Fuel & Lubricant	0.0	0.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	18.0
Maintenance & Repair	0.0	0.0	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	2.1
Others	1.4	1.4	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	20.0
Overhead	3.8	3.8	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	43.4
2 Commission for Fee Collection	7.5	20.3	28.4	29.7	30.0	30.2	30.5	30.9	37.6	38.1	38.6	321.7
3 Contract Cost (VAT included)	201.4	402.9	582.9	484.6	484.6	484.6	484.6	562.5	605.1	612.9	639.6	5,545.8
Collection	167.5	335.1	412.2	276.4	276.4	276.4	276.4	344.8	344.8	344.8	371.5	3,426.2
Transfer Station	16.6	33.2	119.7	136.1	136.1	136.1	136.1	136.1	136.1	143.8	143.8	1,273.9
Final Disposal Site	17.3	34.6	51.0	72.2	72.2	72.2	72.2	81.6	81.6	81.6	81.6	717.9
Recycling	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	42.6	42.6	42.6	127.8
4 Ownership Cost	0.5	1.0	12.3	28.5	28.5	28.5	28.5	26.7	29.5	29.9	30.9	244.9
State Comp	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4
Collection	0.0	0.0	4.1	9.9	9.9	9.9	9.9	7.7	7.7	7.7	8.8	75.6
Transfer Station	0.5	1.0	5.7	7.4	7.4	7.4	7.4	7.4	7.4	7.8	7.8	66.9
Final Disposal Site	0.0	0.0	2.5	11.2	11.2	11.2	11.2	11.6	11.6	11.6	11.6	93.7
Recycling	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.8	2.8	2.8	8.3
5 Other Operating Cost	54.4	63.2	70.6	73.4	73.7	74.1	74.6	76.4	76.9	77.4	77.9	792.6
Environmental Payment	8.6	17.3	24.8	27.5	27.8	28.2	28.7	30.5	31.0	31.5	32.1	287.9
Illegal Dump Site Reclamation	45.9	45.9	45.9	45.9	45.9	45.9	45.9	45.9	45.9	45.9	45.9	504.6
b Capital Investment	0.0	1,354.3	1,886.0	208.0	45.0	23.3	347.1	587.5	78.8	592.3	213.4	5,335.8
Initial Investment	0.0	1,354.3	1,886.0	208.0	0.0	0.0	347.1	424.5	55.5	51.7	11.6	4,388.7
Replacement	0.0	0.0	0.0	0.0	45.0	23.3	0.0	153.0	23.3	540.6	201.9	997.0
c Debt Service	0.0	0.0	176.1	415.8	429.9	416.1	402.3	388.5	374.7	360.9	347.1	3,311.6
1 Long-term Interest	0.0	0.0	108.3	253.8	257.5	243.7	229.9	216.1	202.3	188.5	174.7	1,874.9
Foreign	0.0	0.0	75.8	177.7	180.2	170.6	160.9	151.3	141.6	132.0	122.3	1,312.5
Local	0.0	0.0	32.5	76.1	77.2	73.1	69.0	64.8	60.7	56.6	52.4	562.5
2 Short-term Interest	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3 Long-term Loan Repayment	0.0	0.0	67.7	162.0	172.4	172.4	172.4	172.4	172.4	172.4	172.4	1,436.7
Foreign	0.0	0.0	47.4	113.4	120.7	120.7	120.7	120.7	120.7	120.7	120.7	1,005.7
Local	0.0	0.0	20.3	48.6	51.7	51.7	51.7	51.7	51.7	51.7	51.7	431.0
4 Short-term Loan Repayment	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
d VAT												0.0
e Corporate Income Tax												0.0
III Net Cash Flow	23.6	311.3	252.1	140.7	92.2	135.1	-160.6	-449.7	286.8	-203.2	179.7	
IV Cash Reserve	23.6	334.9	587.0	727.7	819.9	955.1	794.4	344.7	631.6	428.4	608.1	
V Net Debt	23.6	-1,019.4	-2,585.7	-2,490.9	-2,226.3	-1,918.7	-1,906.9	-2,184.2	-1,725.0	-1,755.7	-1,403.6	
a Long-term Debt Outstanding	0.0	1,354.3	3,172.7	3,218.6	3,045.2	2,873.8	2,701.4	2,529.0	2,386.5	2,184.1	2,011.7	
1 Foreign	0.0	948.0	2,220.9	2,253.0	2,132.4	2,011.7	1,891.0	1,770.3	1,649.6	1,528.9	1,408.2	
2 Local	0.0	406.3	951.8	965.6	913.9	862.1	810.4	758.7	707.0	655.2	603.5	
b Short-term Debt	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
c Cash Reserve	23.6	334.9	587.0	727.7	819.9	955.1	794.4	344.7	631.6	428.4	608.1	

Table 20.4.5 Cash Flow of the Waste Authority (Case B)

Unit: KZT million; 1999 price

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Total
I Cash Inflow	299.0	2,164.5	3,023.2	1,395.6	1,198.7	1,206.8	1,221.8	1,237.7	1,504.3	1,523.0	1,542.1	16,316.9
a Charge Revenue	299.0	810.2	1,137.2	1,187.6	1,198.7	1,206.8	1,221.8	1,237.7	1,504.3	1,523.0	1,542.1	12,868.5
1 Domestic	198.4	490.9	619.0	663.5	665.9	668.3	674.3	690.4	823.8	831.1	838.4	7,153.9
2 Commercial	87.0	267.9	421.5	426.6	433.0	438.2	445.8	454.8	555.5	565.8	576.5	4,673.6
4 Medical	5.9	18.1	29.5	29.5	30.7	30.7	32.0	32.0	38.4	40.0	40.0	326.9
5 T/S Charge	5.1	22.4	45.4	45.0	45.6	47.1	47.1	47.7	57.9	58.6	59.3	483.4
6 D/S Charge	2.5	10.9	21.8	22.0	22.5	22.5	22.5	22.8	27.6	27.6	27.9	230.6
b Subsidy	0.0	1,354.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1,354.3
c Loan	0.0	0.0	1,886.0	208.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2,094.0
1 Long-term Loan Disburse	0.0	0.0	1,886.0	208.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2,094.0
Foreign	0.0	0.0	1,320.2	145.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1,465.8
Local	0.0	0.0	565.8	62.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	628.2
2 Short-term Loan Disburse	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
II Cash Outflow	275.4	1,853.2	2,595.1	1,084.2	941.3	911.8	1,228.1	1,533.4	1,073.9	1,583.1	1,229.7	14,319.2
a Expense for Business Operation	275.4	498.9	709.0	631.0	631.7	632.2	633.1	711.4	763.9	773.0	801.8	7,061.4
1 O&M of State Comp	11.5	11.5	14.8	14.8	14.8	14.8	14.8	14.8	14.8	14.8	14.8	156.4
Personnel	5.4	5.4	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	62.0
Public Relations	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	11.0
Fuel & Lubricant	0.0	0.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	18.0
Maintenance & Repair	0.0	0.0	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	2.1
Others	1.4	1.4	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	20.0
Overhead	3.8	3.8	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	43.4
2 Commission for Fee Collection	7.5	20.3	28.4	29.7	30.0	30.2	30.5	30.9	37.6	38.1	38.6	321.7
3 Contract Cost (VAT included)	201.4	402.9	582.9	484.6	484.6	484.6	484.6	562.5	605.1	612.9	639.6	5,545.8
Collection	167.5	335.1	412.2	276.4	276.4	276.4	276.4	344.8	344.8	344.8	371.5	3,426.2
Transfer Station	16.6	33.2	119.7	136.1	136.1	136.1	136.1	136.1	136.1	136.1	143.8	1,273.9
Final Disposal Site	17.3	34.6	51.0	72.2	72.2	72.2	72.2	81.6	81.6	81.6	81.6	717.9
Recycling	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	42.6	42.6	42.6	127.8
4 Ownership Cost	0.5	1.0	12.3	28.5	28.5	28.5	28.5	26.7	29.5	29.9	30.9	244.9
State Comp	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4
Collection	0.0	0.0	4.1	9.9	9.9	9.9	9.9	7.7	7.7	7.7	8.8	75.6
Transfer Station	0.5	1.0	5.7	7.4	7.4	7.4	7.4	7.4	7.4	7.8	7.8	66.9
Final Disposal Site	0.0	0.0	2.5	11.2	11.2	11.2	11.2	11.6	11.6	11.6	11.6	93.7
Recycling	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.8	2.8	2.8	8.3
5 Other Operating Cost	54.4	63.2	70.6	73.4	73.7	74.1	74.6	78.4	76.9	77.4	77.9	792.6
Environmental Payment	8.6	17.3	24.8	27.5	27.8	28.2	28.7	30.5	31.0	31.5	32.1	287.9
Illegal Dump Site Reclamation	45.9	45.9	45.9	45.9	45.9	45.9	45.9	45.9	45.9	45.9	45.9	504.6
b Capital Investment	0.0	1,354.3	1,886.0	208.0	45.0	23.3	347.1	587.5	78.8	592.3	213.4	5,335.8
Initial Investment	0.0	1,354.3	1,886.0	208.0	0.0	0.0	347.1	424.5	55.5	51.7	11.6	4,338.7
Replacement	0.0	0.0	0.0	0.0	45.0	23.3	0.0	163.0	23.3	540.6	201.9	997.0
c Debt Service	0.0	0.0	0.0	245.2	264.7	256.3	247.9	239.6	231.2	222.8	214.4	1,922.0
1 Long-term Interest	0.0	0.0	0.0	150.9	150.0	151.6	143.2	134.8	126.5	118.1	109.7	1,094.8
Foreign	0.0	0.0	0.0	105.6	112.0	106.1	100.3	94.4	88.5	82.7	76.8	766.4
Local	0.0	0.0	0.0	45.3	48.0	45.5	43.0	40.5	37.9	35.4	32.9	328.4
2 Short-term Interest	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3 Long-term Loan Repayment	0.0	0.0	0.0	94.3	104.7	104.7	104.7	104.7	104.7	104.7	104.7	827.2
Foreign	0.0	0.0	0.0	66.0	73.3	73.3	73.3	73.3	73.3	73.3	73.3	579.0
Local	0.0	0.0	0.0	28.3	31.4	31.4	31.4	31.4	31.4	31.4	31.4	248.2
4 Short-term Loan Repayment	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
d VAT												0.0
e Corporate Income Tax												0.0
III Net Cash Flow	23.6	311.3	428.1	311.4	257.4	295.0	-6.2	-300.7	430.4	-65.1	312.4	
IV Cash Reserve	23.6	334.9	763.1	1,074.4	1,331.9	1,626.8	1,620.6	1,319.9	1,750.3	1,685.2	1,997.6	
V Net Debt	23.6	334.9	-1,123.0	-925.3	-663.2	-163.5	-65.0	-261.1	274.0	313.7	730.8	
a Long-term Debt Outstanding	0.0	0.0	1,886.0	1,999.7	1,895.0	1,790.3	1,685.6	1,580.9	1,476.2	1,371.5	1,266.8	
1 Foreign	0.0	0.0	1,320.2	1,399.8	1,326.5	1,253.2	1,179.9	1,106.6	1,033.4	960.1	886.8	
2 Local	0.0	0.0	565.8	599.9	568.5	537.1	505.7	474.3	442.9	411.5	380.0	
b Short-term Debt	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
c Cash Reserve	23.6	334.9	763.1	1,074.4	1,331.9	1,626.8	1,620.6	1,319.9	1,750.3	1,685.2	1,997.6	

Table 20.4.6 Cash Flow of the Waste Authority (Case C)

Unit: KZT million; 1999 price

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Total
I Cash Inflow	299.0	2,164.5	3,023.2	1,395.6	1,198.7	1,206.8	1,568.9	1,662.3	1,559.8	1,523.0	1,542.1	17,143.9
a Charge Revenue	299.0	810.2	1,137.2	1,187.6	1,198.7	1,206.8	1,221.8	1,237.7	1,504.3	1,523.0	1,542.1	12,868.5
1 Domestic	198.4	490.9	619.0	663.5	665.9	668.3	674.3	680.4	823.8	831.1	838.4	7,153.9
2 Commercial	87.0	267.9	421.5	426.6	433.0	438.2	445.8	454.8	556.5	565.8	576.5	4,673.6
4 Medical	5.9	18.1	29.5	29.5	30.7	30.7	32.0	32.0	38.4	40.0	40.0	326.9
5 TS Charge	5.1	22.4	45.4	46.0	46.6	47.1	47.1	47.7	57.9	58.6	59.3	483.4
6 DS Charge	2.5	10.9	21.8	22.0	22.5	22.5	22.8	22.8	27.6	27.6	27.9	230.6
b Subsidy	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
c Loan	0.0	1,354.3	1,886.0	208.0	0.0	0.0	347.1	424.5	55.5	0.0	0.0	4,275.5
1 Long-term Loan Disburse	0.0	1,354.3	1,886.0	208.0	0.0	0.0	347.1	424.5	55.5	0.0	0.0	4,275.5
Foreign	0.0	948.0	1,320.2	145.6	0.0	0.0	242.9	297.2	38.8	0.0	0.0	2,992.8
Local	0.0	406.3	565.8	62.4	0.0	0.0	104.1	127.4	16.6	0.0	0.0	1,282.6
2 Short-term Loan Disburse	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
II Cash Outflow	275.4	1,853.2	2,730.5	1,163.1	1,155.9	1,310.9	1,623.9	1,942.8	1,494.6	1,988.3	1,603.7	17,143.3
a Expense for Business Operation	275.4	498.9	709.0	631.0	631.7	632.2	633.1	711.4	763.9	773.0	801.8	7,061.4
1 O&M of State Comp	11.5	11.5	14.8	14.8	14.8	14.8	14.8	14.8	14.8	14.8	14.8	156.4
Personnel	5.4	5.4	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	62.0
Public Relations	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	11.0
Fuel & Lubricant	0.0	0.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	18.0
Maintenance & Repair	0.0	0.0	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	2.1
Others	1.4	1.4	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	20.0
Overhead	3.8	3.8	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	43.4
2 Commission for Fee Collection	7.5	20.3	28.4	29.7	30.0	30.2	30.5	30.9	37.6	38.1	38.6	321.7
3 Contract Cost (VAT included)	201.4	402.9	582.9	484.6	484.6	484.6	484.6	562.5	605.1	612.9	639.6	5,545.8
Collection	167.5	335.1	412.2	276.4	276.4	276.4	276.4	344.8	344.8	344.8	371.5	3,426.2
Transfer Station	16.6	33.2	119.7	136.1	136.1	136.1	136.1	136.1	136.1	143.8	143.8	1,273.9
Final Disposal Site	17.3	34.6	51.0	72.2	72.2	72.2	72.2	81.6	81.6	81.6	81.6	717.9
Recycling	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	42.6	42.6	42.6	127.8
4 Ownership Cost	0.5	1.0	12.3	28.5	28.5	28.5	28.5	26.7	29.5	29.9	30.9	244.9
State Comp	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4
Collection	0.0	0.0	4.1	9.9	9.9	9.9	9.9	7.7	7.7	7.7	8.8	75.6
Transfer Station	0.5	1.0	5.7	7.4	7.4	7.4	7.4	7.4	7.4	7.8	7.8	66.9
Final Disposal Site	0.0	0.0	2.5	11.2	11.2	11.2	11.2	11.6	11.6	11.6	11.6	93.7
Recycling	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.8	2.8	2.8	8.3
5 Other Operating Cost	54.4	63.2	70.6	73.4	73.7	74.1	74.6	76.4	76.9	77.4	77.9	792.6
Environmental Payment	8.6	17.3	24.8	27.5	27.8	28.2	28.7	30.5	31.0	31.5	32.1	287.9
Illegal Dump Site Reclamation	45.9	45.9	45.9	45.9	45.9	45.9	45.9	45.9	45.9	45.9	45.9	504.6
b Capital Investment	0.0	1,354.3	1,886.0	208.0	45.0	23.3	347.1	587.5	78.8	592.3	213.4	5,335.8
Initial Investment	0.0	1,354.3	1,886.0	208.0	0.0	0.0	347.1	424.5	55.5	51.7	11.6	4,338.7
Replacement	0.0	0.0	0.0	0.0	45.0	23.3	0.0	163.0	23.3	540.6	201.9	997.0
c Debt Service	0.0	0.0	135.4	324.0	480.3	655.3	643.7	643.9	651.9	623.0	588.5	4,745.2
1 Long-term Interest	0.0	0.0	135.4	324.0	344.8	331.3	298.9	299.1	307.1	278.1	243.7	2,562.5
Foreign	0.0	0.0	94.8	226.8	241.4	231.9	209.2	209.4	215.0	194.7	170.6	1,793.7
Local	0.0	0.0	40.6	97.2	103.5	99.4	89.7	89.7	92.1	83.4	73.1	768.7
2 Short-term Interest	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3 Long-term Loan Repayment	0.0	0.0	0.0	0.0	135.4	324.0	344.8	344.8	344.8	344.8	344.8	2,183.7
Foreign	0.0	0.0	0.0	0.0	94.8	226.8	241.4	241.4	241.4	241.4	241.4	1,528.6
Local	0.0	0.0	0.0	0.0	40.6	97.2	103.5	103.5	103.5	103.5	103.5	655.1
4 Short-term Loan Repayment	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
d VAT												0.0
e Corporate Income Tax												0.0
II Net Cash Flow	23.6	311.3	292.7	232.5	41.8	-104.1	-55.0	-280.6	65.1	-465.2	-61.7	
IV Cash Reserve	23.6	334.9	627.6	860.2	902.0	797.9	742.9	462.4	527.5	62.3	0.6	
V Net Debt	23.6	-1,019.4	-2,512.7	-2,588.2	-2,411.0	-2,191.0	-2,248.2	-2,608.5	-2,254.0	-2,374.4	-2,091.2	
a Long-term Debt Outstanding	0.0	1,354.3	3,243.4	3,448.4	3,312.9	2,988.9	2,991.1	3,070.8	2,781.5	2,436.6	2,091.8	
1 Foreign	0.0	948.0	2,268.3	2,413.9	2,319.1	2,092.2	2,093.8	2,149.6	1,947.0	1,705.6	1,464.3	
2 Local	0.0	406.3	972.1	1,034.5	993.9	896.7	897.3	921.3	834.4	731.0	627.5	
b Short-term Debt	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
c Cash Reserve	23.6	334.9	627.6	860.2	902.0	797.9	742.9	462.4	527.5	62.3	0.6	

Chapter 21

EVALUATION OF THE
PRIORITY PROJECT

CHAPTER 21 EVALUATION OF THE PRIORITY PROJECT

21.1 TECHNICAL EVALUATION

21.1.1 Technical Components

The priority project has been formulated using technical systems which are well accepted both in Kazakhstan and the rest of the world. The technical systems employed in the priority project are:

a.	Collection system	Individual housing area Block housing area Commercial area	Compactor-bag and/or bin Compactor-container (1.1 m ³) Arm-roll-container (6 m ³)
b.	Transfer station	Reloading method Transportation	Direct reloading Open top trailer (40 m ³)
c.	Final disposal	Disposal method Leachate treatment	Sanitary landfill Retention pond

21.1.2 Technical Acceptability

1) New collection system for individual housing area

At present in individual housing areas, solid waste is collected by dump trucks from bags or bins. Containers are not suitable in these areas. The new collection system will replace the dump trucks with compactor trucks which are more efficient (easier loading of waste and larger pay-load) and more suitable for these areas.

2) New collection system for block housing area

At present in block housing areas, solid waste is collected from containers using side-loading trucks. The side loading trucks achieve only a very low rate of compaction. Therefore, compactor trucks will be more efficient and suitable for emptying the containers. Existing containers are not suitable for compactor trucks, so a new container design will be introduced.

3) New collection system in commercial area

At present in commercial areas, most solid waste is collected from containers using side loading trucks. The new collection system will use Arm-roll containers (6 m³) for large commercial waste generators. These large containers are more economical in commercial areas where there is a large volume of waste at the generation point.

4) Transfer station

Direct reloading is the simplest method of reloading at transfer stations. Open top trailers (40 m³) will be used as at present.

5) Final disposal

Sanitary landfill is the most economical disposal method for solid waste and is used throughout the world. Leachate will be treated using a retention pond system. This system is also simple and used throughout the world.

21.1.3 System Balance

The proposed priority project will bring the overall Waste Management System back into balance. Currently there is an imbalance in the system, with insufficient capacity for transfer of waste at transfer stations and its onward transport to the final disposal site. Until this balance is restored illegal dumping is inevitable. Quite simply collection contractors cannot offload legally the waste they have collected as there is insufficient capacity provided at the existing transfer facilities and they lack the transport resources to take this waste the whole distance to the final disposal site.

21.2 ENVIRONMENTAL IMPACT EVALUATION

21.2.1 General

The anticipated environmental impacts of the priority project are mostly beneficial. The project is actually an urban environmental improvement project. Significant beneficial effects of the project include improvement of living environment and public health through better solid waste collection and curtailment of illegal dumping.

The environmental impact assessment study was conducted according to all applicable laws of Kazakhstan. Even though the project is an urban environmental improvement project, there are some potential adverse effects requiring proper management. Such potential adverse effects are principally confined to the new transfer stations and Karasai disposal site, and vicinity.

21.2.2 Potential Environmental Impacts

During the Feasibility Study, Environmental Impact Assessments (EIA) were conducted for the two (sub)projects within the Priority Project which are subject to EIA requirements under Kazakh law. These are:

- (1) Construction of West and Spasskaya Transfer Stations, and
- (2) Karasai Disposal Site Improvement Work.

The potential environmental impacts of the priority projects are summarized in Table 21.2.1 below.

Table 21.2.1 Potential Environmental Impacts of Priority Projects

Priority Project	Construction of West and Spasskaya Transfer Stations		Karasai Disposal Site Improvement Work
	West	Spasskaya	
Potential impacts			
Air	3	3	4
Surface water	4	2	4
Groundwater	4	2	2
Soil	3	4	3
Flora	4	4	4
Fauna	4	4	3
Traffic	3	3	3
Landscape	3	3	4
Settlement adjacent to the site	4	4	4

Legend: 1: impact of high significance; 2: impact of moderate significance;
3: impact of low significance; 4: impact of no significance.

21.2.3 Mitigation Measures

The potential impacts of each component of the priority project and mitigation measures are described below.

1) Construction of West and Spasskaya Transfer Stations

As shown in Table 21.2.1, the environmental impact of the West transfer station will not be significant. However the design will incorporate mitigation measures against offensive odor, waste scattering and water contamination by leachate.

Surface and ground water pollution are potential problems caused by construction of the Spasskaya Transfer Station. The following countermeasures will be taken:

- a. Collection of waste water and leachate on the site;
- b. Installation of a network of monitoring wells to observe quality, level and temperature of the groundwater; and
- c. Maintenance of proper sanitary conditions within the transfer station and surrounding area.

Major air pollution may be caused by collection and transportation vehicles. These impacts can be minimized by routing and scheduling collection and transportation so that, as far as possible, waste transportation is conducted when other traffic is light.

Landscaping with lawns and trees could also be considered to minimize the visual impact of the facilities.

2) Karasai Disposal Site Improvement Work

Groundwater pollution by leachate is the major potential environmental impact. The facilities must be designed and constructed and operational procedures must be adopted to minimize these impacts. That is, a proper leachate collection and drainage system must be installed and operational procedures adopted to ensure that waste is regularly covered

with soil to reduce the amount of leachate generated and to improve the leachate quality. The lining system comprising clay and synthetic membranes will also minimize the impact.

21.2.4 Conclusion

The proposed priority project will have some potential negative impacts but the planned mitigation measures will minimize these impacts.

The construction of new transfer stations will improve the efficiency of the collection service and improve the city environment, which is currently adversely affected by the existing sub-standard collection service.

The existing disposal site at Karasai has some negative impacts on the surrounding environment. The proposed improvement plan will introduce sanitary landfill principles and reduce the impact of existing site operations on the surrounding environment.

Overall the proposed projects will have a beneficial impact on the environment and public health of Almaty City.

21.3 ECONOMIC AND FINANCIAL EVALUATION

21.3.1 Economic Evaluation

The previous section has already outlined the expected environmental benefits of the proposed priority project. Clearly these also represent significant economic benefits, though quantifying such benefits in any meaningful way is impossible.

Given the difficulty in quantifying the benefits of such projects, the usual approach is to compare projects that achieve the minimum required level of environmental and social performance in terms of their overall economic (or resource) cost. The economic cost of a project differs from the financial cost by removing transfer payments (such as taxes) and using opportunity costs rather than financial costs for all inputs. The most important difference in these projects between financial and economic costs is in interest charges. To calculate the economic cost, the opportunity cost of capital (currently approximately 15% p.a. measured in nominal US dollars) must be used rather than the actual interest rate paid. Actual interest payments will be lower than the opportunity cost of capital if the City or Waste Authority receives a grant or is provided with a concessional ("soft") loan.

Such an approach is particularly appropriate in an economic review of the overall M/P. In evaluating the economic performance of the priority project, one additional factor needs to be considered. The various levels of Government in Kazakhstan face massive demands for capital to rebuild critical infrastructure. These demands far exceed the capacity of these Governments to raise finance from the various sources available to them – domestic borrowing, foreign loans and foreign grants. Whether the city government is able to fund the total M/P will depend largely on the priority assigned to this project by key levels of Government. This uncertainty about whether the Government will be able to fund the entire M/P should be factored into the evaluation of the priority project.

Put another way the scarcest resource in Kazakhstan is currently capital. Hence there is some doubt whether the Government is able to fund the entire plan. This makes it doubly important that the early implementation phases maximize the productivity obtained from the scarcest resource -- capital.

The priority project is designed to maximize the productivity of the limited capital available through two key measures:

- Firstly a new transfer station is developed as quickly as possible. This maximizes the productivity of both the existing collection fleet and new collection vehicles. This minimizes the future investments necessary in collection vehicles which represent the largest investment in the overall system
- The deemed leasing charge introduced in the contracting out system will force the contractors to maximize the productivity of both existing and new equipment to win further collection or site management contracts. This is in stark contrast to the existing system which actually discourages efficient use of existing capital resources.

Under the proposed tariff system, the tariffs charged to residents are calculated using the likely financial (and concessional) interest rates paid by the Waste Authority. This minimizes the financial cost to the consumers and effectively shares with the residents the subsidy provided to Kazakhstan by the grant donor or lender of funds at concessional rates. (The cost of equipment borrowed from the Waste Authority is not included in contract between the Authority and the contractor.)

However adjusting contract prices by the deemed lease charge, calculated using the opportunity cost of capital, forces contractors to maximize the productivity of equipment to enable them to win contracts. This (deemed) lease charge will form a large part of the deemed bid price used for comparing bids in the tendering process.

By contrast the current system undercharges contractors for existing equipment which is leased at prices based on unrealistic historic costs which are much lower than the opportunity cost of this equipment. As a result contractors are trying to minimize wage costs with little regard to utilization of the equipment as this has little effect on their total costs.

The priority project and the management procedures to be introduced by the Waste Authority represent a major step towards improving capital utilization in the sector.

21.3.2 Financial Evaluation

1) Tariff structure and revenue of Waste Authority

Given the severe budget constraints faced by the Government, an appropriate financial framework for the SWM sector is required not only to achieve an efficient allocation of scarce resources, but also to assure the long-term financial sustainability of the sector. There are two key objectives in terms of allocative efficiency:

- a. tariffs should be sufficient to provide for the financial viability of the services and undertakings and generate a sufficient surplus to allow for financing a significant part of their own investment programs in the years to come, and

- b. it should be set at levels which encourage efficient use of service capacity and avoids wasteful consumption.

The service charge is the only source of revenue for the Waste Authority. The proposed tariff is based on the cost of service and affordability. GRDP in Almaty city in 2005 is estimated to be KZT 281.7 billion. Average income will be KZT 6,246.9 /month/person (only 29.3% of GRDP). The tariff structure includes a cross subsidy that exempts residents whose income falls in the lowest 25% of the income distribution from any payment. Average income of remaining 75% of population will be about KZT 7,500 /person/month. Tariff in 2005 is set to be KZT 75 /person/month for these residents which will be about 1% of their average income. Total revenue of the Waste Authority is estimated to be 1.2 billion in 2005 which will be only 0.43% of GRDP.

2) Financial viability of Waste Authority

Based on the above tariff, the projected cash flow of the Waste Authority is shown in chapter 20. As shown in Table 20.3.1, Waste Authority will be viable up to year 2010 if the loan (interest rate 8%, repayment period 20 years and no grace period) is provided and the Waste Authority is exempted from VAT.

21.4 SOCIAL AND INSTITUTIONAL EVALUATION

The creation of the Waste Authority constitutes a major institutional development and recognition of the residual responsibilities of the public sector in the changing economic system of Kazakhstan. It will provide a model for more successful privatization of solid waste services in other cities. Perhaps even more importantly it will provide a model that should be applied (with some modifications) to the privatization of some other public services in Kazakhstan.

Creation of the Waste Authority will establish two very important principles for better governance that may in future be applied in other sectors:

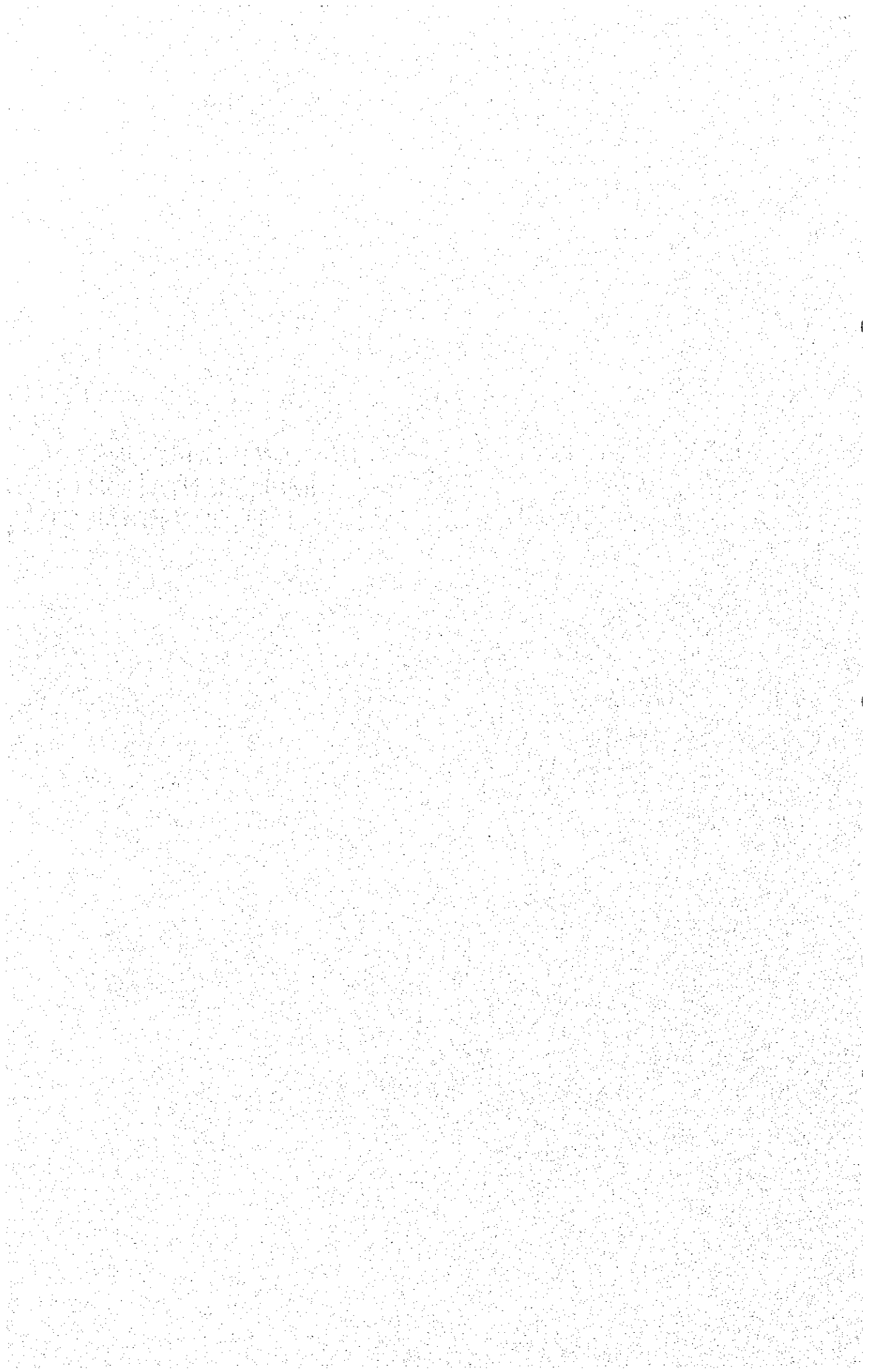
- the need to analyze and identify any public responsibilities before privatization of a public service
- the need to identify a suitable public institution to discharge these public responsibilities and the desirability of controlling such an institution by holding it legally accountable for discharging its duties rather than through direct administrative control.

There appear to be no significant legal or technical barriers to the formation of the Waste Authority, or legal barriers preventing it discharging its proposed duties. The effectiveness of the Authority will depend on its ability to exercise its projected powers to meet its objectives, and counteract potential outside interference directed at other short term political objectives which conflict with its charter.

The priority projects will improve the basic SWM services in Almaty and thus be of immediate social benefit. In the longer term however the formation of the Waste Authority will potentially have a far wider impact. It may prompt a broader reconsideration of public responsibilities for basic infrastructure and social services, and illustrate an appropriate procedure for the Government to continue to discharge such responsibilities in a manner consistent with its Privatization Policies.

Chapter 22

RECOMMENDATIONS ON
IMPLEMENTATION OF
PRIORITY PROJECT



CHAPTER 22 RECOMMENDATIONS ON IMPLEMENTATION OF PRIORITY PROJECT

1) Financial Arrangements

This Study foresees that eventually most of the investment needed in this sector will come from the private sector, once stronger private companies emerge and the local banking system recovers some capability for long term financing.

However the private sector is currently extremely weak and it is likely to be at least ten years before it can play a major role in financing of this sector. In the meantime the Government must play a significant role in financing this sector.

There still appears to be a lack of appreciation within the City Government of the key role of financial institutions in the investment planning process in a market economy. Under the old economic management system the banks only played a subsidiary role. Essentially investment decisions were taken by the political leadership; the banks role was limited to organizing the funds to fulfil the orders of the political leadership.

In the new market economy system the banks play a far more important role. They should perform an independent check on the financial viability of investments before becoming involved in financing them. Of course this does not always happen. The "crony- capitalism" systems of South East Asia in some ways mirrored the soviet system of political control over the banks: in both cases catastrophic financial collapses were the result.

Unfortunately the City Government still does not appear to appreciate the changed role of financial institutions in the new economic order. To date it has failed to provide access for potential lenders to financial data that any international financial institution will require before considering approval of loans. Thus the first step to implementing this plan must be a change in attitude by the City Government to disclosure of information.

Secondly a reassessment needs to be made of realistic financing options. In the opinion of the study team the only realistic option is:

A loan from one of the international development banks to the City Government or the Waste Authority with a Guarantee from either the Republican or City Governments. This might be combined with a grant from one of the international aid organizations.

Several other options appear to be under consideration by the City Government, so the following very brief comments on why these options are unrealistic are included.

- **Loans from local banks** These are considered unrealistic whether they are made to private companies or the Waste Authority. The funds available for lending by the local banks are extremely limited. There is little trust by the local population of these banks, and so the level of deposits is very low. The limited funds raised by the local banks are being used principally to buy either short term high yield treasury notes or to provide short term trade finance. It will be five to ten years before these banks are likely to consider longer term lending for investments such as those proposed in the M/P.

- **Loans from International consortia led by local Banks** There is a perception that the local banks can raise funds from international banks. However the international Banks will still follow their own assessment procedures which are covered below.
- **Loans from International Commercial Banks.** The universal perception of these banks is that Kazakhstan is a high risk environment – the accounting systems are deficient, corporate governance is opaque, the legal system offers little protection to creditors and investments are subject to political interference. Some interest has been shown by the international banks in loans to companies that have strong foreign management, and whose revenues are largely generated by exports (such as Ispat Karmet). However it is likely to be ten years or more before such banks will seriously consider lending for investments of the type included in this M/P.
- **BOOT (Build Own Operate and Transfer) schemes.** In the final analysis such schemes are financed by loans from international commercial banks who also take an equity position. They accept a lower level of security on the loans in return for the possibility of higher returns on the equity investment. However such investments are exposed to major political risks. These schemes are subject to very high risks for long periods. Their financial viability can be destroyed at any time by political interference in the tariffs charged. Given the losses suffered recently by financiers of such schemes in several other developing countries which were considered to have more independent legal systems than Kazakhstan, it is extremely unlikely that any financier would even consider funding such schemes in Kazakhstan. Certainly promoters have already tried to advance such options in Kazakhstan, but these promoters have failed to raise finance for their proposals.

2) Requirements of International Development Banks

The city Government should therefore concentrate on trying to arrange finance from one or several of the International Development Banks. Negotiating such an arrangement is outside the scope of this Study as such, but the following comments are offered by the Study Team to help the City Government prepare for negotiations with potential lenders. Again it must be stressed that this M/P is precisely that – a plan. Each potential lender will insist on making their own independent assessment of its financial viability, and the city must be prepared to co-operate with that process. The following key points should be noted:

- **Identity of borrower.** The borrower will have to be either the City or possibly the Waste Authority. (The possibility of the Waste Authority itself being the borrower can only be discussed once the legal formalities of its formation are complete). Lending to the private sector companies will not be considered at this stage. Their accounting, management and governance systems are not acceptable to the development banks. These systems create risks that are unacceptable to the Development Banks.
- **Purpose of loan.** Loans will only be considered for the development of basic municipal services. If the borrowing proposal attempts to tie together basic collection and disposal systems with what should be commercial recycling systems, then the proposals will not be considered. The Development Banks charter is primarily to assist in the development of basic infrastructure. (It might

also be noted that, based on their international experience, they are almost certain to assess the recycling schemes currently proposed by some Kazakh enterprises as non-viable). Given the lack of transparency in Kazakhstan, granting of a loan to finance these basic services will be much more difficult if private companies leasing equipment from the Waste Authority are also involved in proposals for privately owned recycling plants.

- **Viability of the Project.** The Development Banks will be concerned about the viability of the project, which to a large extent will depend on the willingness of the city (and possibly the Republican Government) to allow tariffs to be raised to appropriate levels. The performance of the City over the next six months in establishing the Waste Authority and guaranteeing its independence to set tariffs, and the performance of the Authority in raising tariffs will be watched very closely by these Banks. If there are delays either in establishing the Authority or raising tariffs, the credibility of the City and the Authority will be badly damaged in the eyes of the potential lenders.
- **Need for a Guarantee.** Some Development Banks will insist on a sovereign guarantee. Some may consider a guarantee issued by the City, but will require far more information than has been provided to the Study Team to assess the quality of that guarantee.
- **Form of Guarantee.** All the Development Banks are likely to prefer a lien over the cash flow of the city. They are unlikely to accept a lien or mortgage over fixed assets of the City. The acceptability of a lien over the cash flow of the city will depend on the legal power of the city to direct such cash flows to a lender. The precise legal position has not yet been revealed to potential lenders. However, based on the very incomplete information so far provided, the Study Team considers that some amendments to Republican Budget Laws will be necessary to allow the city to give a lien over its cash flows and to clarify the powers of the city to control its revenues.

3) Immediate formation of Waste Authority

The City government should proceed as quickly as possible with the formation of the Waste Authority. The city government is uncertain about the prospects for financing some components of the priority project, given its limited powers to influence the priorities assigned by the Republican Government for the use of foreign loans and grants. The City government should not let this uncertainty slow the formation of the Waste Authority.

Formation of the Waste Authority is important not only for the implementation of other new projects. It will play an immediate and critical role in management of the sector even if financing for other new projects is delayed. It does not require external financing. The only financing needed to create the Authority is a contribution from the city budget for the year 2000 for working capital.

Immediate formation of the Waste Authority is necessary to:

- improve tariff collection from residents and to introduce a cross subsidy system which will allow an adjustment of tariff rates and an effective increase in gross revenues collected;
- improve the utilization of existing assets in the sector through economically sounder contracting arrangements;

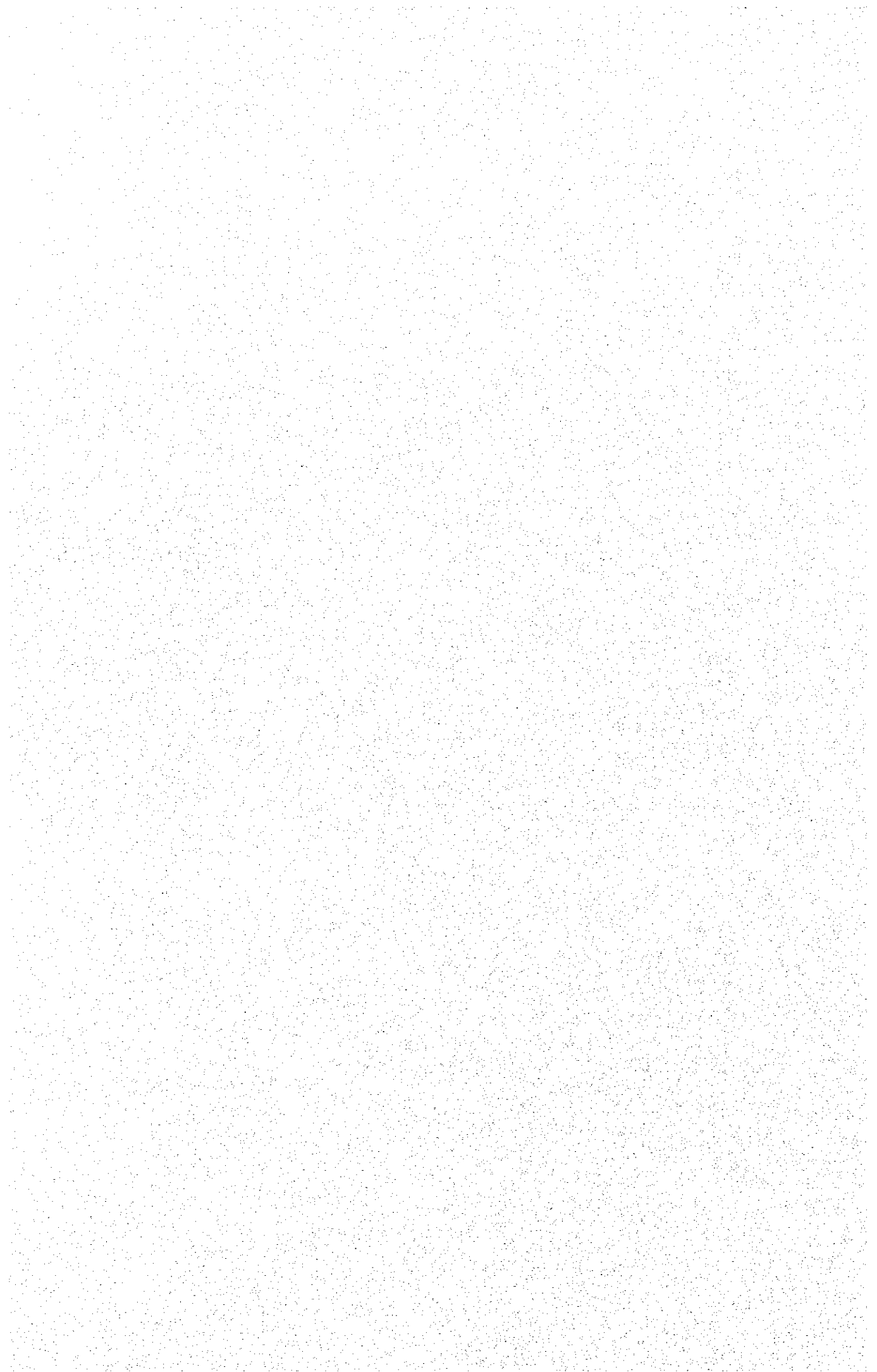
- demonstrate to potential lenders that the City is serious about reform of the service.

4) Environmental Impact Assessment

It is also necessary to mention that during the development of design documents for the construction of SWM facilities, Environmental Impact Assessment (EIA) should be made on full volume as well as the section for environmental protection. After that concordance with the corresponding agencies should be made and results of State Ecological Examination should be submitted as follows:

- Karasai disposal site – to Oblast Department
- New West and Spasskaya transfer stations – to ACDEP

ATTACHMENTS



ATTACHMENT 1

PARTICIPANTS IN THE STUDY

1. JICA ADVISSORY COMMITTEE

Position	Name	Original Position
(1) Chairman	Mr. Morikazu Miyano-hara	Assistant Manager, Clean Center Administration Division, Kobe City
(2) Task Manager	Ms. Kayo Minagawa	Social Development Study Department

2. JICA STUDY TEAM

Position	Name
(1) Team Leader/ SWM Plan	Mr. Hiroshi Abe
(2) Institution/ Privatization	Mr. Graeme Teale
(3) Legal Structure	Mr. Hirochika Manabe
(4) Economic and Financial Analysis	Mr. Makoto Yajima
(5) Solid Waste Collection and Transportation	Mr. Mahmoud-S. Riad
(6) Waste Disposal Plan/ Environment Impact Assessment	Mr. Masakazu Maeda
(7) Waste Minimization/ Recycling	Mr. Anatoly Lesnikov
(8) Medical Waste/ Industrial Waste	Dr. A. Belherazzem
(9) Facility Planning/ Cost Estimation	Mr. Hisashi Yamauchi
(10) Administrative Coordinator	Mr. Taikan Kuwabara
(11) Interpreter	Mr. Takeshi Kagajo Mr. Vassily Beshun

3. STEERING COMMITTEE

Name	Position
Mr. Y. Shatov (Mr. Kazhmuhan Arynov)	Chairman, Director of ACDEP
Mrs. Kuralai Karibaeva	Director of Southern Region Office, NEC
Mr. Azamat Oimarov	Deputy Chairman, Agency of Economic Planning Committee
Mr. Alexander Kim	Head of Public Health and Social Protection and Ecology Dept., Almaty City Akimate
Mrs. Beibut Dyusekov	Deputy Chief of Inspection, Almaty City Dept. of Environmental Protection
Mrs. Elena Simonova	Chief of Housing and Communal Services Dept., Almaty City Akimate

4. WORKING GROUP

Name	Position
Mr. Amre Zhetybayev	Head of Radiation Control and Waste Dept., ACDEP
Mr. Nurlan Aldarbrgenov	Anti-Monopoly Committee
Mrs. Kulyash Bolatbayeva	Southern Region Office, NEC

Mr. Urken Daumov	Head of Air Pollution Control Dept., ACDEP
Mr. Tursylihan Dogusheva	Almaty City Economic Committee
Mr. Marat Kulmanov	Chief Expert of ACDEP
Mr. Nadeshda Minina	Chief Expert of ACDEP
Mr. Aybar Murzaliyev	Almaty City Akimate
Mr. Shamil Nysambayev	Deputy Head of Almaty City Architecture Dept.
Mr. Vassily Renkevich	Sanitary Hygienics Dept., Sanitary-Epidemiological Center
Mr. Almas Tulenov	Chief Expert of ACDEP
Mr. Bosakan Uldarbekov	Almaty Oblast Akimate

ATTACHMENT 2

STUDY TEAM REPLY TO KAZAKH SIDE COMMENTS ON THE DRAFT FINAL REPORT

1. ACDEP COMMENTS

To: JICA Study Team Leader
Mr. H. Abe

Comments

Of the results of JICA Study Team work on the project
Master Plan for "SOLID WASTE MANAGEMENT IN ALMATY CITY"

ACDEP supports this project, the basic components of which are:

- Creation of the state authority for general management and contracting out for actual operation by SWM facilities.
- Introduction of a new waste collection system to ensure the universal service coverage of the city territory.
- Construction of two waste transfer stations to ensure required capacity and stable transfer haul of all city wastes to the disposal site.
- Improvement of Karasai disposal site by introduction of sanitary waste landfilling.
- Separate waste collection in 2010 for maximum reduction of waste amounts and introduction of recycling when the main problems of SWM are resolved and economic conditions are improved. All expenses should be covered by the service charges.

At the same time there are some proposals and remarks:

1. Very often composition of solid waste includes containers from domestic chemical cleaning materials (boxes, packing bottles, gas spray cans, etc.), which can be toxic. At present the matter of their treatment has not been considered. But in the future, in case of separate waste collection measures should be considered for separating toxic wastes from general domestic wastes at the source of generation. Furthermore landfilling of these materials should be carried out together with industrial toxic wastes (this recommendation may be included in the separate waste collection plan).

Study Team Reply

How to manage the special waste included in domestic waste as mentioned above is one of the important issues of solid waste management. It is desirable to have a special system to collect and treat these wastes. Although quantity of these wastes is small, their treatment requires large investment to avoid environmental pollution caused by the treatment process. Therefore, proper management system of these special wastes should be studied at the national level and not the local government level. For the time being, the main system employed for these wastes in most countries in the world consists of separate collection and separate storage. As the quantity of these wastes is small, such temporary measure could be employed in Almaty city. Therefore, it is desirable to collect these wastes separately and landfill together with industrial toxic waste in the future, as described in the comment. The Main Report and Summary Report have been modified to include this reply.

It should also be noted that the expected amount of special waste in the domestic waste is very low. In 1992 various estimates were made for the quantity of hazardous wastes in the municipal solid waste in cities in the US and the values ranged between 0.01 to 1 percent of the total waste by weight, with the typical value of 0.1%. Considering that the hazardous wastes from domestic wastes are generated from mainly luxurious products such as cosmetics, paints, special cleaning products, camera films, batteries, pesticides and insecticides, etc. and taking into account the difficult economic conditions in Almaty at present it is estimated that the amount of such wastes in Almaty city will be in the range of 0.1 to 0.2% by weight of the total.

2. The design specifies the installation of gas exhaust pipes. However gases are sources of air pollution. The project should consider measures for monitoring of air pollution at the disposal site area.

Study Team Reply

Landfill gases consist mainly of methane, carbon dioxide, nitrogen, and oxygen. They also contain carbon monoxide, hydrogen sulfide etc. It is recommended that monitoring of air pollution around the disposal site should be carried out periodically as mentioned in the main report. Concerning estimates of the gas emissions at Karasai disposal site reference should be made to Table 4.4.1, Part II of the Environmental Impact Assessment Report.

3. It is also necessary to mention that during the development of design documents for the construction of facilities EIA should be comprehensive and include the section on Environment Protection. The results of the State Ecological Examination (EIA) should be submitted to the following agencies:
 - concerning Karasai disposal site – to oblast Department;
 - concerning Spasskaya and West TS – to ACDEP

Study Team Reply

This comment has been inserted in the recommendations section of the final report.

4. In Section 9.9 "Public awareness and public education" it is necessary to take into account the mechanism of interaction with KSK and KSD. Public awareness and education should pay special attention to preventing the discharge of toxic and other hazardous wastes with domestic wastes.

Study Team Reply

It is desirable that the Waste Authority should work together with KSK and KSD organizations concerning the public awareness program. Also it is important to educate residents concerning necessity of separation of special waste to avoid environmental pollution. The Main Report and Summary Report have been modified to include this reply. Furthermore more explanation on the public awareness education and campaign has been inserted in Section J of the Supporting Report.

ACDEP expresses its hope that by joint efforts of all utility services of the city, all the population as well as with the assistance of JICA we will succeed to improve the situation of the negative impact of solid wastes on the environment and public health.

Mr. Yevgeniy Shatov
(signature)
Chief of the Department

2. THE ECONOMY COMMITTEE OF AKIM'S STAFF COMMENTS

Comments from The Economy Committee of Akim's staff

To: JICA Study Team Leader
Mr. Hiroshi Abe

November 23d, 1999
No k-2002

Committee on Economy having been acquainted with the draft final report "The Study on Solid Waste Management" and supporting the whole implementation of this project which it considers necessary and important for Almaty city, has the following remarks:

(1) Concerning the tariffs for waste collection.

According to your data the general investment expenses of the Master Plan will be 39,5 million USD or 4543,8 million KZT. Calculations were made based on the exchange rate of 1 USD = 115 KZT. Under these conditions the forecast tariff were accordingly calculated as follows:

Collection Services	2005	2010
Domestic	75 KZT/per./month	90 KZT/ per./month
Commercial	3900 KZT/ton	4680 KZT/ton
Medical	3900 KZT/ton	4680 KZT/ton
Transfer station	1750 KZT/ton	2100 KZT/ton
Disposal site	770 KZT/ton	924 KZT/ton

However the USD rate at present is (10.11.99) 142 KZT per 1 USD, a growth of 23% from the rate used in the tariff estimation. Accordingly forecast tariffs for waste collection should be increased by 23% because the loan repayment is supposed to be made from the sums collected as payments for waste collection services. Besides, the probability of further USD raise exists which will cause constant tariffs growth, which can not be acceptable for most of the population of the city.

Taking into account that investment financing and purchasing equipment will be made in dollar equivalent it is very important to take into consideration the USD raise.

Study Team Reply

As mentioned in the main report, cost and tariff are estimated based on the cost of May 1999. Therefore, tariffs shall be raised according to price escalation as stated in the comment. However, income of residents is also forecast in real term and not nominal term. Therefore, percentage of tariffs to income is expected to remain the same level, as explained in the report.

(2) Concerning the selection of technical alternatives.

You selected as a priority option - alternative No 2. According to Table 4.3.1 (Summary Report) the same system of waste collection has been considered in all four alternatives. At the same time the amount of expenses for collection differs in all four alternatives

(Table 4.3.2 – Summary Report). Proceeding from this there is no answer on the question: Why is collection in the first alternative more expensive than in the second one?

Study Team Reply

The technical collection system was the same for all four alternatives studied in the Master Plan, as described in the comment. This means that the waste discharge methods and types of collection trucks selected based on the land use conditions are the same for all four alternatives.

However the trip production for each truck type was different by alternative. This is because the distances to the unloading facility were different by alternative. For alternatives with lower trip production the number of required trucks increased. Alternatives with lower trip production and therefore higher number of trucks had higher operation and maintenance cost.

As shown in the Main Report, Table 7.1.8 the number of trucks required for Alternative 2 was the lowest of all four alternatives. The same Table also shows the average trip production figures. Therefore the collection system of alternative 2 provided the least operation and maintenance costs.

As for VAT and Corporate income tax, this matter should be settled at the governmental level.

Deputy Chairman
(signature)
M. Ibrashev

3. ALMATY OBLAST STATE DEPARTMENT FOR ENVIRONMENT PROTECTION

Comments on Draft Final report "Master Plan for Solid Waste Management in Almaty City Republic of Kazakhstan"

The Draft Final Report specifies the solution for the most important task – establishment in Almaty city of a special Authority for managing solid wastes. Operation of this Authority will allow provision of prompt, effective and economical collection services, transportation of solid wastes from city districts where they are generated and disposal of these wastes under sanitary and ecological rules to secure good environment for the people.

Authors of this Plan provided good basis for establishing a necessary and viable SWM system in Almaty city and the schedule of works to be fulfilled. The existing city collection system does not permit to separate wastes and leads to worsening sanitary and hygienic conditions in the city and in the neighboring areas.

The Master Plan for SWM is directed to creating new, as well as restoring existing facilities, it will allow to organize additional jobs, to involve additional material resources into the economy, to renew transport vehicle fleet, and to improve Karasai disposal site.

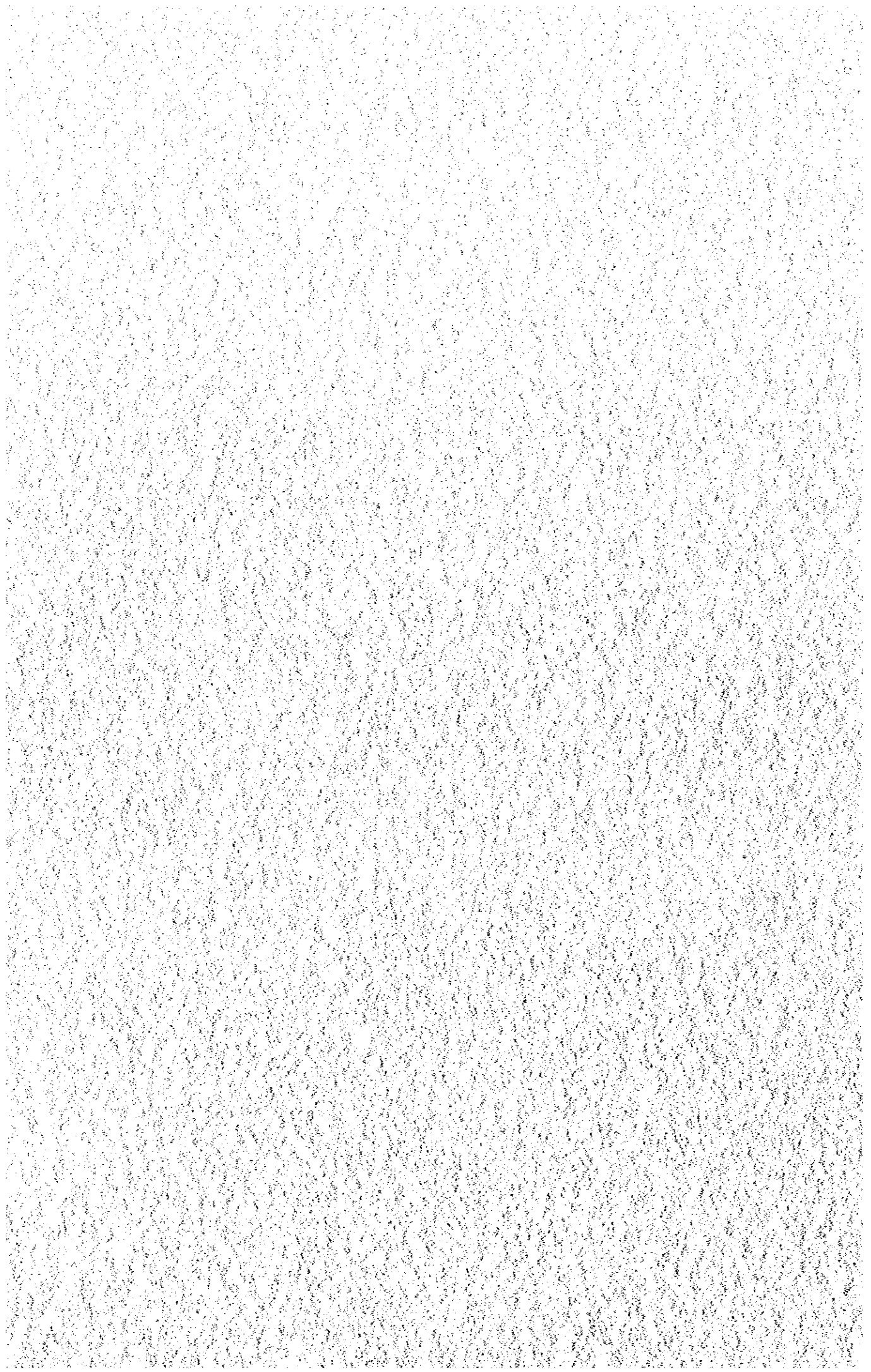
Implementation of the Master plan will promote the improvement of environmental conditions and public health in the city.

Chief Specialist of State Control of AOSDEP
(signature)
B. Sarsenbai

Study Team Reply

No reply may be necessary for this comment





JICA