

Chapter 4

Pilot Projects

4 Pilot Projects

4.1 Experiment on Enhancement of the BCE Laboratory

4.1.1 Objectives

The laboratory is a technical focal point for environmental law enforcement. Therefore the BCE laboratory should be enhanced to support the monitoring activities of other departments in the BCE with reliable analysis. In order to analyse chemical substances accurately, the whole processes of analysis including sample pre-treatment and reagent preparation must be appropriately carried out.

A pilot project entailing enhancement of the BCE laboratory was planned in order to:

- assess the accuracy of BCE's laboratory works by observing their analysis practices, and
- make a recommendation for enhancement of the BCE laboratory.

4.1.2 Plan of the Experiment

The experiment on enhancement of the BCE laboratory consisted of completion of BCE laboratory and joint chemical analysis of the C/P and team. The plan is as described below.

a. Completion of BCE Laboratory

The BCE planned to construct a new laboratory, but the construction halted due to the shortage of fund from the SCE. The structure was completed but there were no doors, windows or piping. In the pilot project the BCE laboratory would be completed. The new BCE laboratory was planned to have the functions as shown in Table 4-1 and Figure 4-1..

Table 4-1: The Plan of BCE Laboratory

Function	Details of the Function
Pre-treatment 1. Wet Chemistry	Pre-treatment for quantitative analysis of wastewater, solid waste and sludge, etc. and chemical analysis by fundamental handling
2. Organic Analysis	Pre-treatment for extraction of organic component in wastewater, solid waste and sludge, etc.
Analysis 1. Spectrophotometric Analysis	Quantitative analysis of chemical component in test sample solution by spectrophotometer
2. Metal Analysis	Quantitative analysis of heavy metals in test sample solution by spectrophotometer and atomic absorption spectrophotometer, etc.
3. Chromatographic Analysis	Quantitative analysis of organic component and inorganic ion by gas chromatograph, liquid chromatograph and FID gas chromatograph, etc.
Storage of Sample	Storage of laboratory samples taken from industrial waste, wastewater and sludge in wastewater, etc.

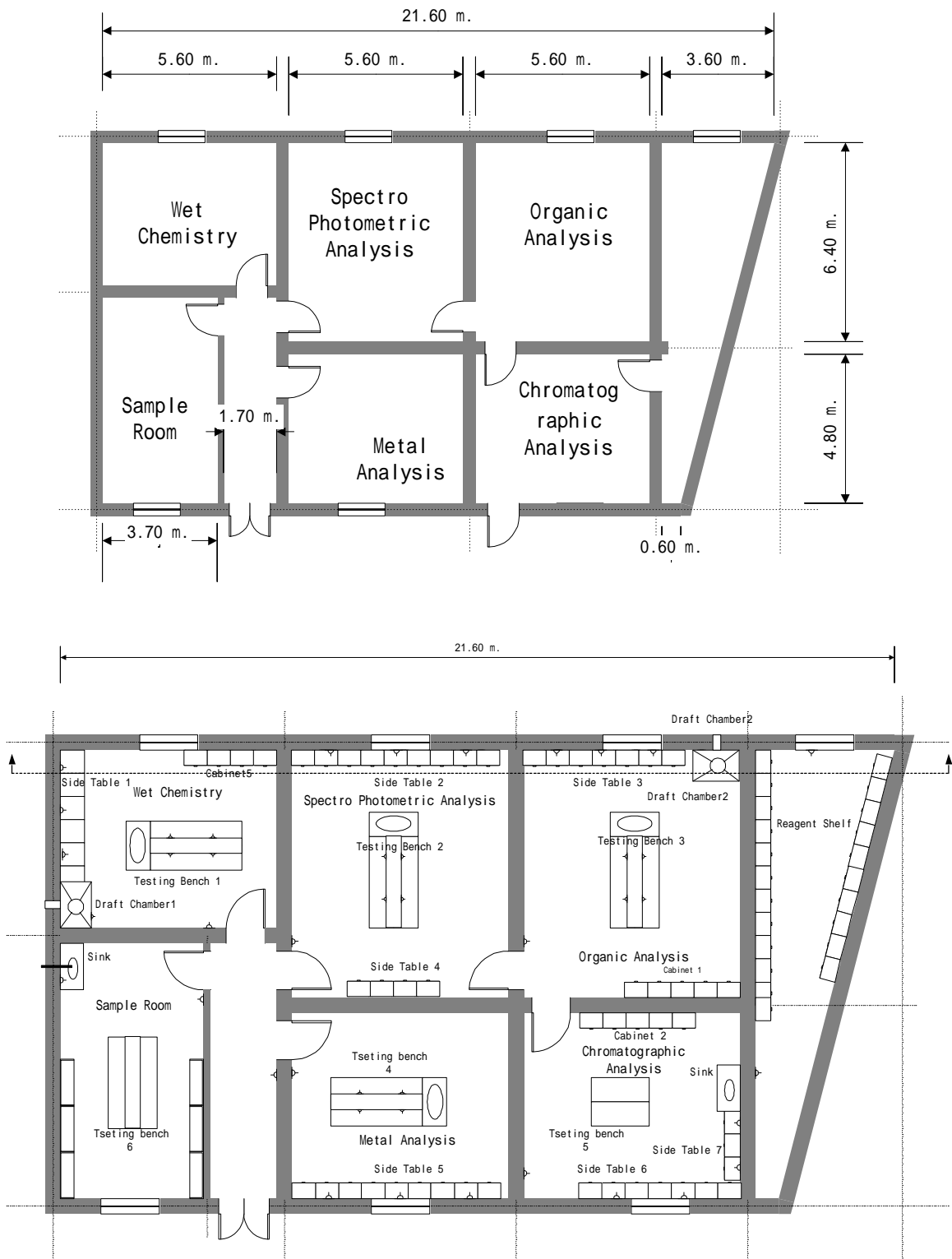


Figure 4-1: Layout of BCE Laboratory

b. Chemical Analysis

Chemical analysis was planned as described below;

Measured items:

Heavy metals (Cd, Pb, As, Cr), Oil content

Samples:

3 samples of sediment (in Lakes Beyuk Shor, Zikh and Ganligol)

3 samples of water (in Lakes Beyuk Shor, Zikh and Ganligol)

Analysis method:

Atomic Absorption Spectro-photometry and Gas Chromatography

Date of analysis practices

Meeting: 25 October, 2000

Pre-treatment: 26 October- 1 November, 2000

Analysis practices:

1st November (Gas Chromatography)

2nd November (Atomic Absorption Spectrophotometry)

Place of analysis practices

BCE laboratory

Analysts: Mr. Aydin Agayev and other BCE staff.

Adviser:

JICA study team.

4.1.3 Implementation of the Experiment

a. Division of the Work

The work responsibilities were divided into two parts as follows and conducted in collaboration with the BCE and the JICA study team.

Table 4-2: Descriptions and Responsibilities of the Project

Work Items	Work Responsibilities
1. Internal Finishing	BCE
2. Mechanical and Electricity Work	BCE
3. Lab Furniture Procurement	JICA
4. Installation of Lab Equipment	BCE
5. Training and Instruction of analysis	JICA
6. Chemical Analysis	BCE
7. Assessment	JICA

b. Implementation Schedule

Implementation schedule is shown in Table 4-3. The BCE staff should have been able to conduct chemical analysis in the new laboratory in BCE. However, the construction of the laboratory was delayed and the experiment of analysis was carried out in the temporary laboratory of the BCE in the Academy of Sciences.

After completion of laboratory, chemical analysis in accordance with team's advise is being continued by the BCE laboratory staff.

Table 4-3: Work Schedule for the Experiment on Enhancement of the BCE Laboratory

Work	Month	September	October	November
Internal Finishing (BCE)		██		
Mechanical & Electrical Work (BCE)			██	
Furniture Procurement (JICA)			██	
Installation of Equipment (BCE)				██
Instruction of Analysis (JICA)			██	
Chemical Analysis (BCE)			██	
Assessment (JICA)				██

c. Installation of Laboratory Facilities

Following laboratory facilities were installed in the new BCE laboratory.

Table 4-4: Laboratory Facilities installed in the BCE Laboratory

	Room	Facilities
1	Wet Chemistry Room	Draft chamber, Testing bench, Side table, Cabinet
2	Spectro-photometric Analysis Room	Testing bench, Side table
3	Organic Analysis Room	Draft chamber, Testing bench, Side table, Cabinet
4	Metal Analysis Room	Testing bench, Side table
5	Chromatographic Analysis Room	Testing bench, Side table, Cabinet, Sink
6	Sample Room	Sink, Sample shelf

d. Analysis Method

The analysis method and equipment are as shown in Table 4-5 and Table 4-6.

Table 4-5: Analysis Methods

Analytical technique	Testing methods	
Oil Content (Mineral oil)	Soil: IOS / TC 190 / SC 3 N 326	Dutch Standard
	Water: IOS / TC 147 / SC 2 N 359	Dutch Standard
Pb, Cd, As, Cr	Soil: Acid digestion – EPA ¹ SW 846 -3050B	
	Water: Acid digestion - EPA SW 846 - 3020A; 3005A	

Table 4-6: Specification of Analysis equipment

Instrument	Model	Accessory
AAS	Varian Spectr AA 110	Lamp: As,Cd,Cr, Pb
		Software: SpectrAA
GC	Varian Chrompack CP-3800	Detector: FID ²
		Column: SimDist DF 0.17
		Software: Star WorkStation

¹ Environmental Protection Agency, USA

² Flame Ionisation Detector

e. Operation of Analysis

e.1 Analysis of Oil Content in Sediment

The sample was weighed by a chemical balance and taken into a 200 ml elenmyer flask. After acetone and $MgSO_4$ solid were added to the flask, it was shaken by a shaker for one hour to extract oil component into acetone. The liquid phase in the flask was poured into a 2,000 ml separate funnel with filter paper to filtrate and separate the solid phase. The residue on the filter paper was washed with acetone and this organic solvent was also poured into the 2,000 ml separating funnel. The 2,000 ml separating funnel was shaken by hand for 5 minutes and left still for 5 minutes. Then the acetone was separated into another 200 ml elenmyer flask₂. This operation was repeated 3 times in order to extract the oil component in the sediment sample. Anhydrite Na_2SO_4 solid was added in the 200 ml elenmyer flask₂ to dry the solution in it.

The solution was purified next. About 0.5g cotton with about 20g dried powder of Al_2O_3 on it was packed in a special glass tube. It was 15 mm in diameter and 20 cm in length, and had a sharpened end like a pipette. The glass tube was set vertically, the solution was poured slowly and dripped solution was received into a 200 ml elenmyer flask₃. The Al_2O_3 column in the tube was washed with hexane. After the hexane entered into the 200 ml flask₃, anhydrite Na_2SO_4 solid was added in the flask₃.

The total volume of the solution in the 200 ml flask₃ was measured and 1 ml of this solution was poured into a small glass vessel to inject in an FID³ gas chromatograph. The FID gas chromatograph was promoted by using H_2 gas for a FID and He gas for carrier gas.

e.2 Analysis of Oil Content in Water

A water sample was poured into a 1 ltr. mess flask. The solution was then poured into a 2 ltr. separating funnel, and acetone and $MgSO_4$ solid were added.

The separating funnel was shaken by hand for about 5 minutes and was left to separate the solvent which had extracted the oil component in the water sample. The separated solvent in the 1 litre separating funnel was dropped into a 200 ml elenmyer flask. This operation was repeated 3 times. The solution in 200 ml flask was purified as in the case of sediment analysis and purified solution was distilled. The oil components in distilled solution were determined by the FID gas chromatograph.

e.3 Analysis of Heavy Metal in Sediment and Water

The HNO_3 was added to the sediment sample and the sample was heated on a hotplate to make the sample solution to determine the heavy metals by the atomic absorption spectrophotometer (AAS).

f. Results of Analysis

The results are as shown in Table 4-7 and Table 4-8. Absorbance is shown in the table regarding analysis by the AAS. It should be noted that there are many minus values of absorbance such as those of Pb and As. This indicates that the values of absorbance in case of the blank test were high due to the presence of foreign matters mixed in the beakers or reagent used in the blank test.

³ flame ionization detector

Table 4-7: Oil Content

Sample	Water (mg/l)	Sediment (mg/kgdm)
Lake Beyuk-Shor	12.1	210
Lake Zikh	18.1	20,600
Lake Ganli-gol	4.8	162

Table 4-8: Heavy metal (Cd, Pb, As, Cr)

Sample	Cd		Pb		As		Cr	
	Mean Abs.	Dilution Ratio	Mean Abs.	Dilution Ratio	Mean Abs.	Dilution Ratio	Mean Abs.	Dilution Ratio
M1	0.3751	2	0.4905	20	0.1777	20	0.4212	1
M2	0.3227	2	0.3674	20	0.1652	20	---	---
M3	0.0357	2	0.3559	20	0.0532	20	---	---
W2	-0.0034	2	-0.0302	2	-0.0048	1	-0.0279	1
W4	0.0018	2	-0.0149	2	0.0775	1	0.2487	1
W5	0.0102	2	-0.0189	2	0.1044	1	0.3698	1

Abs.: Absorbance

4.1.4 Findings

a. Manual Analysis

a.1 General

Pretreatment and analysis using the Gas Chromatograph (GC) and AAS were carried out in accordance with manuals based on the Dutch standards and EPA standards.

a.2 Pre-treatment

a.2.1 Shortage of Equipment

i. *Insufficient capacity of sinks*

The sinks are too small to wash glassware and there is no space for drying glassware after washing.

ii. *Shortage of Glassware*

Glassware to be used for analysis like beakers, measuring flasks, separating funnels and pipettes is extremely insufficient. Therefore, the BCE cannot carry out many pretreatment activities simultaneously and this makes it difficult to reduce analytical errors and to shorten the time for analysis. Without glassware suitable for each step of analysis, basic analysis practices cannot be applied.

A pipette or a mess pipette should have been used when 1 ml of solution was taken from the 200 ml flask into the small glass vessel to inject into the FID gas chromatograph. However, neither of them were available.

Instead of a pipette or a mess pipette, a mess flask was used to measure the volume of the sample, leading inaccurate analysis.

iii. *Inappropriate grade of reagent*

The reagent they used in this analysis seemed to be inappropriate due to the unusual colour. The accuracy of analysis depends on securing of reagent of appropriate grade.

Although suitable reagent should have been used to determine pollutants, other kind of reagent was used.

iv. *Inappropriate storage of anhydrous reagent*

Although anhydrous reagent like heated alumina (Al_2O_3) and anhydrous sodium sulfate (Na_2SO_4) should be stored in a desiccator to cut off humidity, there was no desiccator. A desiccator is one of the foundations of glassware in the laboratory.

a.2.2 Insufficiency of Basic Knowledge

i. *Sampling for analysis*

Samples should be taken from laboratory samples after they are mixed well in order to reduce errors due to sampling.

Since samples of sediment are wet and not homogenous, they should be dried in a electric dryer, crushed and mixed well to be homogeneous by a crusher and an agate mortar, and stored in a desiccator with silica gel or CaCl_2 anhydrite. However, the BCE does not have crushers or agate mortars.

ii. *Washing of glassware*

Washing of glassware is a basic activity of chemical analysis operation. The glassware to be used in chemical analysis should be washed by distillate water some time after washed by tap water with cleaner, and should be dried by an electric dryer or naturally. Mess flasks, mess pipettes, mess cylinders and pipettes should be dried naturally. In this study washing and drying were not carried out well due to the shortage of glassware. It means that the results of analysis can include some significant errors.

iii. *Chemical Balance*

A chemical balance should be set horizontally on the table in a chemical balance room, but it is not installed correctly. In weighing a sediment sample, it should be transferred to a glass vessel set in the chemical balance by using a spatula, but there is no spatula in the laboratory.

iv. *Filtration*

There is no funnel stand in the laboratory. Since filter paper was not fixed on the funnel correctly, filtrated solvent did not come down in the foot of funnel. In this case filtration speed becomes very slow and solvent including oil component may overflow the filter paper.

The quality of filter papers was not suitable.

v. *Filling of reagent*

The volume and weight of reagent such as organic solvent and MgSO_4 were not measured in the operation of oil component extraction. If those are not measured, the blank test may be in vain.

In case of purification of solution in the 200 ml elenmyer flask₂, reagent of same weight and same volume should be added to all samples for the blank test, but neither were measured.

b. *Mechanical Analysis*

There is new equipment, FID Gas Chromatograph and AAS, provided by the Dutch government in January, 2000. Two members of BCE had received special training in the Netherlands.

The AAS has a function to dilute a sample automatically when the concentration of the sample is out of range of working curve. The staff of BCE laboratory seemed to depend on this function too much and not to attempt to dilute the sample by themselves in order to shorten the time of analysis.

The results of analysis by AAS included minus values as shown in Table 4-8. This means that the BCE analysts could have made a mistake when they carried out the blank test and selected a working curve.

c. Recommendations

The problems in regard to sink and space for drying of glassware would be solved when a new laboratory, at present under construction in the BCE, is completed. However, the following two problems they confront now should be resolved immediately:

shortage of analysis equipment;
insufficiency of basic knowledge for pre-treatment.

Although expendable supplies like glassware and reagent should be obtained by the laboratory itself, there is no budget for it. Not only major equipment but also glassware and reagent may be provided by bilateral or multi-lateral cooperation.

As for the insufficient basic knowledge of pretreatment for chemical analysis, it may be difficult for each analyst to change his/her habitual practice immediately. Therefore an intensive training programme should be conducted over several months. Training in foreign countries such as the Netherlands and Japan might be useful.

4.2 Experiment on Development of Illegal Dump Control System

4.2.1 Definition

According to the BCE inspectors, there are as many as 800 or 850 illegal waste dumps in Baku city. The size of dumps varies: large dumps spread over 10 ha or more, such as the one along the Babek avenue in Khathai district; there are small, but a large number of, dumps around waste collection points nearby or within residential areas due to an untidy waste discharge habit of people or an unsatisfactory waste collection service. Types of dumped waste are also diverse.

Since the elimination of such illegal waste dumps is one of the greatest challenges in the environmental management of the city, this illegal dump cleanup pilot project attempted to initiate a people's movement towards clean Baku.

The team and the C/P observed a number of illegal dumps in the city and recognised that most of illegal dumps can be categorised into three:

- 1) large dumps where mainly construction waste and other bulky waste (e.g. steel pipes, cars, etc.) were tipped;
- 2) small dumps of domestic waste beside waste collection containers for the residents due to their improper approach to waste disposal;
- 3) other small dumps due to insufficient waste collection services.

Because solving the third type of dumps requires the improvement of collection services, and is not a simple question of illegal dumping, this pilot project considered only type 1 (large dumps) and type 2 (small dumps).

4.2.2 Objectives

- a. **To let people know the presence of a number of illegal dumps in the city and recognize their possible environmental and health risks.**

There are 800 – 850 illegal dumps in the city. Those dumped wastes are associated with the following problems:

- they have spoiled the dignity and beauty of the city, where as many as 2 million people live;
- they attract and breed flies, rats and other vermin that could transfer diseases;
- they may contain hazardous substances. The fact that we can never be sure whether they contain hazardous substances is the serious problem. People may have an access to those hazardous substances, if present, directly (by touching) or indirectly (by inhaling, drinking polluted groundwater, etc.);
- they hamper an alternative use of the land.

City citizens should acknowledge this fact through this pilot project.

- b. **To involve people in an illegal dump control system in order not to have another new illegal dump.**

Large illegal dumps arise in order to save cost for waste transport to, and disposal at, the designated waste disposal site. Any vacant plots all over the city are vulnerable to illegal dumps and the control by the police and other authorities is inadequate. Therefore we will need to explore the way to involve people in the system. For example, they could report to the authorities when they observe an actual illegal dump case.

On the other hand, small dumps are caused by inappropriate behaviour among people who produce waste, keep waste away from their houses, but do not take care of public places. The waste collection points are used by the community and all community members have responsibility always to keep the place clean. The pilot project therefore focused on public awareness raising by a campaign to foster people's attitude towards a clean and sanitary city.

c. To let people know how costly waste cleanup is.

Cleanup of large dumps is costly in terms of money and labour. It should be well recognised that the cost for waste cleanup is the cost that would not be needed if there were no waste dumps. People should be aware that illegal dump control and prevention is the cheapest way to clean the city.

Because of their large number, cleanup of small dumps also entails laborious and costly works. People should recognise that most of such works will not be necessary if their waste discharge manner changes to a proper one.

4.2.3 Work Items

a. Cleanup Campaign Activity

a.1 Target Areas

Small dumps in the Narimanov district, where the waste collection service is provided by UP Azerbaijan, and those in the Yasamal district, served by KASCO, are the targets of the campaign for the following reasons:

- in those districts, sufficient waste collection services are provided. People's disordered waste discharge manner is the prime reason for dumps;
- waste containers are installed for public use at every waste collection point in those districts. However, it is observed that people do not put their waste into the given waste containers and they even damage the containers by burning waste inside;
- the Sabail district, another KASCO service area, is not selected because the situation is fairly good;
- in other districts served by district authorities, an insufficient waste collection service is another major cause of waste dumps, and a public awareness campaign alone will not solve the problem.

a.2 Campaign Tools

a.2.1 Campaign logo design contest

An advertisement for logo design appeared on the newspaper on 7 September. Collected logos were ranked by poll, which was carried out on 25 September. Judges were six from the JICA team, seven from the BCE/SCE and one from the Japanese Embassy. Each judge put 5 points to the best logo, 3 points to the second best logo, and 1 point to the third best logo. The top six logos were recognised. The logo by Ms. Sultanzade Firuza was selected as first prize and used throughout the campaign.



Campaign Logo

a.2.2 Campaign tools

The following tools were prepared for the campaign and the logo above appeared in every campaign tool, in order to become familiar among Baku people. The campaign banner was used in the inauguration ceremony for the illegal dump cleanup site, public meeting and also attached to the dump trucks which carry wastes from the illegal dump site to the designated disposal site.

- Campaign Badge 1000pcs
- Campaign Sticker 1000pcs
- Campaign Banner 50pcs
- Campaign Ballpoint pen 1000pcs
- Leaflet 2000pcs



Campaign Tools (Ballpoint pen, Badge, Sticker)



PROBLEMS CAUSED BY WASTES

1. In Baku City, there are more than 800 illegal waste dumps. Dumped waste is estimated ____ tons in total. This is equivalent to __ kg per person in Baku.

2. There are large dumps where heavy or large waste such as stone blocks are dumped illegally.



3. There are also many small waste dumps nearby houses.

4. Illegally disposed and scattered wastes make the city insanitary, unsafe and unpleasant. They degrade our environment.



WHAT YOU SHOULD DO?

5. Always put waste neatly into the given waste containers.



6. Clean the public places with the neighbours.

7. Do not burn waste in the container.



8. Call 00-00-00 when you witness waste dumping.



Campaign Leaflet



Campaign Banner on front of Dump Truck

a.3 Public Meetings

On the 19 October, a public meeting was held in Yasamal district, and local residents, attended. In the meetings, the BCE staff showed a number of photos of various types of illegal dumps found throughout the city and explained the seriousness and causes of the problem. It was almost the first chance for the local residents to be provided with information about the waste dump problem in Baku. The audience and the BCE freely discussed their opinions on the waste issue.

The second meeting was held in Narimanov district the next day. Nearly 150 people gathered. Representatives of the communal department and a waste collection company also joined in. The BCE staff stressed the waste collection points are commonly used by the local residents and they are responsible for keeping the area clean.

a.3.1 Yasamal District

Venue: Yasamal Flat Meeting room

Date: 19th October 2000

Chair Person: Mr. Nusalov

15 min	Opening address (Background of the campaign, organising agencies, purposes, etc.)	JICA Mr.Shimura
15 min	Photograph show (waste dump site shown on a screen)	JICA team prepares photo and Mr.Gasanov will explain.
15 min	Presentation (requests to people on how they should dispose of waste)	KASCO/Mr Gasanov Leaflet will be used.
15 min	Discussion (comments from people, questions)	Chair person
30min	Video Show (Waste management and Recycling in Japan)	JICA team prepare Video and Teymour will explain briefly.

a.3.2 Narimanov District

Venue: Young Cooperator College

Date: 20th Oct 2000, 1:00 pm

Chair Person: Mr. Nusalov

15 min	Opening address (Background of the campaign, organising agencies, purposes, etc.)	JICA Mr.Shimura
15 min	Photograph show (waste dump site shown on a screen)	JICA team prepares photo and Mr.Zeynalov will explain.
15 min	Presentation (requests to people on how they should dispose of waste)	UPAzerbaijan/Zeynaslov Leaflet will be used.
15 min	Discussion (comments from people, questions)	Chair person
30min	Video Show (Waste management and Recycling in Japan)	JICA team prepare Video and Teymour will explain briefly.



Public Meeting in Narimanov District

a.3.3 Result of Public Meetings

The audiences spoke aggressively and the ladies, who usually dispose of waste, expressed their concern about a lack of services provided by the District Office and KASCO. But there was no opinion expressed by them that the public spaces should be kept clean by the residents themselves.

It might be the first experience for the BCE staff to organize such kinds of meetings, but they worked hard to prepare for the meetings such as calling for audiences, finding places for the meetings, and discussing agendas. In the meetings, they played active roles to chair and freely discussed with the audiences.

The team believes that the BCE staff gained valuable experiences and this pilot project served as an on-the-job training in order for them to organise same kind of activities in future.

a.4 Visit Tour of Illegal Waste Dump Site

On the 21 October 2000, a bus tour was carried out in order to observe the current waste dumping situations in Baku City. The tour was carried out according to the following schedules.

Time	Description	Person in Charge
8:30	Pick up participants from relevant district 8:30 Pick up participant from Yasamal 8:45 Pick up participant from Narimanov	Adil/Anvor
9:00	Gather in the restaurant near BCE Introduction(Purpose of the tour) Questionnaire (1)	Nusalov Adil
9:30	Starting the tour in Yasamal district Tour Route: Where to stop	Conductor:Anvor
10:00	Clean up at one disposal site in Yasamal district Dump Truck, Shovel, Gloves	Anvor
11:00	Starting the tour in Narimanov district Tour Route Where to stop	Conductor:Adil
12:00	Gather in the restaurant near BCE Presentation by BCE with leaflet and video Free discussion Questionnaire (2), Result of Questionnaire	Speakers Adil Zeynalov
13:00	Lunch	
14:00	End of tour	

Schedule of the Bus Tour



Tour Bus

Tour participants included representatives from residents in the Narimanov and Yasamal districts, mass media, and others (e.g. students). Campaign badges with the selected logo were provided to the participants. The tour bus was identifiable by attaching a banner with the campaign logo.

Before the tour started, the participants answered pre-tour questionnaires regarding illegal dumps. And after the tour, they answered post-tour questionnaires and the results were analysed, shown in the section E.4 of this Appendix.

The participants observed several small dumps and took part in cleanup of one small dump in cooperation with BCE staff. After the tour, representatives from UP Azerbaijan explained the causes of small dumps formulation and appealed for the cooperation of community members.

The participants also observed the large dump behind the Sports Palace and BCE explained the causes of such large dumps, how hard it is to clean up and how people can cooperate to stop illegal dumps.



Cleanup Operation by tour participants

After the tour, the participants discussed their impressions and opinions about waste dumps and their cleanup.

a.5 Publicising to NGOs and others

There is an international organization “ISAR (Initiative for Social Action and Renewal in Eurasia)” in Azerbaijan and it is supporting more than 200 NGOs, which are active here.



Environment NGOs Meeting

This organization started operation in December 1995 and monthly meetings have been held with the environmental NGOs. The JICA Study team was invited for this meeting and had a chance to present the activities here in Azerbaijan and explain about the illegal dump control campaign. We had received many opinions from the NGOs about this campaign and they express their concern about future participation of the projects.

Some of the most serious illegal dumps in the city, the visit tour, interviews with the tour participants and cleanup behind the Sports Palace were introduced on the TV and newspaper to raise the awareness of illegal dumps and their elimination, among a wider population.

b. Illegal Dump Cleanup

The team planned to physically cleanup one of a large illegal dump using heavy machinery. The plan included the development of the site into a park, whereby future waste tipping is restricted.

b.1 Site Selection

Three cleanup sites were recommended by BEP and one site by BCE. The comparison table is shown as follow.

Comparison of the Large dump site

	Sports Palace	Salyan Street	Babek Avenue	Yasamal Slope
Area	1-2 ha	2-3 ha	20-30 ha	1 ha
Location	Nasimi	Sabail	Khatai	Yasamal
Improvement effect	Very high	Fair	Low	High
Attraction for Neighbourhood	Very high	Low	Fair	Fair
Improvement cost	Fair	Low	High	Low
Overall evaluation	Suitable	Not suitable	Not suitable	Not suitable

A large dump behind the Sports Palace was concluded as the best place among four candidate sites (three proposed by the BEP and one by BCE) to carry out a cleanup process considering its high improvement effect, high attraction for nearby residents and relatively low improvement cost.

Location and the current conditions are shown as follows.

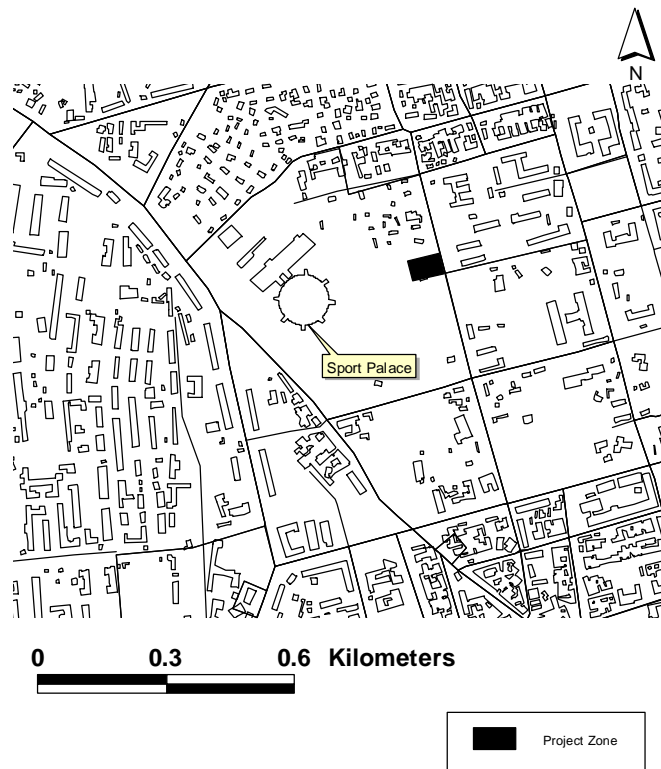
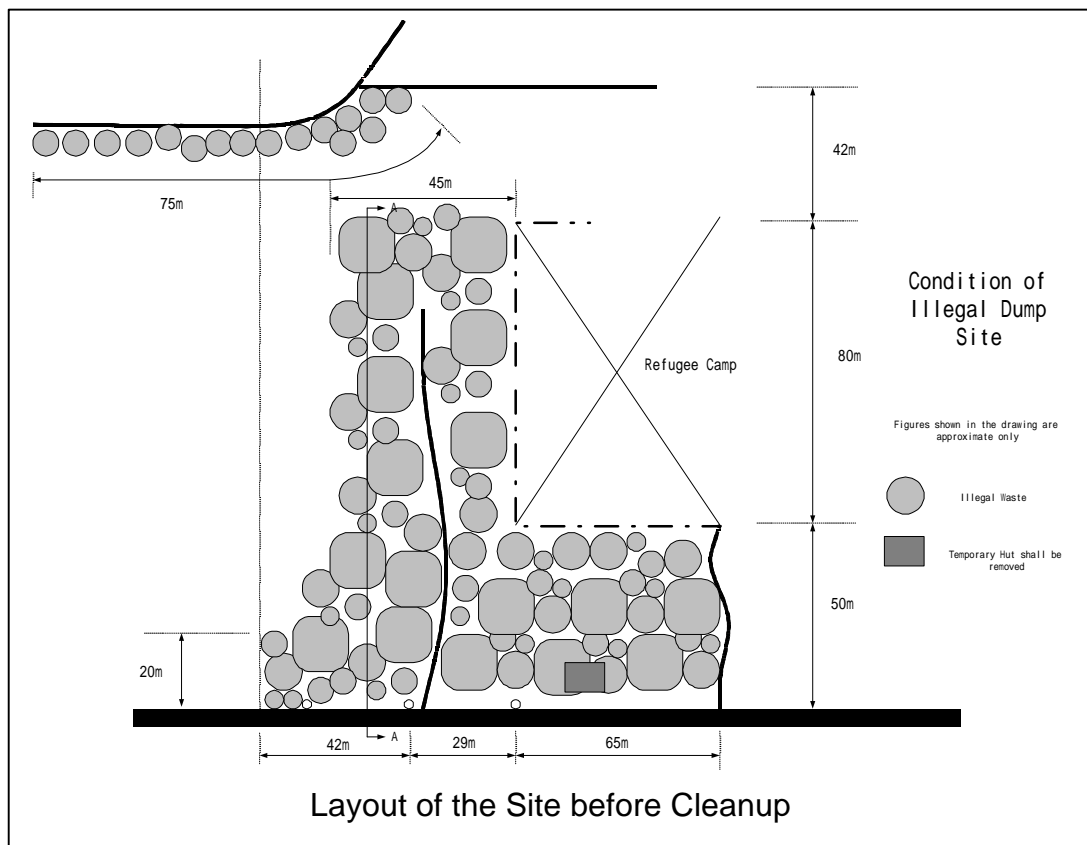


Figure 4-2: Location of the Site



Layout of the illegal dump site before clean up was shown as follows.



b.2 Commencement of the Works

The Inauguration Ceremony was held on 24th October 2000 at site and there were a number of dignitaries such as Vice Mayor, Head of Greenery Department from BEP, Chairman of BCE and Secretary from Japanese Embassy. Media such as TV and newspapers also attended and broadcast later.



A notice boards were installed in order to demonstrate the cleanup activities in the city.



Notice Board in Large Dump Site

b.3 Descriptions of the works

b.3.1 Cleanup, transport and dispose wastes

Excavation of the wastes was carried out up to the original ground level. The surface was graded and compacted by the grader and bulldozer.

Excavated wastes were transported and disposed to the designated legal disposal site. A Balakhany Disposal Site was decided as the designated disposal site and all the wastes were disposed accordingly.

Total number of trips was 895 and total volume of the wastes was 7,413 m³. These quantities were certified by the representative of UP Azerbaijan which is operating company of a Balakhany disposal site.

b.3.2 Fertile soil

The type of the fertile soil was approved by the greenery department of BEP and suitable for planting trees and shrubs. Fertile soils were distributed throughout the area in a 200mm thick layer excluding paths area.

Total area for the soil spreading was equal to 8,500m² and the actual volume of the soil delivered was 1,713 m³.

b.3.3 Trees and shrubs

Type of trees and shrubs were carefully chosen in order to suite to local climate conditions. Following evergreen trees and shrubs were selected and planted. Sampling, procurement and planting of trees and shrubs were carried out under strict control of agronomist.

- Trees: Cypress, Pine, Olive tree, Eucalyptus
- Shrubs: Oleander, Legustrum, Rose bush

b.4 Machinery and manpower input

Following machineries were engaged for the duration of each works.

- Cleanup wastes

Type of Machinery	unit	Working days	Total No· Day
Dump Truck	18	19	219
Excavator	2	18	36
Bulldozer	1	24	24
Grader	1	5	5
Truck Crane	1	6	6
Trailer	1	6	6

- Importing fertile soil

Type of Machinery	unit	Working days	Nos x Day
Dump Truck	5	7	35
Excavator	1	6	6

Manpower input for each type of work was summarised as follows.

Description	days	Total man· day
Engineer	42	223
Estimator	24	53
Guardians	39	78
Common labourers	39	130
Common labourers for planting	20	336
Total		820

Total of 820 man· day was involved for the work.

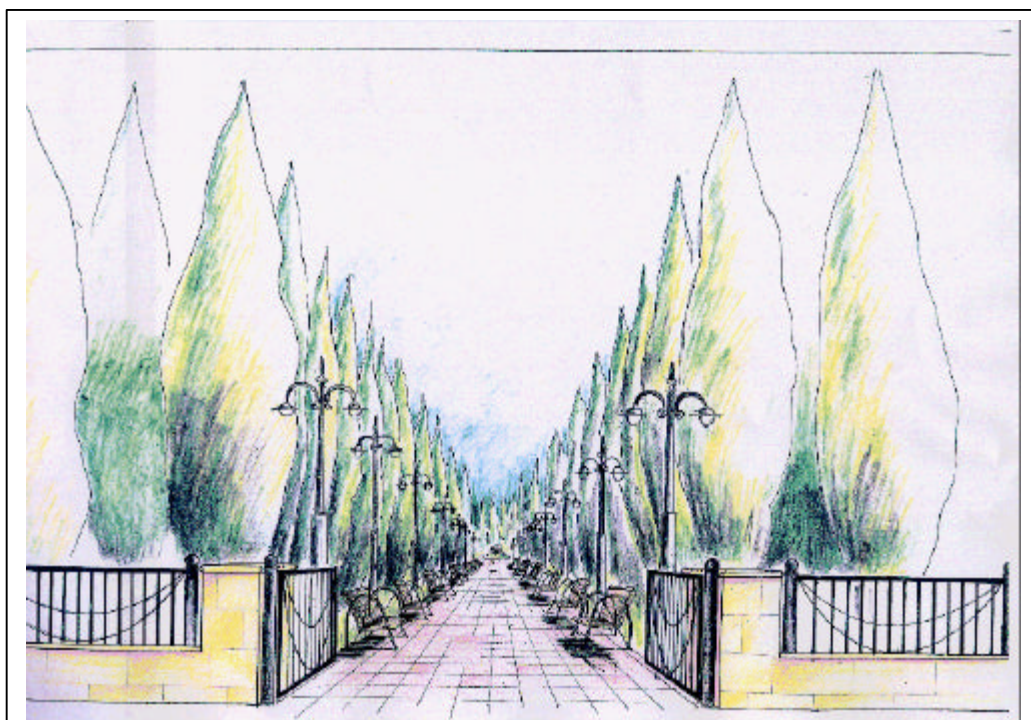
b.5 Actual schedule of the works

The schedule of executed works is shown as follow.

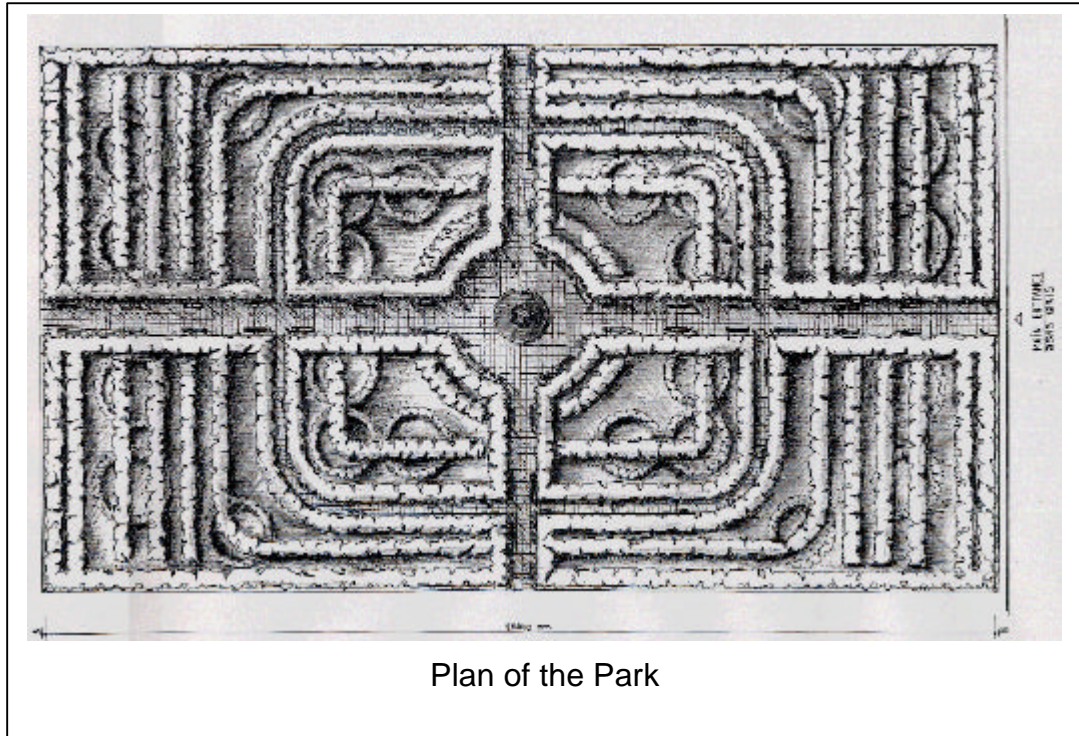
Item	00 Oct	00 Nov	00 Dec	
1. Cleanup wastes	[Bar spanning Oct 15 to Oct 25]			
2. Fertile soil		[Bar spanning Nov 15 to Nov 25]		
3. Plant and Shrub		[Bar spanning Nov 20 to Nov 30]		
4. Irrigation work			[Bar spanning Dec 10 to Dec 25]	
5. Masonry work			[Bar spanning Dec 20 to Dec 30]	
6. Benches, fences		[Bar spanning Nov 25 to Dec 10]		
7. Assessment		[Bar spanning Nov 25 to Nov 30]		

b.6 Architectural Design for the Park

Architectural design for the park was developed by the local Architect and approved by the relevant authorities. Perspective view and plan of the future park was presented below.



View of the Park from the Entrance



As of the end of November 2000, wastes were removed and trees and bushes were planted as shown above.

4.2.4 Analysis of the result of questionnaire

A questionnaire survey was executed for the audience of the public meetings. The tour participants filled out post-tour questionnaires. 18 answers from Yasamal district, 58 answers from Narimanov district and 16 answers from tour participants were collected. The following are the results.

a. Result of the Campaign Questionnaire

a.1 Öiöìè ìÿ'ëóìàð (General Information)

a.1.1 Ñèçèí éàøúíúç (Your age)

Ñèçèí éàøúíúç (Age)	æàââááèàð	%
1. 20-äÿí àøäüü (under 20)	56	63
2. 20-29	6	7
3. 30-39	8	9
4. 40-49	8	7
5. 50-59	7	8
6. 59-ääí éóðàðü (over 59)	5	6
No answer	4	-
æÿìè (Total)	94	100

More than half the participants are students under 20 years old. One of the reasons is that the meeting room in the Narimanov district was an auditorium of a college.

a.1.2 Æèíñ (Sex)

Æèíñ (Sex)	æàââááèàð	%
1. Êèøè (Male)	58	70
2. Äàäüí (Female)	25	30
No answer	9	-
æÿìè (Total)	92	100

70% of the participants were male. Three ladies participated at the Yasamal public meeting and according to them, they were not informed of this meeting until that day. Therefore, calling for the people to attend has to done be well advance.

a.1.3 Ìÿøüóèèééÿð íðäö (Occupation)

Ìÿøüóèèééÿð íðäö (Occupation)	æàââááèàð	%
1. Äðäèÿð ðÿøèèèàðü (Governmental)	9	11
2. Øÿøñè êñíàíèéà (Private companies)	4	5
3. Äàäàð äàäüí (Housewives)	0	0
4. Øÿèÿáÿ (Students)	56	65
5. Êøñèç (Unemployed)	16	19
6. Äèÿÿð (Others)	0	0
No answer	7	-
æÿìè (Total)	92	100

Due to the meeting location, 65% of the audience were students. Of the other 35 % of the audience, more than half were unemployed.

a.1.4 Àèÿÿ öçäèÿðèíèí ñàéü (Family size)

Àèèý òçàèýðèfèí ñàéú (Size)	æàààáèàð	%
1. àèð íýðýð (one)	2	2
2. èèè íýðýð (two)	2	2
3. 3 íýðýðäýí (three) – 5 íýðýðýäè (five)	62	74
4. 5-äýí ÷íð (more than five)	19	22
No answer	7	-
æýìè (Total)	92	100

The family size of 62% of the audience was three to five. This result was almost same as the result obtained from the public opinion survey conducted during the 1st study.

a.1.5 Öíâàí (Your address)

Öíâàí (Address)	æàààáèàð	%
1. Íàðèìàíá ðàéíó (Narimanov district)	6	8
2. Éàñàìàè ðàéíó (Yasamal district)	32	43
3. Àèýýð ðàéíèàð. (Other districts.)	36	49
No answer	18	-
æýìè (Total)	92	100

a.2 Ñóàèèàð äý æàààáèàð (Questionnaire and Answer)

a.2.1 Ñèçèí òèèèðèáèý, Áàèú òýìèç øýùýðàèð?

(Do you think that Baku city is generally clean?)

C.1.	æàààáèàð	%
1. Áýèè. (Ñ.3-ý èâ÷èí) (Yes.)	3	3
2. Óàéð. (Ñ.2-ý èâ÷èí) (No.)	88	97
No answer	1	-
æýìè (Total)	92	100

Almost all answered that the city is not clean.

a.2.2 Íèèý òèèèðèýøèðñèèç èè, øýùýð ÷èðèèèàèð? (àèð íá÷ý æàààá ìòèèíàðð)

(Why do you think that the city is not clean? (multiple answers allowed))

C.2.	æàààáèàð	%
1. Ííà ýððý èè, ùààà òýìèç ààèèè. (Because the air is not clean.)	14	10
2. Ííà ýððý èè, ýðèèýðäý ñó òýìèç ààèèè. (Because water of lakes and ponds is not clean.)	12	9
3. Ííà ýððý èè, òíðíàà ÷èðèèèàèð. (Because soil is contaminated.)	6	4
4. Ííà ýððý èè, çèáèè ÷íð éáðèýðý òðèèèèá. (Because waste is dumped at many places.)	88	64
5. Àèýýð ñýáýáèýð (Other reasons)	18	13
æýìè (Total)	138	100

64 % of the people think that waste dumped at many places in the city is making the appearance of the city dirty. Therefore, the elimination of the illegal dump will be essential for a better city environment.

a.2.3 N̄ç çàéèè ùàðà àòùðñúíç? (Where do you discharge your waste?)

C.3.	æàààéèð	%
1. Çàéè èíðàéíáðëÿðè ãíéóèìóø éúüà ìÿíðÿäÿëÿðéÿ. (At a waste collection point where waste containers are installed.)	45	50
2. Çàéè áíðóñíá. (Dust chute of my flat.)	25	27
3. Çàéè èíðàéíáðëÿðè ãíéóèììúø çàéèðáíáéàðà. (At a waste collection point where waste containers are not installed.)	18	19
4. Äëÿð èáðëÿðÿ (Other places)	3	3
5. Áèèèðÿì. (I don ' t know.)	1	1
No Answer	4	-
æÿìè (Total)	96	100

90 % of the people dispose of wastes to the predetermined places. Most of the people in Baku live in flats and there are dust chutes provided. Therefore, there are less chances to throw waste away in places other than predetermined places.

a.2.4 Áèèèðñéíèçìè, ñçèí çàéèëÿðèíèçè èèì éúüð äÿ òññèè àèðúèìø ñàùÿëÿðÿ äàðàéúð?

(Do you know who collects your waste and transport to the designated waste disposal site?)

C.4.	æàààéèð	%
1. Áÿèè. (Yes.)	33	36
2. Õáéð. (No.)	58	64
No answer	1	-
æÿìè (Total)	92	100

More than 60 % of the people do not know who collects wastes. People pay less attention to wastes that they produce.

a.2.5 N̄çèí çàéè àòàùúíúç ñàùÿíè äÿçééÿðè íáæÿàèð?

(The place where you discharge waste is:)

C.5.	æàààéèð	%
1. ßñàñÿí ðÿìèçàèð. (generally clean.)	18	20
2. Ùÿðäÿíáèð ðÿìèçàèð. (sometimes not clean.)	48	52
3. ßñàñÿí ðÿìèç àáéèè. (generally not clean.)	24	26
4. Áèèèðÿì. (I don ' t know.)	2	2
æÿìè (Total)	92	100

More than 70% think that the places they discharge waste are generally clean. Most of the people in Baku live in flats and they think that they have to clean the places where they live, but they seem not to care about the public places away from where they live.

a.2.6 N̄ç ìÿ áäÿðñèèç, ÿÿð èèìñÿ ñçèí áàèì éáíúá çàéè àòàðñà?

(If somebody dumps waste near your house, what will you do?)

C.6.	æàââáéàð	%
1. ĪĒN-äýí çéáéèèí éúúúøäüðúèìàñúíú ðàùèø ääýðýì. (I will ask the housing committee to clean.)	14	13
2. Ðáéíí Ēæðà Ûáèèìèééýðèíäýí çéáéèèí éúúúøäüðúèìàñúíú ðàùèø ääýðýì. (I will ask the district authority to clean.)	13	12
3. "ĒĀÑĒĪ" äý éà "UP-Āçýðááéæáí" Áèðýý Īöýññèñýèýðèíäýí çéáéèèí éúúúøäüðúèìàñúíú ðàùèø ääýðýì. (I will ask KASCO or UP Azerbaijan to clean.)	13	12
4. Īýí ùá÷ íý äðìýðýì. (I will do nothing.)	1	1
5. Īýí þçöì çéáéèè éúúúøäüðàðàì. (I will clean by myself.)	15	15
6. Āíðóèàðèà áèð éáðäý çéáéèè éúúúøäüðàðàì. (I will clean with the neighbours.)	8	7
7. Īýí çéáéèè àðáíú ðàñàüà ÷äèúðàðàì. (I will try to find who dumped waste and let him clean.)	37	35
8. Äèýðð (Others)	7	5
No answer	7	-
æýìè (Total)	115	100

40% of the people replied that waste collectors need to clean and 30% replied that persons who dump wastes need to clean. The answer that people themselves will clean was only 22%.

a.2.7 Ñèçèìè òèèèðèìèçæý, çéáéèèýðèì éúúúèìà ìýìðýäýñèìèì òýìèç äýçèééýðäý ñàðèáíúèìàñúíúà èèì æàââáááüàèð?

(Who do you think is responsible to keep your waste collection point clean?)

C.7.	æàââáéàð	%
1. Ðáéíí Ēæðà Ûáèèìèééýðè. (The district authority.)	21	20
2. UP çýðááéæáí/ĒĀÑĒĪ. (UPA/KASCO.)	19	18
3. Īýí þçöì. (Myself.)	9	8
4. Éáðèè ñàèèíèýð. (Community.)	48	44
5. Äèýðð (Others)	6	6
6. Īýí áéèìèðýì. (I don ' t know.)	4	4
No answer	4	-
æýìè (Total)	111	100

40% of the people think that they do not have responsibilities for cleaning their collection points. This percentage did not largely change even after the campaign tour.

b. Results of the Campaign post-tour questionnaire

19 people participated the campaign tour and 16 people replied to the questionnaire.

b.1 Õìòìè ìý'èòìàð (General Information)

b.1.1 Ñèçèì èàøúíúç (Your age)

Ñèçèì èàøúíúç (Age)	æàââáéàð	%
1. 20-äýí àðäüú (under 20)	9	50
2. 20-29	1	6
3. 30-39	3	16
4. 40-49	3	16

5. 50-59	1	6
6. 59-ääí éóðàðú (over 59)	1	6
No answer	0	-
æÿìè (Total)	18	100

More than half of the participants were the students under 20 years old.

b.1.2 Æèíñ (Sex)

Æèíñ (Sex)	æääááéàð	%
1. Êèøè (Male)	18	100
2. Äääúí (Female)	0	0
No answer	0	-
æÿìè (Total)	18	100

All the participates were male.

b.1.3 Ìÿøüóèèéÿò íþâö (Occupation)

Ìÿøüóèèéÿò íþâö (Occupation)	æääááéàð	%
1. Äþáéÿð ðÿøèèèàðú (Governmental)	4	22
2. Øÿðñè éññíàíèéà (Private companies)	1	6
3. Äääàð äääúí (Housewives)	0	0
4. Öÿéÿáÿ (Students)	10	55
5. Êøñèç (Unemployed)	3	17
6. Äéÿÿð (Others)	0	0
No answer	0	-
æÿìè (Total)	18	100

This was a similar results to that of the above questionnaire.

b.1.4 Àèÿ öçáéÿðèíèí ñàéú (Family size)

Àèÿ öçáéÿðèíèí ñàéú (Size)	æääááéàð	%
1. àèð íÿðÿð (one)	0	0
2. èèè íÿðÿð (two)	2	13
3. 3 íÿðÿðäÿí (three) – 5 íÿðÿðÿäÿè (five)	10	62
4. 5-äÿí ÷íð (more than five)	4	25
No answer	2	-
æÿìè (Total)	18	100

62% of the people have families of three to five members.

b.2 Ñóàèèàð äÿ æääááéàð (Questionnaire and Answer)

b.2.1 What was your impression of waste dump in the city?

(Impression)	æääááéàð	%
1. Severe	16	89
2. No problem	2	11
3. Others	0	0
No answer	0	-
æÿìè (Total)	18	100

About 90 % of the people replied that waste dump in the city appeared severe.

b.2.2 Who do you think should take the initiative in preventing illegal dumping?

(Who)	æàââáëàð	%
1. District/City Executive	7	30
2. Housing Committee	5	23
3. Waste Collector	3	13
4. BCE/SCE	0	0
5. Community members	7	30
6. Other	1	4
æÿìè (Total)	23	100

Only 30 % of the people replied that they have to do something by themselves to eliminate illegal dumps. The other 70 % replied that somebody in charge of waste management will take action. It is important to raise people's awareness of the cleanliness of the city and to promote environmental education.

b.2.3 Who can do something for illegal dump prevention?

(Who)	æàââáëàð	%
1. Residents	9	39
2. District	7	30
3. BCE	1	4
4. UPA/KASCO	2	9
5. I do not know	2	9
6. Other	2	9
æÿìè (Total)	23	100

It is important that residents are involved in the elimination of illegal dumps. 40 % of the people replied that they can do something for it.

b.2.4 Who do you think is responsible to keep your waste collection point clean?

(Who)	æàââáëàð	%
1. The District Authority	8	30
2. UPA/KASCO	4	15
3. Myself	4	15
4. Community	9	33
5. Others	2	7
6. I do not know	0	0
7. No answer	0	-
æÿìè (Total)	27	100

50 % of the people replied that they and their communities have responsibility to keep the waste collection points clean.

c. Findings

c.1 Public Meetings

- The audiences spoke aggressively and the ladies, who usually dispose of waste, expressed their concern about a lack of services provided by the District Office and KASCO. But there was no opinion expressed by them that the public spaces should be kept clean by the residents themselves.
- It might be the first experience for the BCE staff to organise such kinds of meetings, but they worked hard to prepare for the meetings, calling for audiences, finding places for the meetings, and discussing agendas. In the meetings, they played active roles to chair and freely discuss issues with the audiences.
- the BCE staff gained valuable experience and this pilot project served as an on-the-job training for them to be able to organise same kind of activities in future.

c.2 Questionnaires

A questionnaire survey was executed for the audience of the public meetings. The tour participants filled out post-tour questionnaires. 18 answers from Yasamal district, 58 answers from Narimanov district and 16 answers from tour participants were collected. The following are the results:

- most respondents felt that the city is not clean and the illegal waste dumps are the major reason;
- the main cause of illegal dumps is that there are already a number of illegal dumps in the city and the people have accepted them as an ordinary condition;
- most are waiting for somebody to clean the illegal dumps. Few people think that they have to clean these themselves;
- nearly half of respondents think that they have no responsibility for cleaning the waste collection points by themselves;
- it was observed that the one-day campaign tour did not sufficiently raise the percentage of the respondents who consider that they are responsible for keeping their waste collection points clean. There will need to be continuous promotion to let people know that proper waste disposal, by every resident, every day is the only solution to the problem.

c.3 Cleanup of the Large Illegal Dump

- Total volume of the illegal wastes was around 8,000 m³ and all were excavated. Every dump truck coming in and going out the site was recorded in order to make sure that all waste was properly transported to and disposed of at the legally operated disposal site in Balakhany.
- In the process of waste disposal, the following machinery was mobilised and used for the duration of around 1.5 months.

Table 4-9: Type of Machinery Used for Cleanup

Type of Machinery	No of unit
Dump Truck	18 units
Excavator	2 units
Bulldozer	1 unit
Grader	1 unit
Truck Crane	1 unit
Trailer	1 unit

- About 2,000 m³ of fertile soil suitable for tree and shrub plantation was imported from a designated place.
- Five dump trucks were used to transport the fertile soil making around 220 trips.
- Following trees and shrubs were planted considering their adaptability to local climatic conditions.

Trees: Cypress, Pine, Olive-tree and, Eucalyptus:

Shrubs: Oleander, Legustrum and Rose-bush.

- The cost of clean up of this large illegal dump was over 80,000US\$ including fertile soil, plants and shrubs but excluding the construction of the park.
- It is said that over 800 illegal dump sites exist in Baku City. If 10 % of those assumed to be the same size as this site, it will cost over US\$ 6 million to clean only those.
- Therefore people should be aware that illegal dump control and prevention is the cheapest way to clean the city.