

**CHAPTER 5**

**FIELD SURVEY IN TASHKENT CITY**

## CHAPTER 5 Filed Survey in Tashkent City

### 5.1 Questionnaire Survey on User Awareness

#### 5.1.1 Conclusion of the Survey

##### (1) Outline of the Surveys

The first and the second questionnaire surveys (the surveys) on the Users' Awareness on Waterworks Improvement in connection with the Study for Improvement of Water Supply Management and Tariff Policy were carried out as follows by Japan International Cooperation Agency (JICA) in cooperation with the Ministry of Communal Services (MCS).

Table 5.1.1  
Survey Area, Date of implementation and number of available questionnaires

Survey Area	Tashkent City	
	Resident Users	Corporate Users
Object of the survey		
Survey methods	Distribution/collection of questionnaires to/from households and company offices selected by random sampling	
Minimum number of the samples collected	800	300
Date of the implementation	The First Survey	August 1999
	The Second Survey	November 1999

##### 1) Objective of the Survey

The objective of the survey is to evaluate the residential users' awareness or the corporate users' awareness in Tashkent regarding the following key issues:

- i) Water conservation
- ii) User participation
- iii) Willingness and Ability to pay the present water tariff systems and the future tariff system of the future improvement program
- iv) Water Leakage
- v) Need for the possible improvement in the service areas

## **2) Purpose of the Survey**

The main purposes of the study are:

- i) To reflect the study results in the policy of the improvement plan on both the water tariff system and the water supply management from the participating users' point of view.
- ii) To reflect the study results in making the practical education programs for the users' awareness improvement plan.

## **3) Methodology**

The questionnaire survey was carried out twice by distribution/collection of questionnaire to/from households and company offices selected by random sampling in the Study Area at the first stage in August 1999 and at the second stage in November 1999.

The questionnaire forms were prepared in English and translated into Russian and Uzbekistan languages.

The surveys were carried out with the use of the Russian or Uzbek questionnaire form.

## **4) Study Area and Number of the Samples Collected**

The Study Areas covered Tashkent City.

The number of available questionnaires collected is as follows:

We put the residential users into 3 types of residential categories and the corporate users into 3 types of industry categories. The ratios for the numbers of the available questionnaires collected are as follows.

**Table 5.1.2 Number of Available Questionnaires  
According to Categories of Users**

	Number of Available Questionnaires Collected	
	The First Survey	The Second Survey
<b>Residential users</b>	<b>800 (100%)</b>	<b>900 (100%)</b>
Apartment Residential Users without Meters	82%	75%
Apartment Residential Users with Meters	1%	1%
Housing Residential Users	17%	24%
<b>Corporate users</b>	<b>300 (100%)</b>	<b>350 (100%)</b>
Manufacturing Industry	32%	36%
Commerce Industry	49%	41%
Other Industry except Communal Services	19%	23%

**5) Key Issues on the Questionnaire**

**i) The First Survey**

The questionnaire of the first survey include the following key issues:

- a Water conservation
- b Contentment with the water supply services of Vodokanal
- c Need of improvement of the communication between users and the water supply management
- d Ability to pay for the existing tariff system
- e Water leakage

**i) The Second Survey**

The questionnaire of the second survey include the following key issues:

- a Ability to pay for the tariff system based on actual quantity of the consumed water by meter reading
- b Practical Actions for Water conservation
- c Repairer of the water leakage

- d Areas for Vodokanal to improve in the future

## Conclusions of the Key Areas on the Surveys

### Awareness on Water conservation

- i) Awareness on water conservation

- a Residential User

A large number (80%) of the total residential users interviewed surprisingly have the awareness on water conservation. As residential analysis, 83% of apartment residential users without meters, 70% apartment with meter and 79% house residential users showed that they could save water. As family member analysis, 81% of single users, 83% of 2-family member users, 79% of 3-5 family member and 84% of more than 6-member family users gave a positive opinion on water conservation. It turned out that they show a moral awareness on water conservation, even though charged by fixed-rate water tariff now. We evaluate that residential users' awareness on environmental issues is quite normal on this point.

It is, however, assumed that most of them actually have not tried to save water intentionally under the present situation without meter reading because the current fixed water tariff systems does not give any incentive, such as cost reduction, to the user who saves more water. The system also does not have any penalty for the users to waste much water for cooling fruits, vegetation and gardening. In addition, they do not have any exact measurement of the volume of water they save in their daily life.

- b Corporate User

A large number (89%) of the total corporate users interviewed surprisingly have the awareness on water conservation. Whether they have meters or not, 90% of the corporate users without meters show their positive awareness on water conservation

as well as 88% of those with meters. In type of industry analysis, 89% of corporate users in manufacturing industry, 89% commerce industry and 84% other industries, except for communal service, have awareness on water conservation. It turns out that corporate users, as a whole, are much concerned about water conservation, and that their awareness on water conservation is higher than residential users'. It is because of their keener sense of cost management.

**ii) Methods of water conservation for saving expenditure of water supply**

**a Residential Users**

In case a new tariff collection system by meters reading starts for all residential users, it is found that water conservation to reduce water tariffs of wasted water, 27% of interviewed residential users would be responsible for finding water leakage of in-house water pipes and for repair. It shows that more than 1/4 of them recognizes that they waste much water because of the in-house water leakage.

It is noted that at least 1/4 residential users will have much concern about in-house water leakage after the new system works. The users, therefore, may be more sensitive of quality of repairer, such as materials of water pipes or repairing skills for replacing broken or too old water pipes, as they are trying to save water from the in-house water leakage. The issues of replacement of in-house water pipes are potentially involved in the water conservation issues.

Subsequently 25% of users would have custom to turn off taps tightly after using water. It turns out that the new collection system will push more than half (27% plus 25%) of users to take practical actions to reduce the large volume of wasted water, which has no benefit to users' daily life, nor to Vodokanal's revenue under the fixed tariff system after the meter reading systems works well.

16% of people chose the method of instructing their family members for better

cooperation to save water to reduce expenditure. 19% chose the method of checking carefully the water volume consumed and the charged water tariff on each water tariff invoice they receive after meter reading. 13% of interviewed residential users need more information on how to save water efficiently.

**b Corporate Users**

28% of interviewed corporate users would like to take responsibility to find water leakage from water pipes inside office or factory for repair. It shows that 1/4 of them recognize that they waste much water because of the inside water leakage. 25% of users would like to turn off taps tightly after using water. It turns out that more than half (28% plus 25%) of users try (or will try) to take practical action to reduce large volume of wasted water supply, which does not benefit their business. 18% chose the method of checking carefully the water volume consumed and charged water tariff every time they receive the water tariff invoice prepared after meter reading. 16% chose the method to instruct their employees in better cooperation and how to take actions to save water to reduce cost. 13% need more information on how to save water efficiently.

**2) Awareness on User Participation**

**i) Awareness on need of more communication with Vodokanal**

**a Residential User**

A large number (84%) of the residential users surprisingly have the positive awareness on the need of more public relation activities of Tashkent City Vodokanal. 30% of the users chose mass communication media such as newspapers, radio as the best communication channel for more public relation activities. It shows that the users are much interested in what happens around their life by having access to mass media.

22% of the users chose the quality of supplied water issue and the way of water conservation as the most preferable information contents provided from the Vodokanal. It shows that they are also much interested in the public safety and interests issues on water supply sector because the quality of supplied water and the water conservation methods, respectively, impact the safety of the user's life and the protection of the limited natural resource issue.

In addition, it turned out that the users have awareness on willingness to communicate with Tashkent City Vodokanal. 20% of the users show that they need direct communication with Vodokanal when they are having water supply problems, which was the second most chosen way of the public relation activities in this survey. It also shows some lack of communication with the current communication system between Tashkent City Vodokanal and the users.

**b Corporate User**

78% corporate users surprisingly have the positive awareness on the need of more public relation activities by Tashkent City Vodokanal.

The most preferable information contents provided from the Vodokanal that the users chose are the ways of water conservation (21%) and the quality of supplied water (20%). It seems that they are much concern about their own management issues. Because the water conservation and the quality of supplied water means, respectively, the business cost issue and the safety issues that effect their product or service quality.

It is the same as the residential user case, which turned out that the users have awareness and willingness to communicate with Tashkent City Vodokanal. They show that they need indirect communication with Vodokanal by mass communication media such as newspapers or radio (34%), poster (21%) and by issuing brochure (21%).



**ii) Disclosing the cost elements or showing Vodokanal management**

**a Residential Users**

The majority (88%) of residential users considers that Vodokanal should disclose the cost elements of the water tariff or explain their management performance. It means that asking for management disclosure of Vodokanal has increased in importance after the fixed water tariff is changed to the new tariff system based on the actual quantity of the consumed water.

**b Corporate Users**

91% company users consider that Vodokanal should disclose the cost elements of the water tariff or explain their performance of management. The corporate users more interested in the management of Vodokanal than the residentials.

**3) Awareness on Willingness and Ability to Pay the Present Water Tariff**

**i) Awareness on ability to pay for the present water tariff**

**a Residential User**

Nearly 60% of the residential users have willingness and ability to pay for the present water tariff. 50% users consider that the present tariff is proper. 8% consider it is cheap.

38% answered it is expensive. 4% answered that they could not to pay.

The number of users, however, satisfied with the present water supply services of the Tashkent City Vodokanal is surprisingly small (25%). The main reasons of the discontent are the quality of water (31%) water supply interruption (30%), the low water pressure (23%). It means that the users imply that safety of supplied water issues and stable water supply issues are key areas for the Vodokanal to

improve from the users' point of view.

It turned out that the residential users in Tashkent have three main criteria and put the priority according to the rank below to evaluate the present water supply services.

These are:

1. The safety of supplied water for protecting their life and health
2. The stable water supply for keeping the users daily life (cooking, drinking, washing etc.)
3. The ability to pay water tariff

It shows that the affordability of the present water tariff is not ranked the highest criterion among them.

Most of them consider that the present water tariff collection method is convenient.

#### **b Corporate User**

Nearly 70% of the corporate users have willingness and affordability to pay for the present water tariff. 60% corporate users consider that the present tariff is proper. 6% consider it cheap. On the other hand, 31% consider that it is expensive. 3% consider they can not afford to pay.

However, it turned out that more than half (51%) of the manufacturing industry show that they had negative awareness on willingness and ability to pay for the present water tariff. 45% answered that the present tariff is expensive. 6% answered they could not afford to pay.

On the other hand, the remaining industries, 66% commerce and 83% the other services (except for the communal service) show positive awareness on willingness and affordability to pay for the present water tariff.

It means that the present water tariff collection systems charged by reading meter impose much burden on the production cost in manufacturing industry because they need more water for their production than other industries. The more water they consume, the more water tariff they have to pay. Most of them consider that the present water tariff collection method is convenient.

**4) Awareness on Willingness and Ability to Pay the Future Water Tariff**

**i) Water tariff concept based on consumed volume of water supply**

**a Residential Users**

71% residential users consider that it is a fair tariff concept, and that water tariff should be calculated and charged based on consumed volume of water. 29% of them do not agree to pay according to the consumed volume of water.

**b Corporate Users**

79% corporate users consider that it is a fair tariff concept that water tariff should be calculated and charged based on consumed volume of water. 21% of them do not agree to pay according to the consumed volume of water.

**ii) Tariff system according to meter**

**a Residential Users**

More than half (58%) interviewed residential users agree to a tariff system to pay for the water tariff according to their actual consumed volume of water by reading meter. 42% disagree to the system. It turned out that most opponents of the system need a safety net for the poor and the pensioner on the system.

72% of people who answered "No" agree to pay according to meter if there is a

safety net for those who are poor or pensioner and to have a discounted water tariff. 24% of people who answered "No" agree to pay according to meter if water tariff is reduced for standard of living.

#### **Safety net on the new tariff system**

We analyzed the opponents reasons for disagreeing to the tariff system with meters. Both 72.7% of apartment residential users and 70.6% of house residential users with opinions against the meter reading system feel that the tariff system based on meter reading should have a safety net of a discounted water tariff for the poor or the pensioner. It shows that the new tariff system based on the consumption concept is not fully complete. It is noteworthy that opponent users stand against the system not only because of increasing the water tariff.

Most opponents feel that it is better and fairer to the community for the system to have the social safety net for the poor, the pensioners groups, and so on, so that residential users can keep their standard of living.

#### **b Corporate Users**

Most interviewed corporate users agree to a tariff system to pay for the water tariff according to their actual consumed volume of water by reading meter. 76% of interviewed companies agree to the system according to meter. 24% do not agree to the system.

It turned out that more than half of the opponents of the system need a safety net for the priority business. 43% of companies that answered "No" agree to pay according to meter if the system keeps the tariff level less or not more than the present one for ordinary business.

55% of companies who answered "No" agree to pay according to meter if there is a

safety net for priority businesses to have discounted water tariff, and the other 2% of disagreed people prefer some other way.

**iii) Payment period for the installation cost of the meter**

**a Residential Users**

64% of interviewed residential users prefer to pay for the installation cost of the meter divided into the monthly tariff. This means that for more than half of interviewed people the installation cost seems to be expensive, and they do not show willingness or ability to pay it at once. 30% of interviewed people would like to pay for meter installation at once after installation. We can suppose that 30% of interviewed people have financial ability to pay it at once. 6% of people prefer other ways.

**b Corporate Users**

55% of interviewed companies would like to pay for the installation cost of the meter divided into the monthly tariff. This means that most companies prefer to pay partially every month. 41% of interviewed companies would like to pay for the meter installation cost at once. 4% of companies prefer other ways.

**iv) Frequency of Vodokanal's staff visiting for meter reading**

**a Residential Users**

Most residential users preferred quarterly base for frequency of Vodokanal's staff to visit for meter reading. 40% of people prefer to see Vodokanal's staff do the meter reading quarterly. This means that for most interviewed people, it is optimal to be visited for reading meter neither too often nor too seldom.

27% of users prefer to be visited by the Vodokanal's staff every month. It shows that 1/4 of interviewed people need to know the exact consumed water volume and

the tariff monthly. This means that this 1/4 of residential users will be the best users for Vodokanal's cash flow management by monthly tariff settlement and by efficiency of water consumption through the practice of water conservation.

26% of them prefer their meter to be checked once a year.

This means that this 1/4 of interviewed residential users find it adequate to read meter once a year. This means that another 1/4 of residential users will not be good users for Vodokanal's cash flow management, as well as, for water conservation.

**b Corporate Users**

Almost half of interviewed companies prefer Vodokanal's staff to visit and to do monthly meter reading. 48% of interviewed companies would like to have their meter reading every month. In general, from the management point of view, a well-managed company needs the information of exact consumed water volume and the tariff monthly base to prepare a monthly report for the management. This means that nearly half of corporate users may have a sense of good management. They will be the best users for Vodokanal's cash flow management by their monthly water tariff settlement if the monthly tariff collection works well.

36% of companies would like to be visited by the Vodokanal's staff quarterly. 9% of companies prefer to be visited every two months. 7% prefer their meter to be checked once a year.

It turns out that 43% (36% plus 7%) of interviewed corporate users prefer to delay payments for more than 3 months. They will be a potential factor against the improvement of the cashflow shortage issue from tariff collection by Vodokanal management.

**v) Preferable payment methods of the water tariff**

**a Residential Users**

The most convenient method is to pay through bank or post offices. 68% of interviewed people prefer this method. The second most preferable method is one not mentioned in the questionnaire. 16% of users prefer to pay in other ways as follows:

- To pay the tariff at their house or apartment. (Vodokanal or JEK should collect the tariff .)
- To be withdrawn from their salary
- 13% of people prefer to pay directly at the Vodokanal office.
- 3% of people prefer withdrawing money through their bank accounts.

The least number of people prefer to pay by automatically withdrawing money from their bank accounts, because most of them do not have such practices, and do not have bank accounts.

**b Corporate Users**

74% of interviewed companies prefer to pay for water from their bank account without any approval. It shows that automatic withdrawal is more convenient and acceptable for the majority of companies than the present method.

26% of them do not prefer this way.

**5) Awareness on Water Leakage**

**i) Water Leakage Issues**

**a Residential User**

43% of the residential users answered that they had noticed water leakage from

water distribution pipes inside their house. They, however, seem to rank the water leakage issues as less priority problem than others such as the quality of water because of the present fixed water tariff system. It points out that they are interested in this issue, and in water conservation to reduce water tariffs under the tariff system by meter reading, 27% of interviewed residential users would be responsible for finding water leakage from in-house and for water pipes for repair.

Their awareness on the water leakage, therefore, is evaluated as a highly potential issue after the implement of the water tariff collection system charged by meter reading. The water leakage from water distribution pipes between the meter and their water faucets inside house will cause to increase charged water tariff and to impose additional burden to repair them for themselves.

**b Corporate User**

43% of interviewed corporate users answered that they had noticed water leakage from water distribution pipes inside their companies. It is found that the corporate users have much concern about the water leakage. Even in the case of the manufacturing industry who uses much water volume for the production, the water leakage inside their factory directly impacts on the increase of the production cost on the tariff collection system charged by meter reading

**ii) Repairer to whom users apply for water leakage**

**a Residential Users**

67% of people apply for JEK service. 16% apply to some repair shop or specialists. 10% of them prefer other ways including repair by themselves. 7% of people ask Vodokanal to recommend other shop or specialist.

1/4 of the apartment residential users does not ask JEK to repair their in-house water leakage. Only 75.4% of the apartment residential users answered that they use JEK.



The remaining 24.6 % use repairers either they selected (12.2%), repairers recommended by Vodokanal (6.2%) and other ways (6.2%).

**b Corporate Users**

45% of interviewed companies ask Vodokanal to recommend some shop or specialist. This shows that nearly half of corporate users need recommended repairer information from Vodokanal. In case of repairing water leakage in office or factory, most cases may be so serious and complicated that repairers are required to have much experience and skills. The users seem to contact Vodokanal to ask their professional advice, as well as, for a recommended repairer with water work's skill. 41% of users apply to some repair shop or specialists. They may have a connection to the repair shop or the specialists. 14% apply other ways.

**iii) Contentment with repairing services**

**a Residential Users**

Majority of interviewed people are discontent with the rendered service. 61% of them are discontent with the repair service for water leakage. 39% of people are satisfied with the repairing service, which they apply for. Repairers whom the majority of apartment residential users are content are the repair shops or professionals selected by users themselves or other ways.

Most users are discontent with JEK as a repairer. Only 29.1% of the apartment residential users are content with the service of JEK. 70.9% are discontent with their services.

**b Corporate Users**

It turns out that the majority of them are content with the rendered service. 70% of interviewed companies are satisfied with service. 30% of companies are not satisfied with repairing service, which they apply for.

**iv) Area for improvement on the repairing service for water leakage**

**a Residential Users**

From the users' point of view, the area to improve the most is the quality of the repairing service for water leakage. 60% of interviewed residential users are not satisfied with the quality of the service. The quality of service needs to improve in both the quality of materials (i.e. spare parts) and in the skill for repairing water leakage. 25% of them consider that the repairing fee is expensive. The fee may not be reasonable enough to meet the service quality they expected. 11% request the service should be completed, as soon as possible, once booking is confirmed. 4% want service to improve in other areas.

The apartment residential users who use JEK, whether they are content or not, show that the quality of service should be improved most. The apartment residential users who use repairers other than JEK also consider that the quality of service should be improved most. It turned out that the quality of JEK's repairing service for the water leakage inside apartments including skills, technology, man training and so on, is outdated and does not meet the users expectations

**b Corporate Users**

It turns out that from the users' point of view, the area to improve the most is the quality of the repairing service for water leakage. 65% of interviewed companies need more improvement in the quality of the repairing service. This means that most companies have a keener sense of the quality of the repair to stop water leakage, even though they show their contentment with the repairing service. This supports that corporate users require higher quality of materials (i.e. spare parts), and higher technical skills for repairing water leakage. 21% of companies request the service should be completed as soon as possible once their bookings are confirmed. This shows that the repairer may not keep to their due time to finish the

repair. 13% consider that the fee is expensive. 1% needs other areas improved.

**6) Areas to Improve on Vodokanal in Near Future**

**a Residential Users**

The highest priority area to improve from the users' point of view is the issue of the safety of water quality for health reasons. 44% of interviewed users chose the item of safety of water quality for health. This means that nearly half of interviewed residential users are much concerned whether the quality of water maintains a safety level for their health, which they use in their apartments or houses in their daily life. This fits the result that the quality of water was the most reason why users were discontent with the present Vodokanal. In addition, we evaluate residential users' awareness on environmental issues is quite normal on this point, and that they are much concerned about the safety of drinking water.

The following priority area to improve is the issue of stability of water supply. It includes the water interruption and low pressure of water issues. 28% chose the item of stability of water supply. It also fits in the result that the water interruption and the low water pressure were main reasons why users were discontent with the present Vodokanal

The third priority area to improve is the current water tariff including the price. 18% wish to decrease or improve the current water tariff. 5% of people accordingly answered that they would like to have a better tariff collection system. 5% need more communication with Vodokanal.

**b Corporate Users**

The most priority area to improve from the users' point of views is the issue of the safety of water quality for health. 45% of interviewed companies wish to improve water quality. It fits in the result that the quality of water was the most reason why

users were discontent with the present Vodokanal.

The following priority area to improve is the issue of the stability of water supply. 32% of them would like to have more stable water supply. It includes the water interruption and low pressure of water issues. It also fits in the result that the water interruption and the low water pressure were main reasons why users were discontent with the present Vodokanal

The third priority area to improve is the current water tariff including the price. 14% of companies wish to decrease or improve tariff system. 5% and 4% of interviewed companies answered accordingly that they prefer to have more communication with Vodokanal and better tariff collection system.

## 5.1.2 Findings on the First Survey

### (1) Awareness on contentment with the present Tashkent City Vodokanal

#### 1) Residential Users

25% of interviewed residential users answered that they were content with the present Tashkent City Vodokanal. It shows that the number of users satisfied with the present water supply services of the Vodokanal was surprisingly small.

The main reasons of 75% user discontent are water quality problem (31%), water supply interruption (30%), low water pressure (23%) and so on. It means that the safety and high quality of supplied water and the stable water supply are highly ranked as significant factors for evaluating water supply services on the user's awareness.

On the other hand, looking at the answers, water tariff (10%) water tariff collecting method (4%), water tariff and tariff collection method issues are lower ranked on the user's awareness than the reasons-above.

#### **Result 1.1**

##### **Are you content with the present Vodokanal?**

- Yes – 25%
- No – 75%

##### **If "No", what is the reason?**

- Water tariff – 10%
- Water tariff collecting method – 4%
- Water supply interruption – 30%
- Water quality problem – 31%
- Low water pressure – 23%
- Other – 2%

#### 2) Corporate Users

In all 47% of interviewed corporate users answered that they were content with the present Tashkent City Vodokanal. It shows that the majority (53%) of corporate users has an awareness of discontent with the present water supply services of Tashkent City Vodokanal.

The main reasons for 53% user discontent are the water quality problem (32%), water supply interruption (25%), low water pressure (22%) and so on. This means that the safety and high quality of water supplied and stability of water supply are ranked as highly significant factors for evaluating water supply services in the user's awareness.

Relatively, by looking at the answers, water tariff (12%) and water tariff collecting method (7%), issues of water tariff and the tariff collection method are lower ranked in the user's awareness than the reasons given above.

**Result 1.2**

**Are you content with the present Vodokanal?**

- Yes – 47%
- No – 53%

**If “No”, what is the reason?**

- Water tariff – 12%
- Water tariff collecting method – 7%
- Water supply interruption – 25%
- Water quality problem – 32%
- Low water pressure – 22%
- Other – 2%

**(2) Awareness on Contentment with the Quality of Supplied Water**

**1) Residential Users**

67% of interviewed residential users answered that they were discontent with the quality of supplied water from Tashkent City Vodokanal.

The reasons of discontent are turbidity (47%), red water (30%), and strange odor or taste (23%).

**Result 2.1**

**Are you content with the quality of supplied water?**

- Yes – 33%
- No – 67%

**If “No”, what is the reason?**

- Red water – 30%
- Turbidity – 47%
- Strange odor or taste – 23%

## 2) Corporate Users

Some 41% of corporate users interviewed answered that they were discontented with the quality of water supplied from Tashkent City Vodokanal.

The reasons for discontent are turbidity (47%), strange odor or taste (31%), and red water (22%).

### Result 2.2

Are you satisfied with the quality of supplied water?

- Yes – 59%
- No – 41%

If “No”, what is the problem?

- Red water – 22%
- Turbidity – 47%
- Strange odor or taste – 31%

## (3) Water Supply Interruption

### 1) Residential Users

67% of interviewed residential users answered that they had suffered water supply interruption.

In terms of frequency of the suffering, 42% of the users above answered that they frequently had suffered it.

### Result 3.1

Do you encounter water supply interruption?

- Yes – 87%
- No – 13%

If “Yes”,

- Frequent – 42%
- Sometimes – 58%

## 2) Corporate Users

Some 58% of corporate users interviewed answered that they had suffered water supply interruption.

In terms of frequency of suffering, 23% of the users above answered that they frequently had suffered it.

<p><b>Result 3.2</b> <b>Do you encounter water supply interruption?</b></p> <ul style="list-style-type: none"><li>• Yes – 58%</li><li>• No – 42%</li></ul> <p><b>If “yes”,</b></p> <ul style="list-style-type: none"><li>• Frequent – 23%</li><li>• Sometimes – 77%</li></ul>
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## (4) Water Pressure

### 1) Residential users

52% of interviewed residential users answered that they had proper water pressure in use.

<p><b>Result 4.1</b> <b>Do you have proper water pressure?</b></p> <ul style="list-style-type: none"><li>• Yes – 52%</li><li>• No – 48%</li></ul>
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### 2) Corporate Users

Around 73% of residential users interviewed answered that they had proper water pressure in use.

<p><b>Result 4.2</b> <b>Do you have proper water pressure?</b></p> <ul style="list-style-type: none"><li>• Yes – 73%</li><li>• No – 27%</li></ul>
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**(5) Water Leakage Inside House**

**1) Residential Users**

43% of interviewed residential users answered that they had noticed water leakage from water distribution pipes inside their house.

<p><b>Result 5.1</b> <b>Did you notice water leakage from water distribution pipes in your house?</b></p> <ul style="list-style-type: none"><li>• Yes – 43%</li><li>• No – 57%</li></ul>
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**2) Corporate Users**

Some 43% of corporate users interviewed answered that they had noticed water leakage from water distribution pipes inside their companies.

<p><b>Result 5.2</b> <b>Did you notice water leakage from water distribution pipes in your company?</b></p> <ul style="list-style-type: none"><li>• Yes – 43%</li><li>• No – 57%</li></ul>
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**(6) Willingness and Affordability to Pay for the Present Water Tariff**

**1) Residential Users**

**i) Awareness on the present water tariff**

8% or 50% of interviewed residential users respectively answered 'Cheap' or 'Proper level' for the present water tariff (Result 6.1.1). It means that the majority of the users have willingness and affordability to pay for the present water tariff.

On the other hand, 38% or 4% answered 'Expensive' or 'Can not afford to pay' for the present water tariff. 42% of the users have a negative awareness on affordability to pay for the present water tariff.

**ii) Type of residence**

In terms of type of residence (apartment, apartment with meters, house), the awareness of the interviewed users on the present water tariff were shown on the table 5.1.3 below.

The majority of each type of residence answered that they had willingness and affordability to pay for the present water tariff.

In spite of the water tariff charged by water reading, the users living in apartments with meters surprisingly show more willingness and affordability than do others charged by fixed rate. We should consider the fact that most of the meters in the apartments have something wrong with them and do not work, and that the water tariff for these residences also are charged by fixed rate.

**iii) Number of family members**

In terms of number of family members (single, 2 members, 3-5 members, more than 6 members), the awareness of the interviewed users on the present water tariff are shown in Table 5.1.4 below.

The majority of the single families has negative awareness on affordability to pay for the present water tariff (42% or 10% answered respectively "Expensive" or "Can not afford to pay").

Two-member families show the most willingness and affordability to pay for the present water tariff (56% or 5% answered respectively "Proper level" or "Cheap").

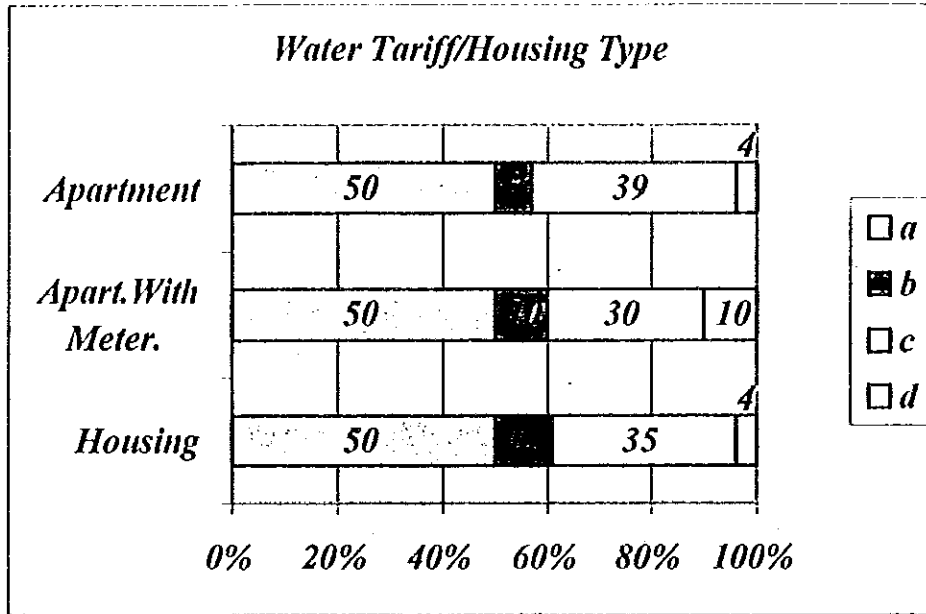
The rest have also positive awareness.

**Result 6.1.**

**What do you think about present water tariff?**

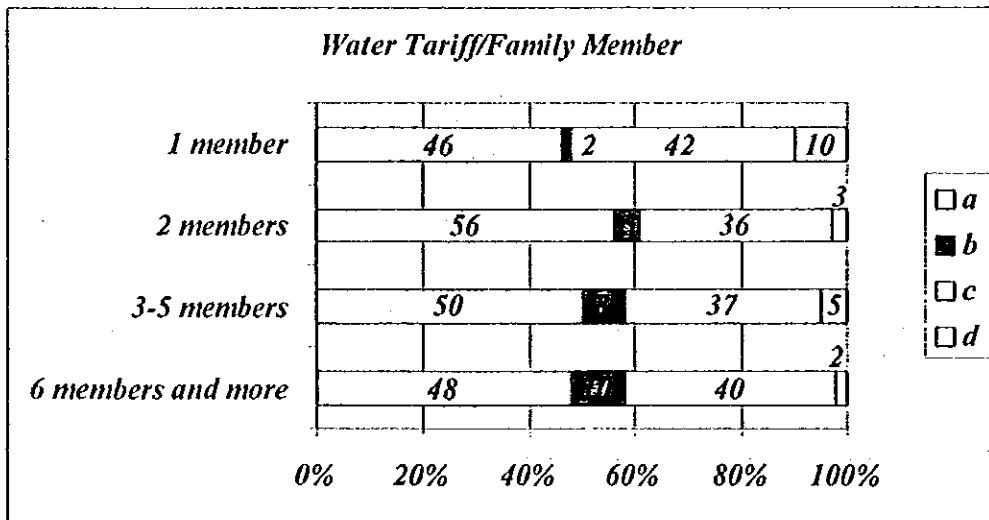
- Proper level – 50%
- Cheap – 8%
- Expensive – 38%
- Can not afford to pay – 4%

Table 5.1.3



a) Proper b) Cheap c) Expensive d) Can not afford to pay

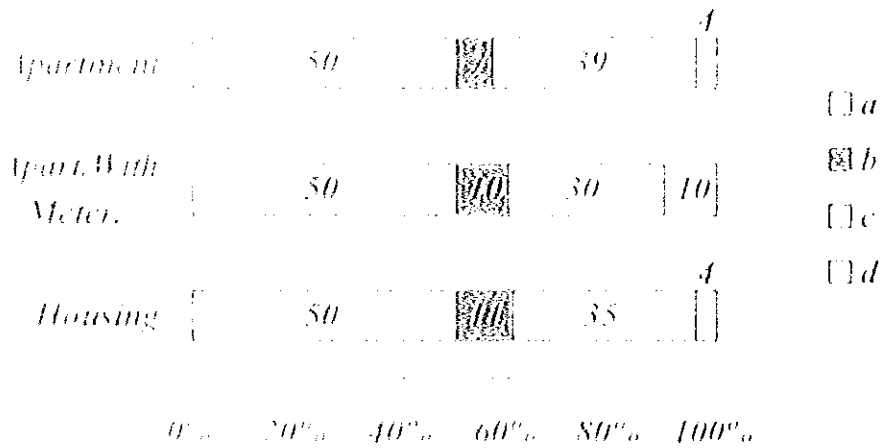
Table 5.1.4



a) Proper b) Cheap c) Expensive d) Can not afford to pay

Table S.1.3

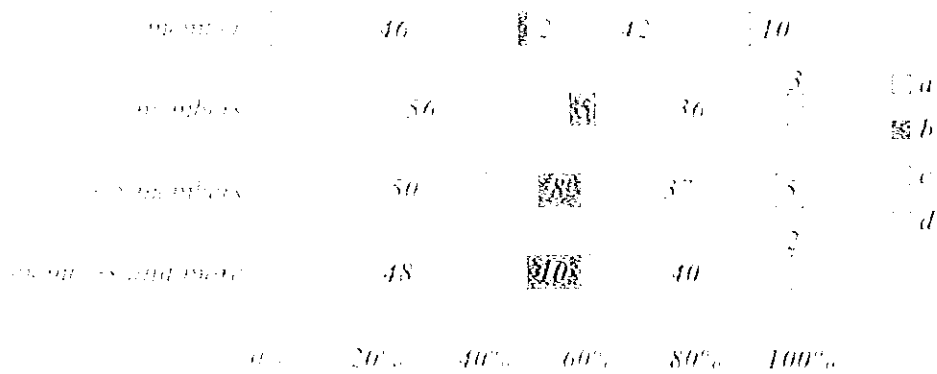
*Water Tariff Housing Type*



Source: Survey of household water expenses, 2004, not all had to pay

Table S.1.4

*Water Tariff Family Member*



Source: Survey of household water expenses, 2004, not all had to pay

## 2) Corporate Users

### i) Awareness of the present water tariff

In all 6%, or 60%, of corporate users interviewed respectively answered 'Cheap' or 'Proper level' for the present water tariff (Result 6.2). It means that the majority (66%) of the users has the willingness and affordability to pay for the present water tariff.

On the other hand, 31% or 3%, answered 'Expensive' or 'Cannot afford to pay' for the present water tariff. Some 34% of the users have a negative awareness of affordability to pay for the present water tariff.

### ii) Type of industry

In terms of the type of industry (manufacturing industry, commerce, other industries except for communal services), the awareness of the users interviewed on the present water tariff are shown in Table 5.1.5 below.

It turned out that the majority (51%) in the manufacturing industry answered that they had a negative awareness on willingness and affordability to pay for the present water tariff. To put it concretely, 45%, or 6% of the corporate users interviewed in the manufacturing industry respectively answered 'Expensive' or 'Cannot afford to pay' for the present water tariff.

On the other hand, it turned out that the majority (more than 70%) of the corporate users in both commerce and other services answered that they had an awareness of willingness and affordability to pay for the present water tariff.

To put it concretely, 63%, or 6%, of corporate users interviewed in commerce respectively answered 'Proper' or 'Cheap' for the present water tariff, and 78%, or 5%, of the users in other services respectively answered 'Proper' or 'Cheap' for the present

water tariff.

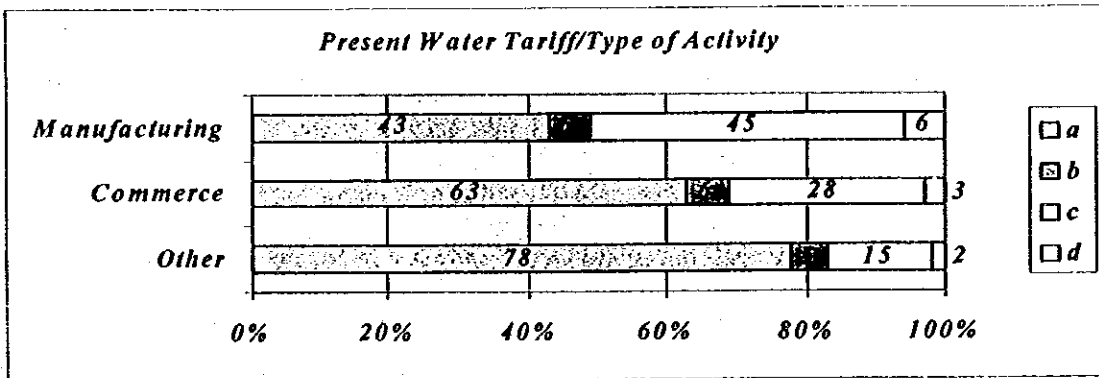
This shows that the present water tariff collection systems charged by reading meters impose a heavy burden on the production costs of the manufacturing industry because they need more water for their production than other industries. The more water supply they consume, the more water tariff they have to pay.

**Result 6.2**

**What do you think about present water tariff?**

- Proper level – 60%
- Cheap – 6%
- Expensive – 31%
- Can not afford to pay – %

**Table 5.1.5**



- a) Proper
- b) Cheap
- c) Expensive
- d) Cannot afford to pay

water tariff

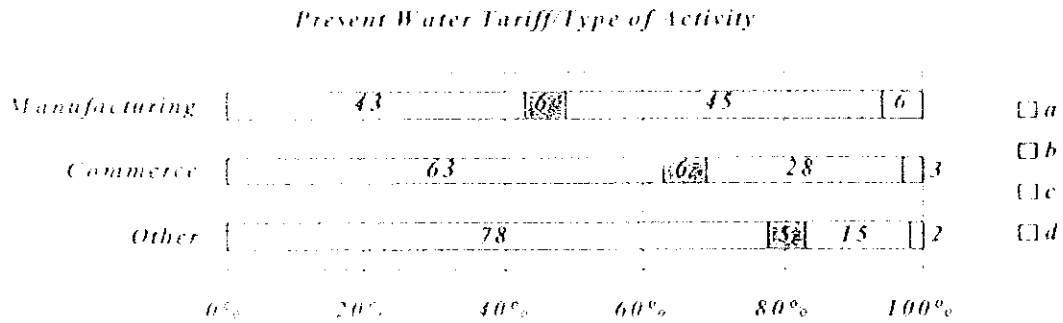
It is shown that the present water tariff collection systems charged by reading meters impose a heavy burden on the production costs of the manufacturing industry because they need more water for their production than other industries. The more water supply they consume, the more water tariff they have to pay.

**Result 6.2**

**What do you think about present water tariff?**

- Proper level – 60%
- Cheap – 6%
- Expensive – 31%
- Can not afford to pay – 6%

**Table 5.1.5**



- a) Proper
- b) Cheap
- c) Expensive
- d) Cannot afford to pay

**(7) Present Water Tariff Collection Method**

**1) Residential Users**

80% of the interviewed users answered that the present water tariff collection method was convenient.

<p><b>Result 7.1</b> <b>Are the current payment methods convenient for you?</b></p> <ul style="list-style-type: none"><li>• Yes – 80%</li><li>• No – 20%</li></ul>
--

**2) Corporate Users**

Some 78% of the users interviewed answered that the present water tariff collection method was convenient.

<p><b>Result 7.2</b> <b>Are these payment methods convenient for you?</b></p> <ul style="list-style-type: none"><li>• Yes – 78%</li><li>• No – 22%</li></ul>
--

**(8) Awareness on the Needs of More Communication with Tashkent City Vodokanal**

**1) Residential Users**

**i) More public relation activities**

84% of the interviewed users answered that Tashkent City Vodokanal should emphasize more public relation activities. It shows that most of the users have awareness on the needs of more communication with Tashkent City Vodokanal.

<p><b>Result 8.1.1</b> <b>Do you think that Vodokanal should emphasize more public relation activities?</b></p> <ul style="list-style-type: none"><li>• Yes – 84%</li><li>• No – 16%</li></ul>
--



ii) **Content of information to provide**

The quality of water supply (22%), water conservation (14%), ways of preventing water leakage (14%), advising of water supply interruption (12%) are the main issues which the users need to be informed of by Tashkent City Vodokanal.

**Result 8.2.1**

**If Vodokanal conducts more public relations activities which areas should they emphasize?**

- Service activities of Vodokanal office – 10%
- Technology of the waterworks systems – 10%
- How to carry out water conservation – 14%
- Quality of water supply – 22%
- Water shortage at the source of water supply – 7%
- Issues on the management of Vodokanal – 4%
- History of water supply – 3%
- Ways of preventing water leakage – 14%
- Advising of water supply interruption – 12%
- Schedule of the construction of waterworks – 4%
- Other – 0%

iii) **Communication media on public relations**

Advertising in newspapers or radio (30%), question and answer service by direct contact (20%), posters (20%) are the main communication media through which Tashkent City Vodokanal should publicly communicate with the users.

**Result 8.3.1**

**If Vodokanal do more public relations activities, in which ways should they be conducted?**

- Advertising in newspapers or radio – 30%
- Setting up the internet guide for the users – 7%
- Posters – 18%
- Issuing regular newsletters – 7%
- Making brochures – 10%
- Inviting the users to the Vodokanal's facilities – 5%
- Giving question and answer service while direct contact – 20%
- Other – 3%

## 2) Corporate Users

### i) More public relation activities

Around 78% of the users interviewed answered that Tashkent City Vodokanal should emphasize more public relations activities. This shows that most of the users have an awareness of the need for more communication with Tashkent City Vodokanal.

#### Result 8.1.2

Do you think that Vodokanal should emphasize more public relation activities?

- Yes – 78%
- No – 22%

### ii) Content of information to be provided

Water conservation (21%), quality of water supply (20%), service activities of Vodokanal office (16%), ways of preventing water leakage (13%), advising of water supply interruption (12%), and technology of the waterworks systems (10%) are the main issues which users need to know from Tashkent City Vodokanal.

Finding water conservation issues was their greatest concern along with water leakage issues, which proves that corporate users are very interested in cost savings by putting in the water tariff collection system charged by means of reading a meter for corporate users.

In addition, the quality of water supply issues as a great concern shows that corporate users are very interested in the quality of their products from the viewpoint of the safety of water supplied.

**Result 8.2.2**

**If Vodokanal conducts more public relations activities which areas should they emphasize?**

- Service activities of Vodokanal office – 16%
- Technology of the waterworks systems – 10%
- How to carry out water conservation – 21%
- Quality of water supply – 20%
- Water shortage at the source of water supply – 4%
- Issues on the management of Vodokanal – 2%
- History of water supply – 2%
- Ways of preventing water leakage – 13%
- Advising of water supply interruption – 8%
- Schedule of the construction of waterworks – 4%
- Other – 0%

**iii) Communications media for public relations**

Advertising in newspapers or on radio (34%), Posters (21%), and Making brochures (21%) are the main communications media through which Tashkent City Vodokanal should publicly communicate with users.

**Result 8.3.2**

**If the Vodokanal does more public relations activities, in which ways should they be conducted?**

- Advertising in newspapers or radio – 34%
- Setting up the internet guide for the users – 5%
- Postering – 21%
- Issuing regular newsletters – 6%
- Making brochures – 21%
- Inviting the users to the Vodokanal's facilities – 7%
- Giving question and answer service while direct contact – 3%
- Other – 3%

**(9) Awareness on Water Conservation**

**1) Residential Users**

**i) Willingness to save water supply**

80% of the interviewed users answered that they could save water. Most of the users surprisingly have positive awareness on water conservation (Result 9.1).

ii)

**Type of residence**

In terms of type of residence (apartment, apartment with meters, and house), the awareness of the interviewed users on the water conservation were shown on the table 5.1.6 below.

More than 70% of each type of residence answered that they had willingness to save water.

We, therefore, should consider the fact that most of the meters of the apartment have something wrong with and do not work and that the water tariff for these residence also are charged by fixed rate.

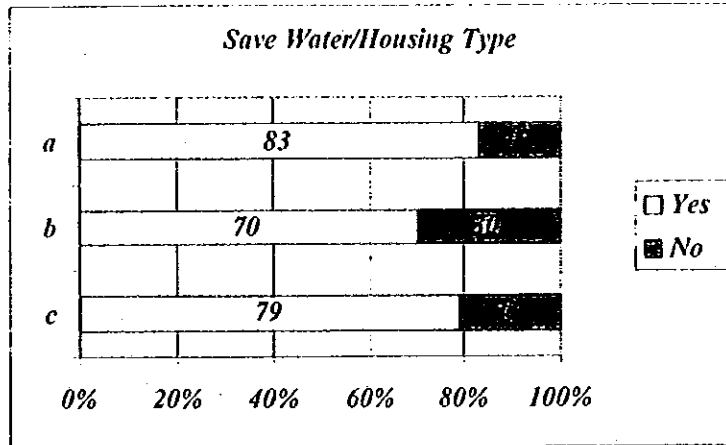
iii) **Number of family member**

In terms of number of family member (single, 2 members, 3-5 members, more than 6 members), the awareness of the interviewed users on the water conservation are shown on Table 5.1.7 below.

More than 70% of each category of number of family members answered that they had willingness to save water.

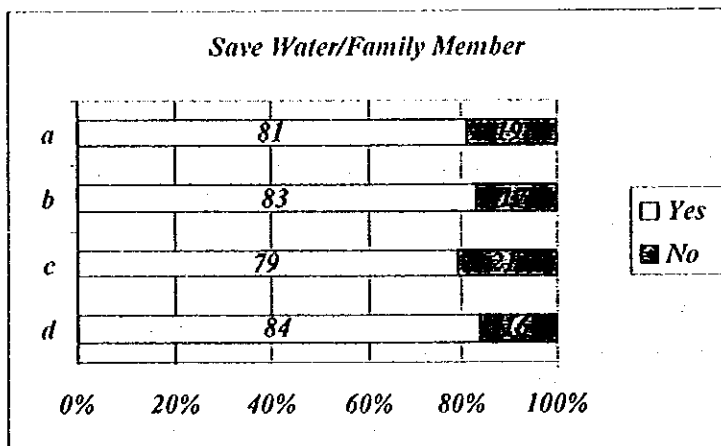
<p><b>Result 9.1</b> <b>Can your family save water?</b> • Yes – 80% • No – 20%</p>
--

Table 5.1.6



- a. Apartment
- b. Apartment with meter
- c. House

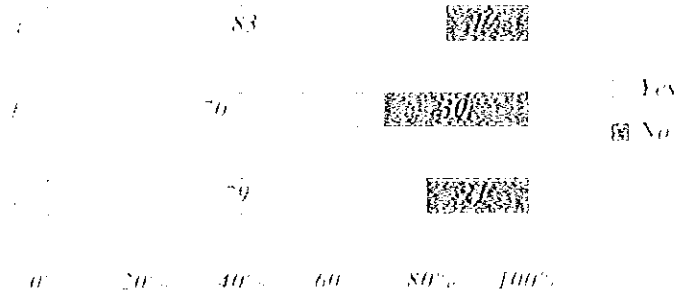
Table 5.1.7



- a. 1 member
- b. 2 members
- c. 3-5 members
- d. more than 6 members

Table 5.1.6

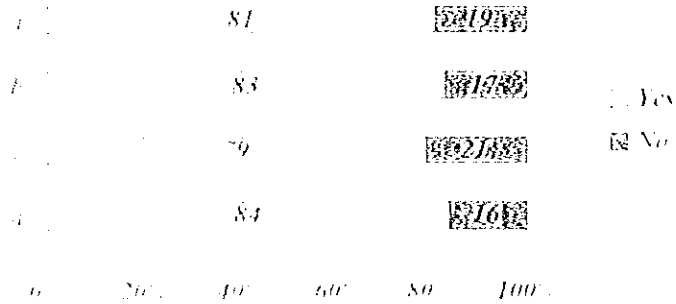
*Save Water Housing Type*



- a. Apartment
- b. Apartment with meter
- c. House

Table 5.1.7

*Save Water Family Member*



- a. 1 member
- b. 2 members
- c. 3-5 members
- d. more than 6 members

## 2) Corporate Users

### i) Willingness to save water

In all, 89% of the users interviewed answered that they could save water. Most users surprisingly have a positive awareness on water conservation (Result 9.2).

### ii) Meter

In terms of meter (corporate users with meter, corporate users without meter), the awareness of the users interviewed on water conservation are shown in Table 5.1.8 below.

About 90 % of each type of corporate user answered that they had a willingness to save water.

This shows that water conservation issues are what corporate users are highly concerned about.

### iii) Type of industry

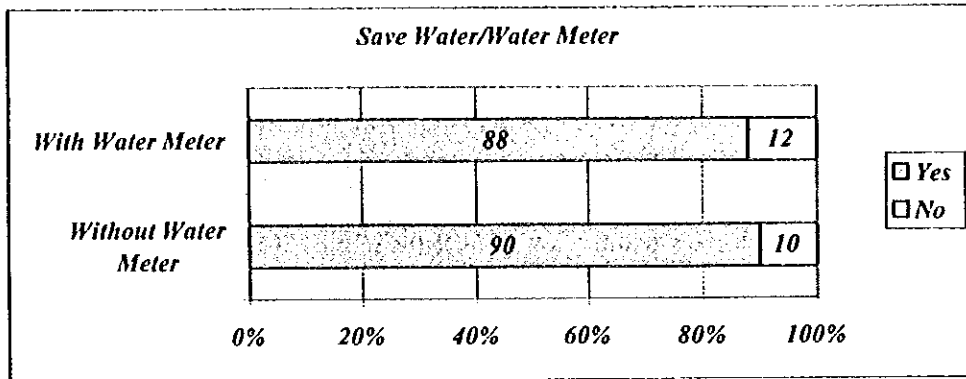
In terms of the type of industry (manufacturing industry, commerce, other industries except for communal services), the awareness of the users interviewed on the present water tariff are shown in Table 5.1.9 below.

It turned out that most industries have a positive awareness of water conservation.

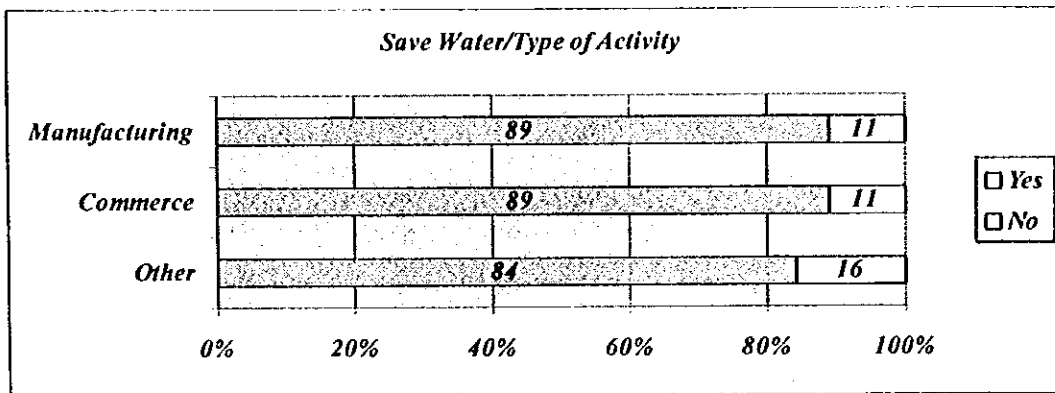
To put it concretely, respectively, 89%, 89% and 84% of the manufacturing industry, commerce and other services industry answered that they can save water.

<p><b>Result 9.2</b> <b>Can your company save water?</b></p> <ul style="list-style-type: none"><li>• Yes – 89%</li><li>• No – 11%</li></ul>
---

**Table 5.1.8**



**Table 5.1.9**



**5.1.3 Findings on the Second Survey**

**(1) Water Tariff Concept Based on Consumed Volume of Water Supply**

**1) Residential Users**

Results show that most residential users consider the water tariff system a fair concept, and that charges should be calculated and based on consumed volume of water. 71% of interviewed residential users answered that they agree to pay more or less for more or less quantity of consumed water. 29% of them do not agree to pay according to the consumed volume of water.



**Result 1.1**

**Do you think it is fair to calculate and charge a water tariff on the more (or the less) water consumed, the more (or the less) you have to pay in water tariff?**

- Yes – 71%
- No – 29%

**2) Corporate Users**

Results show that most corporate users consider the water tariff a fair concept and that charges should be calculated and based on consumed volume of water.

79% of interviewed companies answered that they agree to pay more or less for more or less quantity of consumed water. 21% of them do not agree to pay according to the consumed volume of water.

**Result 1.2**

**Do you think that it is fair to calculate and charge a water tariff on the more (or the less) water consumed, the more (or the less) they have to pay in water tariff?**

- Yes – 79%
- No – 21%

**(2) Tariff System According to Meter**

**1) Residential Users**

Results prove that more than half of interviewed residential users agree to a tariff system to pay for the water tariff according to their actual consumed volume of water by reading meter.

58% of people agree to the meter system.

42% disagree to the system.

It turned out that most opponents of the system need a safety net for the poor and the pensioner.

72% of people who answered “No” agree to pay according to meter if there is a safety net for those who are poor or pensioner and to have a discounted water tariff.

24% of people who answered “No” agree to pay according to meter if water tariff is reduced

for standard of living.

4% of people who disagreed agree to pay under other conditions as follows:

- Meters do not work now. They first should be repaired.
- Vodokanal's technical service should be improved.
- The tariff system should have a discounted tariff for gardening or vegetation.

**Result 2.1**

**Do you agree that we need a tariff system by reading meters to measure our actual water volume consumed and to pay the fair amount of water tariff?**

- Yes – 58%
- No – 42%

**If answer "No", to the question above, in order for you to agree to a tariff system by reading meters to measure the actual water volume consumed and to pay the fair amount of water tariff, what kinds of condition do you need? Please choose one.**

- We can keep or reduce the present water tariff for standard living. – 24%
- The system should have a safety net for those who are poor or pensioner, and have a discounted water tariff for standard living. – 72%
- Other – 4%

**i) House type analysis**

**a Apartment Residential Users**

Table 5.1.10 shows that 28.3% of apartment residential users disagree with the concept of water tariff system based on consumed volume of water. Also 38.5% of them do not agree to the system to pay for the water tariff according to consumed volume of water by reading meter.

**b House Residential Users**

On the other hand, 33.6% of house residential users disagree with the concept of water tariff system based on consumed volume of water. Also 49.5% of them do not agree to the system to pay for the water tariff according to consumed volume of water by reading meter.

It shows that house residential users oppose the new tariff system more than apartment users.

House residential users may feel that they will pay higher water tariff under this system than they do under the present fixed tariff system, if they keep consuming the same water volume.

They tend to consume much water because, in general, the number of family members in house residence is more than that in apartment, and the living space of house residence is larger than that of apartment. Other reasons opponents give in result 2.1 are that some residential users request a discount tariff for gardening or vegetation. The residential house users seem to be very content with the present fixed water tariff system.

**Table 5.1.10**  
**The ratio of Numbers of "No" for Result 1.1(R1.1) or Result 1.2(R1.2) to Total**  
**Numbers of Each Residential Type and the reason of "No" for R1.2**  
**Residential users in Tashkent**  
 (%)

	"No" of R1.1 /Residence	"No" of R 1.2 /Residence	The Reasons of "No" of R1.1 *		
			a	b	c
Apartment	28.3	38.5	25.3	72.7	2.0
House	33.6	49.5	20.1	70.6	9.3

\*

Code	<i>Condition to agree to a tariff system by reading meter</i>
A.	New system should keep or reduce the present water Tariff for standard living.
B	New system should have a safety net of discounted Tariff for those who are poor or pensioner for standard living.
C	Other

## **ii) Safety net on the new tariff system**

We analyzed the residential user answers of those who agree with the water tariff concept on result 1.1, but who disagree to the tariff system according to meter. Of total residential users, this group accounts for 13% (71% Yes on result 1.1 minus 58% Yes on result 2.1).

The 13% shows that they understand the concept itself, but are worried about a higher tariff on the new tariff system with meter than the present system.

We analyzed the reasons given by the opponents of the tariff system with meters.

Both 72.7% of apartment residential users and 70.6% of house residential users with opinions against the meter reading system (table 5.1.10) feel that the tariff system based on meter reading should have a safety net of a discounted water tariff for the poor or the pensioner.

It shows that the new tariff system based on the consumption concept is not fully complete. It is noteworthy that opponent users stand against the system not only because of increased the water tariff.

Most opponents feel that it is better and fairer to the community for the system to have the social safety net for the poor, the pensioners groups, and so on, so that residential users can keep their standard of living.

## **2) Corporate Users**

Results prove that most interviewed corporate users agree to a tariff system to pay for the water tariff according to their actual consumed volume of water by reading meter.

76% of interviewed companies agree to the system according to meter.

24% do not agree to the system.

It turned out that more than half of the opponents of the system need a safety net for the priority business.

43% of companies that answered "No" agree to pay according to meter if the system keeps the tariff level less or not more than the present one for ordinary business.

55% of companies who answered "No" agree to pay according to meter if there is a safety net for priority businesses to have discounted water tariff, and the other 2% of disagreed people prefer some other way.

**Result 2.2**

**Do you agree that we should have a tariff system by reading meter to measure actual water volume consumed and to pay the fair amount of water tariff?**

- Yes – 76%
- No – 24%

**If answer "No", of the question above**

**In order for you to agree to a tariff system by reading meters to measure the actual water volume consumed and to pay the fair amount of water tariff, what kinds of condition do you need? Please choose one.**

- We can keep or reduce the present water tariff for ordinary business – 43%
- The system should have a safety net for those who are priority business, to have a discounted water tariff for standard living – 55%
- Other – 2%

**i) Business Type Analysis**

**a Manufacturing Industry**

19.2% of corporate users in manufacturing industry disagree with the concept of water tariff system based on consumed volume of water. Also 24% of them do not agree that it is fair to pay for the water tariff according to consumed volume of water by reading meter.

Table 5.1.3.2 shows that they oppose the water tariff system by meter the most.

We add the fact that on our first survey most of them feel the present tariff system by meter reading is expensive for them.

43.5% of companies that answered "No" agree to pay according to meter if the system keeps the tariff level less or not more than the present one for ordinary

business.

53.5% of companies who answered "No" agree to pay according to meter if there is a safety net for priority businesses to have discounted water tariff, and the other 3% of disagreed people prefer some other way.

**b Commerce Industry**

24.8% of corporate users in commerce industry disagree with the concept of water tariff system based on consumed volume of water. 22.8% of them do not agree that it is fair to pay for the water tariff according to consumed volume of water by reading meter.

33.3% of companies that answered "No" agree to pay according to meter if the system keeps the tariff level less or not more than the present one for ordinary business. It is the smallest figure.

63.7% of companies who answered "No" agree to pay according to meter if there is a safety net for priority businesses to have discounted water tariff, and the other 3% of disagreed people prefer some other way. It is the largest figure among them.

It turned out that the commerce industry users feel that the present tariff is not too expensive for them even under the tariff system by meter reading. In addition, they seem to be aware that they should have more discounted tariff as being the priority industry in this country because most of them are private companies that want to be more supported by government.

**c Other Industry**

17.5% of corporate users in other industry disagree with the concept of water tariff system based on consumed volume of water. Also 22.5% of them do not agree that it is fair to pay for the water tariff according to consumed volume of water by reading meter. Both figures are the lowest.

61.1% of companies that answered "No" agree to pay according to meter if the system keeps the tariff level less or not more than the present one for ordinary business.

38.9% of companies who answered "No" agree to pay according to meter if there is a safety net for priority businesses to have discounted water tariff, and the other 0% of disagreed people prefer some other way.

Most of the other industry users may feel that the present tariff is not too expensive for them even under the tariff system by meter reading. Some industries in this category are more of the opinion that the new water tariff should be kept the present level or reduced.

**Table 5.1.11**  
**The ratio of Numbers of "NO " on Result 1.2 (R1.2) or Result 2.2 (R2.2) to Total**  
**Numbers of Each Industry**  
**And The Reasons of "No" on R 2.2 Corporate users in Tashkent (%)**

	"No" of R 1.2 /Industry	"No" of R2.2 /Industry	The Reasons of "No" of R2.2 *		
			a	b	c
Manufacturing	19.2	24	43.5	53.5	3
Commerce	24.8	22.8	33.3	63.7	3
Other	17.5	22.5	61.1	38.9	0

\*

Code	<i>Condition to agree to a tariff system by reading meter</i>
a	New system should keep or reduce the present water Tariff for ordinary business.
b	New system should have a safety net of discounted Tariff for those who are priority business.
c	Other

**(3) Disclosing the Cost Elements or Showing Vodokanal management**

**1) Residential Users**

Results prove that the majority of residential users are interested in this kind of information.

88% of interviewed people would like Vodokanal to explain their management.

12% do not need this information

**Result 3.1**

**Do you think that the Vodokanal should disclose the cost elements of water tariff, which the users pay, or show to the public their management efforts to attain business efficiency?**

- Yes – 88%
- No – 12%

**2) Corporate Users**

Results prove that the majority of companies are interested in such kind of information

91% of interviewed companies would like Vodokanal to explain their management.

9% do not need this information.

**Result 3.2**

**Do you think that the Vodokanal should disclose the cost elements of water tariff that the users pay, or show to the public, their management efforts to attain business efficiency?**

- Yes – 91%
- No – 9%

**(4) Payment Period for the Installation Cost of the Meter**

**1) Residential Users**

64% of interviewed residential users prefer to pay for the installation cost of the meter divided into the monthly tariff.

This means that for more than half of interviewed people the installation cost seems to be expensive, and they do not show willingness or ability to pay it all at once.

30% of interviewed people would like to pay for meter installation all at once after installation.



We can suppose that 30% of interviewed people have financial ability to pay it all at once.  
6% of people prefer other ways.

**Result 4.1**

**If you have to pay the installation cost of meter, what kinds of payment do you prefer to choose?**

- To pay all the cost once at the time of the installation – 30%
- To pay the cost divided into the monthly water tariff after the installation – 64%
- Others – 6%

**2) Corporate Users**

55% of interviewed companies would like to pay for the installation cost of the meter divided into the monthly tariff. This means that most companies prefer to pay partially every month.  
41% of interviewed companies would like to pay for the meter installation cost all at once.  
4% of companies prefer other ways.

**Result 4.2**

**If you have to pay the installation cost of meter, what kinds of payment do you prefer to choose?**

- Pay all the cost once at the time of the installation – 41%
- Pay the cost divided into the monthly water tariff after the installation – 55%
- Other – 4%

**(5) Frequency of Vodokanal's Staff Visiting for Meter Reading**

**1) Residential Users**

Results prove most residential users preferred quarterly base for frequency of Vodokanal's staff to visit for meter reading.

40% of people prefer to see Vodokanal's staff do the meter reading quarterly

This means that for most interviewed people, it is optimal to be visited for reading meter neither too often nor too seldom.

27% of users prefer to be visited by the Vodokanal's staff every month.

It shows that 1/4 of interviewed people need to know the exact consumed water volume and the tariff monthly. This means that this 1/4 of residential users will be the best users for Vodokanal's cash flow management by monthly tariff settlement and by efficiency of water consumption through the practice of water conservation.

26% of them prefer their meter to be checked once a year.

This means that this 1/4 of interviewed residential users find it adequate to read meter once a year. This means that another 1/4 of residential users will not be good users for Vodokanal's cash flow management, as well as, for water conservation.

7% of people prefer to be visited every two months. This is the least number of people who prefer this method.

**Result 5.1**

**How often do you think employees of Vodokanal should visit you for reading meter?**

- Monthly – 27%
- Every 2 months – 7%
- Quarterly – 40%
- Once in a year – 26%

**2) Corporate Users**

Results indicate that almost half of interviewed companies prefer Vodokanal's staff to visit and to do monthly meter reading.

48% of interviewed companies would like to have their meter reading every month. In general, from the management point of view, a well-managed company needs the information of exact consumed water volume and the tariff monthly base to prepare a monthly report for management. This means that nearly half of corporate users may have a sense of good management. They will be the best users for Vodokanal's cash flow management by their monthly water tariff settlement if the monthly tariff collection works well.

36% of companies would like to be visited by the Vodokanal's staff quarterly.

9% of people (companies?) prefer to be visited every two months

7% of them prefer their meter to be checked once a year

It turned out that 43% (36% plus 7%) of interviewed corporate users prefer to delay payments for more than 3 months. They will be a potential factor against the improvement of the cashflow shortage issue from tariff collection on Vodokanal management.

**Result 5.2**

**What do you think about how often employees of Vodokanal should visit and read meters?**

- Monthly – 48%
- Every 2 months – 9%
- Quarterly – 36%
- Once in a year – 7%

**(6) Preferable Payment Methods of the Water Tariff**

**1) Residential Users**

Results show that the most convenient method is to pay through bank or post offices. 68% of interviewed people prefer this method.

The second most preferable method is one not mentioned in the questionnaire. 16% of users prefer to pay in other ways as follows and so on.

- To pay the tariff at their house or apartment. (Vodokanal or JEK should collect the tariff.)
- To be withdrawn from their salary

13% of people prefer to pay directly at the Vodokanal office.

3% of people prefer withdrawing money through their bank accounts.

The least number of people prefer to pay by automatically withdrawing money from their bank accounts, because most of them do not have such practices, and do not have bank accounts.

**Result 6.1**

**Which way do you think is the best to pay water tariff? Please choose one.**

- Visit Vodokanal office to pay directly – 13%
- Visit bank or post office to pay – 68%
- Withdraw automatically from your bank account – 3%
- Other – 16%

**2) Corporate Users**

Payment from the company's bank account without any approval

74% of interviewed companies prefer to pay for water from their bank account without any approval.

It shows that automatic withdrawal is more convenient and acceptable for the majority of companies than the present method.

26% of them do not prefer this way.

**Result 6.2**

**Do you think that it is reasonable to draw water tariff amounts from the company's bank accounts without any approval?**

- Yes – 74%
- No – 26%

**(7) Methods of Water Conservation for Saving Expenditure of Water Supply**

**1) Residential Users**

27% of interviewed residential users would like to be responsible for finding water leakage from in-house water pipes for repair.

This shows that 1/4 of them recognize that they waste much water because of the in-house water leakage.

25% of users would like to turn off taps tightly after using water.

It turned out that more than half (27% plus 25%) of users will be able to take practical action to reduce the large volume of wasted water, which has no benefit to users' daily life, nor to Vodokanal's revenue under the fixed tariff system after the meter reading systems works well.

19% chose the method of checking carefully the water volume consumed and the charged

water tariff on each water tariff invoice they receive after meter reading.

16% of people chose the method of instructing their family members for better cooperation to save water and to reduce expenditure.

13% of interviewed residential users need more information on how to save water efficiently.

0% of them prefer other ways.

**Result 7.1**

**If you have a meter in your house and you decide to reduce your monthly water tariff, which methods would you prefer to choose? Choose 3 items below.**

- Monitor carefully the water volume consumed and charge water tariff amount every time – 19%
- Be careful to find water leakage from you water pipes for repair – 27%
- Be careful to close completely all water faucets in your house whenever you finish using water – 25%
- Collect more information to save water – 13%
- Give instruction to save water to your family members for family cooperation – 16%
- Others – 0%

**2) Corporate Users**

28% of interviewed corporate users would like to take responsibility to find water leakage from water pipes inside office or factory for repair.

This shows that 1/4 of them recognize that they waste much water because of the inside water leakage.

25% of users would like to turn off taps tightly after using water.

It turned out that more than half (28% plus 25%) of users try (or will try) to take practical action to reduce large volume of wasted water supply, which doesn't benefit their business.

18% chose the method of checking carefully the water volume consumed and charged water tariff every time they receive the water tariff invoice prepared after meter reading.

16% chose the method to instruct their employees in better cooperation and how to take action to save water and to reduce cost.

13% need more information on how to save water efficiently.

0% of them prefer other ways

**Result 7.2**

If you have a meter at the enterprise, and you decide to reduce your monthly water tariff, which methods would you prefer to choose? Choose 3 items below.

- Monitor carefully the water volume consumed and charged water tariff amount every time – 18%
- Be careful to find water leakage from your water pipes to repair – 28%
- Be careful to close completely all water faucets in your offices or factories whenever you finish using water.– 25%
- Collect more information to save water – 13%
- Give instruction to save water to your company staff for better cooperation.– 16%
- Others – 0%

**(8) Repairer to Whom Users Apply for Water Leakage**

**1) Residential Users**

67% of people apply for JEK service.

16% apply to some repair shop or specialists. 10% of them prefer other ways including making repairs themselves.

7% of people ask Vodokanal to recommend other shop or specialist.

**Result 8.1**

Whom do you order to repair water leakage in your house, if you have the trouble?

- JEK – 67%
- Ask Vodokanal to recommend a repair shop or repair professional – 7%
- Ask any repair shop or repair professional – 16%
- Other – 10%

**The Utilization of JEK**

Table 5.1.12 shows that 1/4 of the apartment residential users do not ask JEK to repair their in-house water leakage.

Only 75.4% of the apartment residential users answered that they use JEK. The remaining 24.6 % use repairers selected (12.2%), repairers recommended by Vodokanal (6.2%) and other ways (6.2%).

**Table 5.1.12**  
**Repairers to be asked by Apartment Residential Users in Tashkent City**  
**and Contentment of their service**

Repairers to be asked by Apartment Residential Users	Numbers		Contentment of their services		
	Person	%	Yes	Person	%
JEK	508	75.4	No		
			Yes	148	29.1
Repair shops or Professional Recommended Vodokanal by	42	6.2	No	360	70.9
			Yes	8	19.0
Repair shops or Professional Selected by users themselves	82	12.2	No	34	81.0
			Yes	51	62.2
Others	42	6.2	No	24	57.1
			Yes	18	42.9
Total	674	100.0	No	443	65.7
			Yes	231	34.3

**2) Corporate Users**

45% of interviewed companies ask Vodokanal to recommend some shop or specialist. This shows that nearly half of corporate users need recommended repairer information from Vodokanal.

In case of repairing water leakage in office or factory, most cases may be so serious and complicated that repairers are required to have much experience and skill. The users seem to contact Vodokanal to ask their professional advice, as well as, for a recommended repairer with water work's skill.

41% of users apply to some repair shop or specialists. They may have a connection to the repair shop or the specialists. 14% of them apply other ways.

**Result 8.2**

**To whom do you order to repair water leakage at your company?**

- Ask Vodokanal to recommend any repair shops or repair professional – 45%
- Ask any repair shops or repair professional – 41%
- Other – 14%

**(9) Contentment with Repairing Service**

**1) Residential Users**

Results show that the majority of interviewed people are discontent with the rendered service.

61% of them are discontent with the repair service for water leakage.

39% of people are satisfied with the repairing service, which they apply for.

Table 5.1.12 shows that the majority of repairers that apartment residential users are content with are the repair shops or professionals the users selected by them or by other ways.

**Result 9.1**

**Are you satisfied with the repair service?**

- Yes – 39%
- No – 61%

**Discontent with JEK**

Table 5.1.12 shows that most users are discontent with JEK as a repairer.

Only 29.1% of the apartment residential users are content with the service of JEK. The remaining majority, 70.9%, are discontent with their services.

**2) Corporate Users**

It turned out that the majority of them are content with the rendered service.

70% of interviewed companies are satisfied with service. 30% of companies are not satisfied with repairing service, which they apply for.

**Result 9.2**

**Are you satisfied with the repair service, which you usually use?**

- Yes – 70%
- No – 30%



**(10) Areas to be Improved on the Repairing Service for Water Leakage**

**1) Residential Users**

Results show that from the users' point of view. The area to improve the most is the quality of the repairing service for the water leakage. 60% of interviewed residential users are not satisfied with the quality of the service. The quality of service is supposed to need improvement of both the qualities of materials (i.e. spare parts) and of the skill for repairing water leakage 25% of them consider that the repairing fee is expensive. The fee may not be reasonable enough to meet the service quality they expected.

11% of them request the service should be completed, as soon as possible, once booking is confirmed.

4% of them want service to improve in other areas.

**Result 10.1**

**Which areas should be improved for the repairer? Please choose any item.**

- The quality of the service – 60%
- The price of the service – 25%
- Time schedule to finish repair after ordering – 11%
- Other – 4%

**Low Quality of Repairing Service**

Table 5.1.13 shows that the apartment residential users who use JEK, whether they are content or not, think the quality of service should be improved most. The apartment residential users who use repairers other than JEK also consider that the quality of service should be improved most.

It turned out that the quality of JEK's repairing service for the water leakage inside apartments including skills, technology, man training and so on, is outdated and does not meet the users expectations.

**Table 5.1.13**  
**Repairers to be asked by Apartment Residential Users in Tashkent City**  
**And Areas to be improved on their service**

Repairers to be asked by Apartment Residential Users	Contentment of their Services		Areas to improvement*				
	Yes No	Person	a	b	c	d	Total (a-d)
JEK	Yes	148	57%	22%	17%	4%	100%
	No	360	65%	25%	9%	1%	100%
Repair shops or Professional Recommended by Vodokanal	Yes	8	63%	25%	0%	12%	100%
	No	34	85%	12%	3%	0%	100%
Repair shops or Professional Selected by users themselves	Yes	51	57%	33%	8%	2%	100%
	No	31	61%	29%	10%	0%	100%
Others	Yes	24	62%	17%	4%	17%	100%
	No	18	44%	22%	28%	6%	100%

\*

Category	Areas to Improve
a	Quality of Services
b	Price of Services
c	Time schedule to finish to repair after ordering
d	Other

## 2) Corporate Users

It turned out that from the users' point of view, the area to improve the most is the quality of the repairing service for water leakage. 65% of interviewed companies need more improvement in the quality of the repairing service. This means that most companies have a keener sense of the quality of the repair to stop water leakage, even though they show their contentment with the repairing service above (9). This supports that corporate users require higher quality of materials (i.e. spare parts), and higher technical skills for repairing water leakage.

21% of companies request the service should be completed as soon as possible once their booking is confirmed. This shows that the repairer may not keep to their due time to finish the repair.

13% of them consider that the fee is expensive.

1% of them need other areas improved.

**Result 10.2**

**Which areas should be improved for the repairer? Please choose any item.**

- The quality of the service – 65%
- The price of the service – 13%
- Time schedule to finish repair after ordering – 21%
- Other – 1%

**(11) Areas are to be Improved on Vodokanal in Near Future**

**1) Residential Users**

The highest priority area to improve from the users' point of view is the issue of the safety of water quality for health reasons.

44% of interviewed users chose the item of safety of water quality for health. This means that nearly half of interviewed residential users are much concerned whether the quality of water maintains a safety level for their health, which they use in their apartments or houses and in their daily life.

The following priority area to improve is the issue of stability of water supply.

28% of them chose the item of stability of water supply.

The third priority area to improve is the current water tariff including the price.

18% of people wish to decrease or improve the current water tariff.

5% of people accordingly answered that they would like to have a better tariff collection system. 5% need more communication with Vodokanal.

0% of them prefer other areas.

**Result 11.1**

**Which areas the Vodokanal in near future should improve? Please choose 3 items below and put in priority.**

- The safety of water quality level for health (according to GOST "Drinking water") – 44%
- The stability of water supply (i.e. prevent water interruption, keep proper water pressure) – 28%
- The reduction or improvement of the current water tariff – 18%
- The improvement of the current water tariff collection system – 5%
- The communication with the users (disclose management result of Vodokanal, provide the users with useful information, or set up the communication section to ask any question ) – 5%
- Other – 0%

**2) Corporate Users**

The highest priority area to improve from the users' point of views is the issue of the safety of water quality for health. 45% of interviewed companies wish to improve water quality.

The following priority area to improve is the issue of the stability of water supply. 32% of them would like to have more stable water supply.

The third priority area to improve is the current water tariff including the price. 14% of companies wish to decrease or improve tariff system.

5% and 4% of interviewed companies answered accordingly that they prefer to have more communication with Vodokanal and better tariff collection system.

0% of them prefer other areas.

**Result 11.2**

**Which areas the Vodokanal in near future should improve? Please choose 3 items below and put in priority.**

- The safety of water quality for health (according to the state standard, GOST "Drinking water") – 45%
- The stability of water supply (i.e. prevent water interruption, keep proper water pressure) – 32%
- The reduction or improvement of the current water tariff -- 14%
- The improvement of the current water tariff collection system -- 4%
- The communication with the users (disclose management result of Vodokanal, provide the users with useful information, or set up the communication section to ask any question) – 5%
- Other – 0%

## 5.2 Water Consumption Research

### 5.2.1 Outline of Research

It is said that the daily maximum water demand per capita in Tashkent City is 750 L/capita/day. However, compared with the average water demand of 300 to 450 L/capita/day for cities in Japan of a similar size to Tashkent, this figure is extremely high and seems to be less than reliable. Therefore, actual water demand will need to be monitored at standard housing units in order to estimate a more reasonable water demand.

At present, only a few water meters have been installed in detached houses. The number of meters for apartment buildings is as low as one in every 2,000 buildings. In addition, most water meters are not functional. To collect reliable data, more meters should be installed in standard detached houses and/or standard apartment buildings of four to five and nine stories. The water demand should then be monitored twice or three times per week. With monitoring the water demand, the following basic data should also be collected.

Detached houses: Family members, area of lot, area of floor, number of outdoor faucets

Apartment buildings: Number of family members and residents

### 5.2.2 Selection of Target Area

#### (1) Selection of District and the Number of Meter Installations

At first, General Uzokov Street and its surroundings were proposed by the Study Team as the ideal site for this survey. However, Vodokanal selected the Sergeli district instead of General Uzokov Street, since the installation of new meters in General Uzokov Street area may not be easily accepted by the residents because of the complicated composition of residents. Vodokanal also preferred the District to General Uzokov Street because it is located closer to their branch office. The number and diameter of the meters proposed for installation are summarized as follows:

Table 5.2.1 Number of Meter Installations

Type of Housing	No. of Meters	Diameter
Detached houses	50	20 mm
Apartment buildings(4 to 5 stories)	10	50 to 80mm
Apartment buildings(9 stories)	5	50 to 80 mm

For detached houses, new meters were installed in the area near the international airport where new houses are located in the suburbs surrounded by firm land. Apartment houses were selected from two areas: (i) the 2 District in the Complex where four- to five-story houses are located, and (ii) the Dustik 2 District which is about 5 km from the 2 District and has a number of nine-story buildings. The houses selected for meter installation in this area were not connected to a sewer system. The detached houses which were connected to a sewer system were only 25 to 30% in spite of 85% of total service rate in Tashkent City.

To estimate the variation in daily consumption a round-the-clock flow measurement will be conducted with an ultra sonic flow meter at one detached house and one four- to five-story apartment and one nine-story apartment.

Figure D.5.2.1 shows the location of the selected detached houses and apartment buildings.

## (2) Selection of Detached Houses

The area recommended by Tashkent City Vodokanal was the district and the area near the International airport. These are residential areas developed in the last 10 years and located behind trunk roads.

In these areas, residential houses are surrounded by farmlands. Most of the residents own and cultivate these farms, and also cultivate crops and fruit or feed cattle on their premises.

Meters were installed in a small area, the location of which is shown in Figure 5.2.1.

Table D.5.2.1 shows the data gathered from 48 of the 50 houses in which meters were installed. The average area of each house is about 600 sq.m for the entire premises, 190 sq.m for the house, and 230 sq.m for the garden. Most households cultivate vegetables or fruit, have cars, and raise livestock such as cows, sheep, or chickens.

The average number of family members for detached houses is approximately 5.1 per household.

Figure 5.2.1 shows the location of the house in which an ultra sonic flow meter was installed.

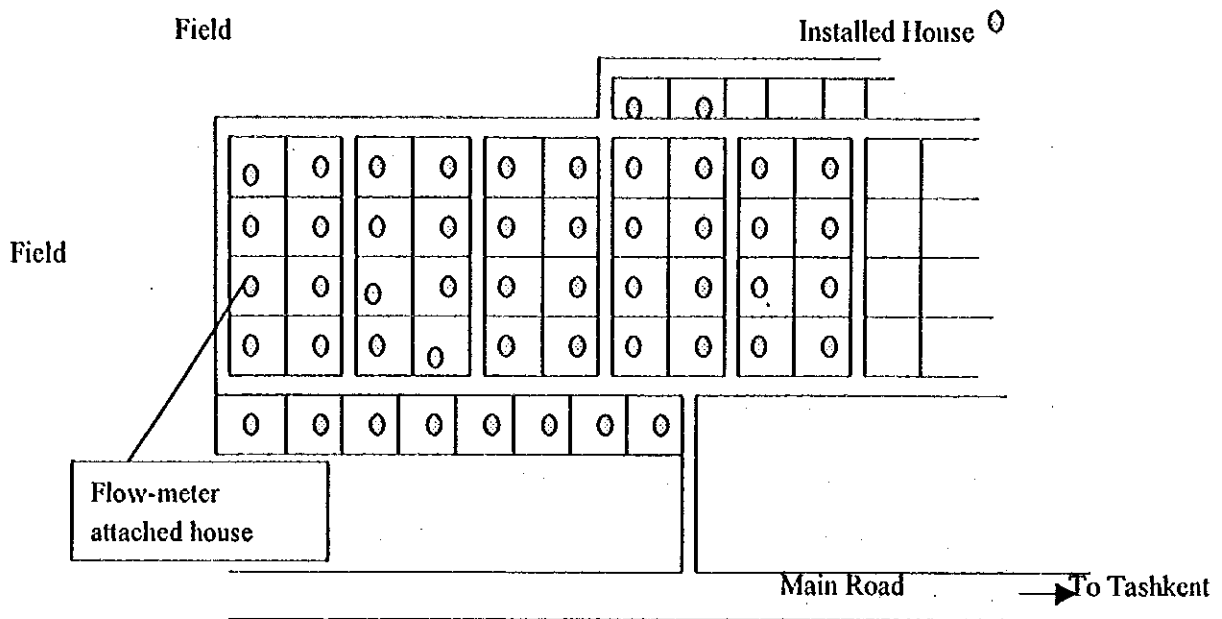


Figure 5.2.1 Schematic Diagram of Detached Houses

### (3) Selection of Apartment Buildings

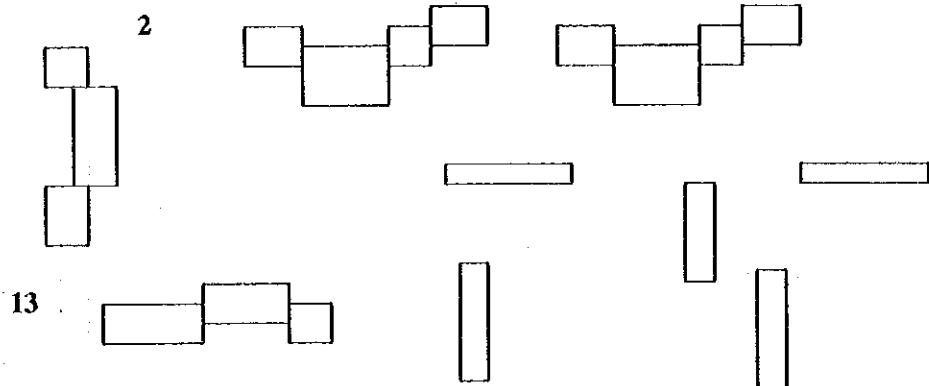
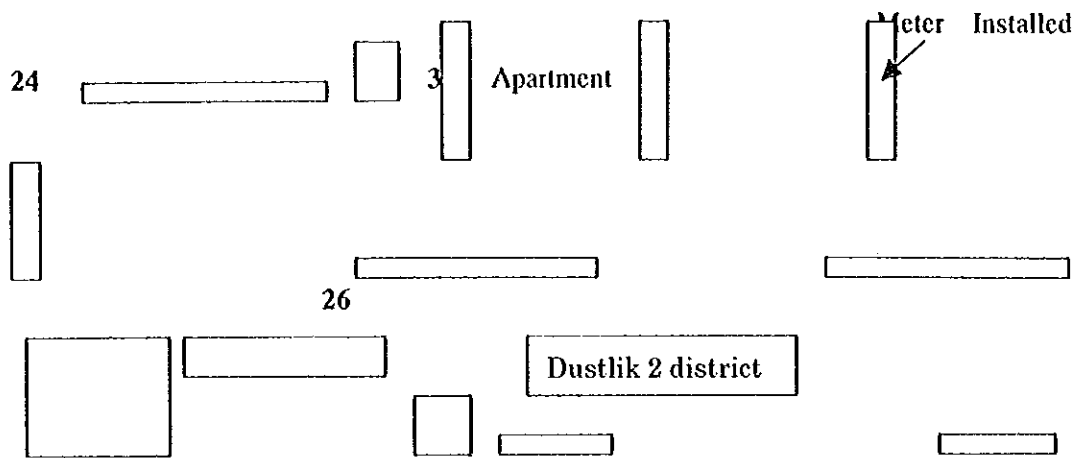
The Location of the apartment buildings selected in the Dustik 2 2 district and the 2 district is shown in Figures 5.2.2 (1) and 5.2.2 (2), respectively.

Table D.5.2.2 and Table 5.2.2 presents the data of the units constitution and the data for the average area, residents, etc. of apartment buildings, respectively. The data show that each apartment unit has one to six rooms with varying floor areas. The larger the floor area and the higher the number of rooms, the larger the number family members.

A total of 964 flats in the 15 apartment houses were occupied. This is about 19 times the number of detached houses in which water meters were installed ( $864/50=19.3$ ).

The average number of family members for the apartment buildings is about 3.6/unit or 70 percent of that for detached houses. The number of apartment residents whose water consumption is to be measured in this study is therefore about 14 times that for the detached houses ( $19.3 \times 70 \text{ percent} = 14$ ).





**Figure 5.2.2(1) Schematic Diagram of Meter Installed Apartments( 9 stories)**

The number of units in each apartment building ranges from 30 to 90 units. The number of occupants of in each apartment building also varies from less than 100 to more than 300. Vacant units are very few as the occupancy rate is high.

The Study Team installed an ultrasonic flow meter at Unit No. 23 in the District and at Unit No. 30 in the Dustlik District.

### 5.2.3 Installation of Water Meters

#### (1) Detached Houses

Photo 5.2.1 shows typical view of the area that was installed water meters.

Water meters were installed inside each premise at Tashkent and Chirchik as the meters are purchased by house owners and therefore belong to them.

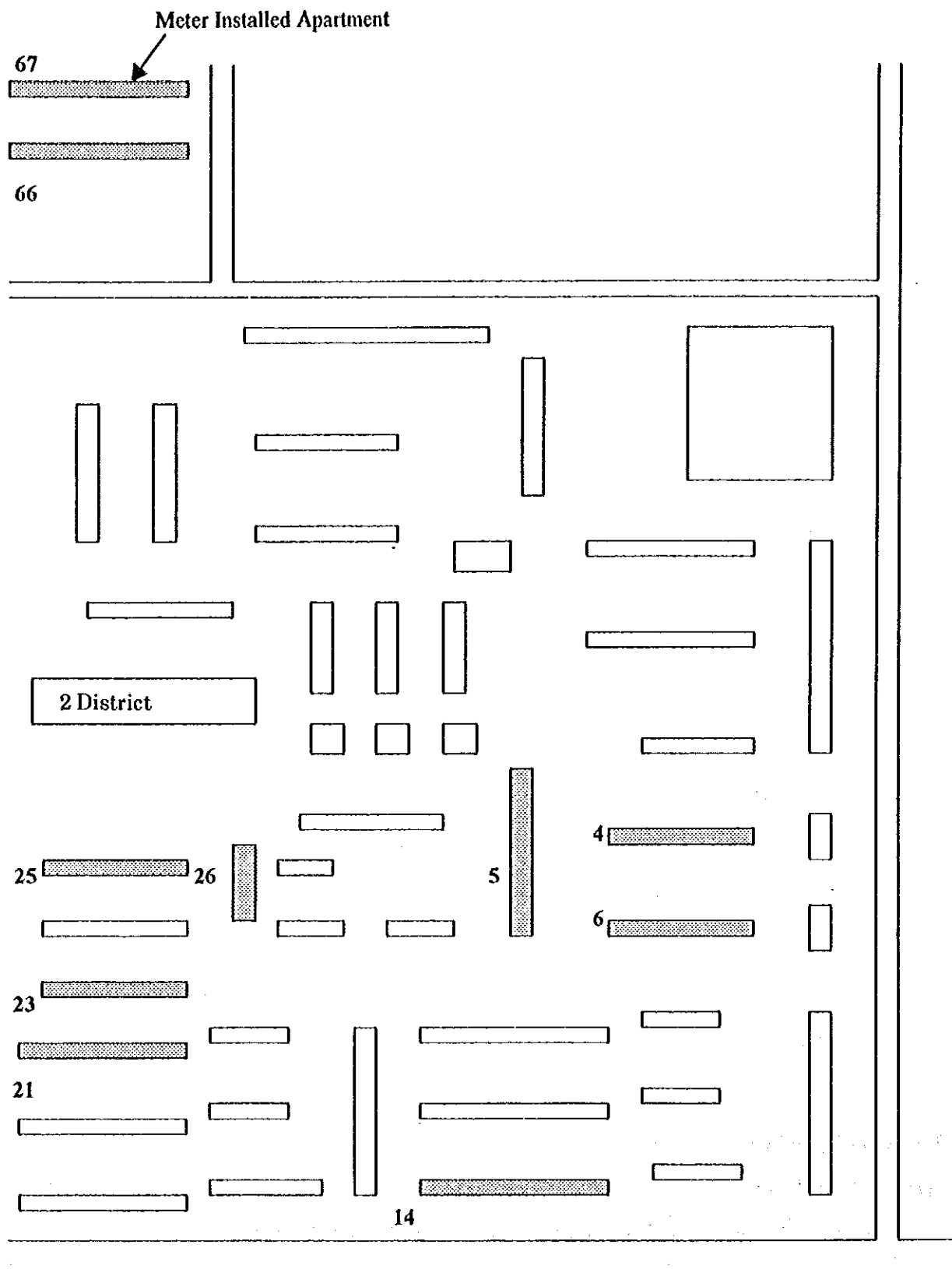


Figure 5.2.2(2) Schematic Diagram of Meter Installed Apartments(4 to 5 stories)

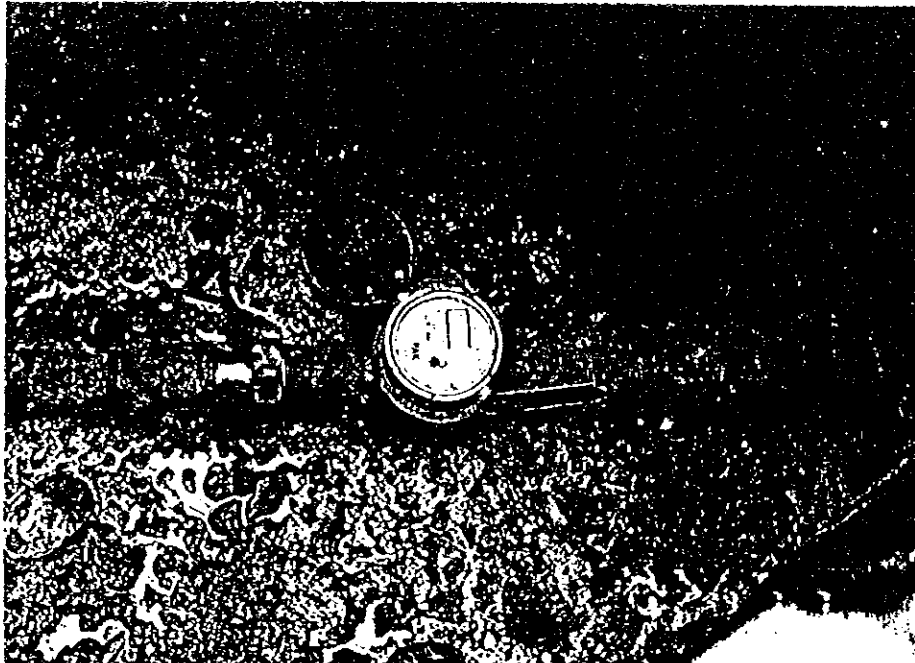
Photos 5.2.2 and 5.2.3 show the installed meters.

**Table 5.2.2 Data of Meter installed Apartment Buildings**

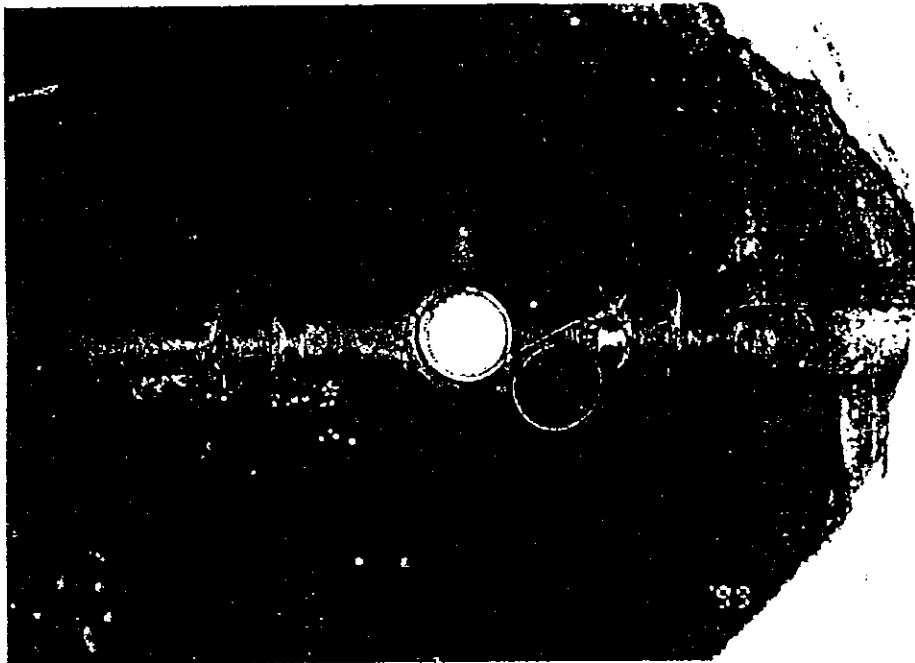
Apart No.	Address	Stories	Units		Occupants	Average			
			No. of Units	Occupied Units		Area sq.m	Occupants	Area/person	
4	-2	5	40	40	188	100	4.7	21.3	
5		4	56	56	179	73	3.2	22.9	
6		5	70	70	223	72	3.2	22.7	
14		5	130	128	374	75	2.9	25.7	
21		5	80	70	193	75	2.8	27.1	
23		5	40	40	184	100	4.6	21.7	
25		5	40	40	159	100	4.0	25.0	
26		5	30	30	94	63	3.1	20.0	
66		5	90	89	242	60	2.7	21.9	
67		5	80	80	241	66	3.0	21.9	
2		Dustlik -2	9	72	71	296	95	4.2	22.8
13			9	72	72	302	88	4.2	21.0
24	9		72	71	296	95	4.2	22.8	
26	9		72	71	270	92	3.8	24.2	
30	9		36	36	150	90	4.2	21.6	
<b>Total</b>			<b>980</b>	<b>964</b>	<b>3391</b>				
<b>Average</b>			<b>65.3</b>	<b>64.3</b>	<b>226.1</b>	<b>82.9</b>	<b>3.6</b>	<b>22.8</b>	



**Photo 5.2.1 Adolat Street**



**Photo 5.2.2 Flow Meter Installed in a Detached House (1)**

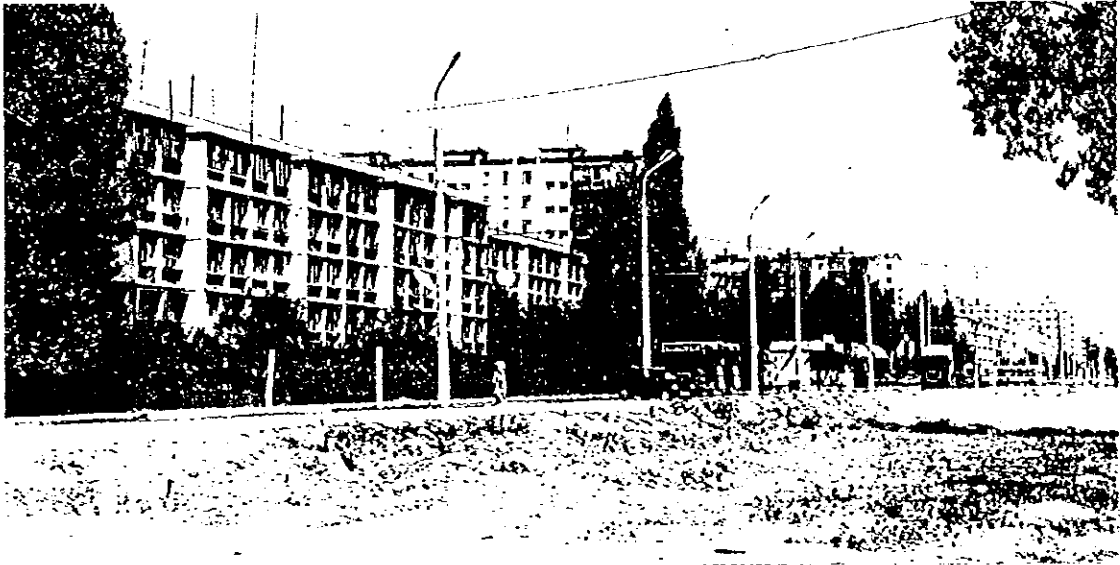


**Photo 5.2.3 Flow Meter Installed in a Detached House (2)**

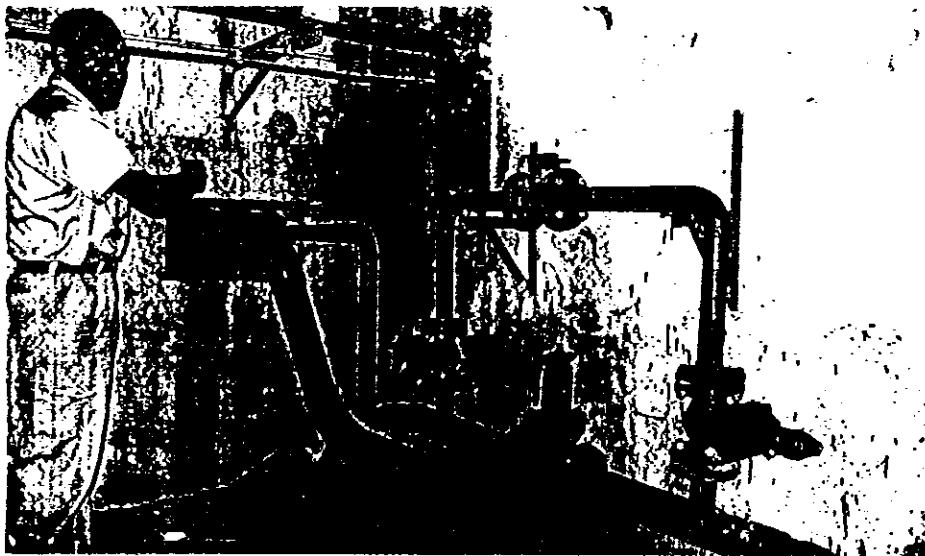
**(2) Apartment Buildings**

Apartment buildings in Tashkent and Chirchik have basements and the occupants are provided with drinking water, hot water, gas, sewer services, and electricity.

Although water supply pipes were designed to accommodate a water meter in a basement, the Study Team installed meters cutting and welding pipes to fit the purchased meters at the suitable position. Photo 5.2.4 shows apartments of meter installed and photo 5.2.5 shows an installed water meter.



**Photo 5.2.4 Apartment Buildings with Water Meters**



**Photo 5.2.5 Installed Water Meter**

## **5.2.4 Measurement of Water Consumption with Meters**

### **(1) Survey Sheet**

The Study Team prepared a survey sheet for the detached houses (as shown in Table D.5.2.3) and this was then translated into Russian. This survey sheet provides spaces to be filled in to identify the status of each house and the meter readings. Meter readings were scheduled to be carried out three times, once each in August, September, and November. Readings in some areas were, however, delayed until September for the first reading.

Survey sheets are to be collected after each reading and new sheets are distributed for the subsequent readings.

For apartment buildings, two types of survey sheets were prepared in Russian from the original sheets in English shown in Table D.5.2.4 (1) and (2). The survey sheet in Table D.5.2.4 (1) is designed to gather the basic data for apartment buildings and result of reading. The survey sheet in Table D.5.2.4 (2) is designed for the specific data for each apartment unit.

Meter reading are to be conducted three times as well at detached houses. Both sheets in Table D.5.2.4 (1) and (2) were collected after the first reading; and only the data portion in Table D.5.2.4 (1) was distributed.

### **(2) Measurement at Detached Houses**

#### **1) Measurement of Meters**

The results of the three times measurements at detached houses are summarized in Table D.5.2.5 (1) to (3). The data from 48 houses were collected as of the first measurement of August 7 to 14, the data from 47 houses were collected as of the second of September 21 to 28 and the data from 36 houses were collected as of the third of November 22 to 30. Table 5.2.3 shows the results of water consumption per capita calculated of the three times measurements with the data for each detached house.

In the first and second measurements, the data in these tables show large water consumption of 617 and 714 L/capita/day on the average, respectively. The average value of the second measurement increased approximately 100L/capita /day than the one of the first measurement in

cooler season. The reason of the increment was considered that found taps which did not be connected meter were forbidden by Vodokanal as described in the following chapter.

The several maximum water consumptions show the extremely high value of 7,000 L/capita/day which are more than 10 times of the average of these two measurements. Excluding the extremely high values over 1,000 L/capita/day and below 100 L/capita/day, the average consumption is calculated at about 280 and 330L/cap/day, respectively. This value appears reasonable compared with the data in other countries.

Houses showing extremely low values are considered to have other sources of water supply and therefore do not show the real values of consumption. Excluding only the low values of less than 100 L/capita/day, the average consumption was calculated at about 670 and 750 L/capita/day, respectively.

Considering that the data indicating high consumption apparently result from severe wastage and do not represent actual consumption, about 300 L/cap/day was taken to be the average net consumption.


The third measurement result shows the sharply decreased value of 250L/capita/day. The reason of this decrease was considered on the following reasons:

- People suddenly started to save water for money because of the collection of water tariff by the meter-rate system. Water consumption in this area was decreased to one third of the first and the second measurements due to the application of the meter rate tariff system. Water leakage inside the houses in this district was considered relatively low because of new construction. Therefore reduction of water consumption of occupants was presented as deduction of water consumption.
- The dwellers of this district decrease in winter season.
- Water meters do not indicate exact value.
- Another water source was connected to taps (including bypass line of meter).

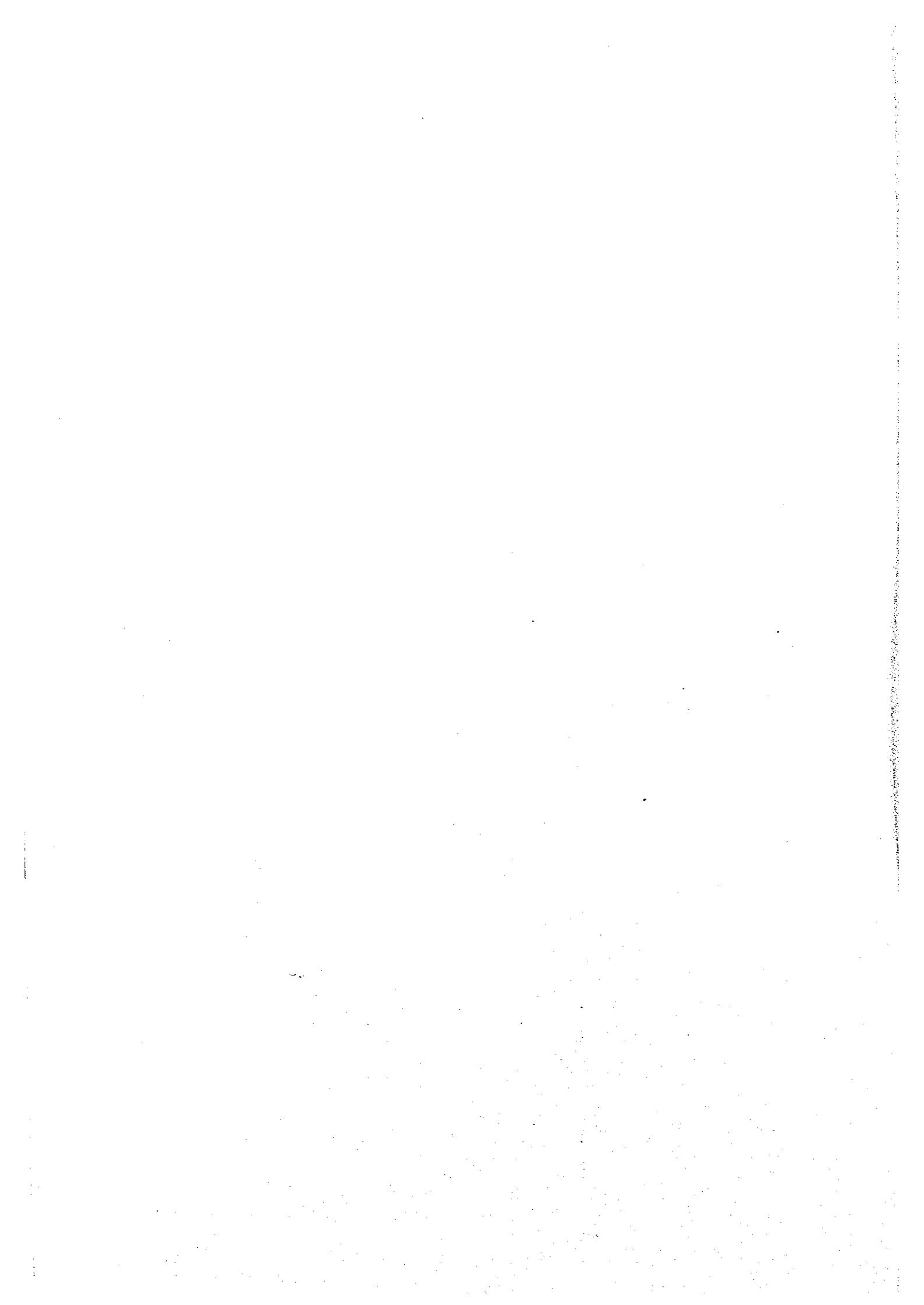
But the average of the third measurement was too low compared with measurement result of apartment buildings in Tashkent City and detached houses and apartment buildings in Chirchik City in same time. Therefore, this value can not be used for estimation.

Table 5.2.3 Water Consumption at Detached House

No.	House No	Address	Number of Occupants	Total Area(x100sq.m)			No of taps	Others			Water consumption (1) cu.m/day				Water consumption (2) cu.m/day				Water consumption (3) cu.m/day			
				Total	House	Garden		Cars	Pools/ Fountains	Animals and hens	Aug.7 to Aug.14				Sep.21 to Sep.28				Nov.22 to Nov.30			
											Total	cu.m/ capita/day	Omit too little and much	Omit too little	Total	cu.m/ capita/day	Omit too little and much	Omit too little	Total	cu.m/ capita/day	Omit too little and much	Omit too little
1	37	Adolat str.	5	6	2	1.5	2	+	-	-	2.00	0.400	0.400	0.400	2.00	0.400	0.400	0.400	2.13	0.425	0.425	0.425
2	128	Adolat str.	6	6	2	3	4	-	-	-	1.86	0.310	0.310	0.310	2.33	0.389	0.389	0.389	0.63	0.104	0.104	0.104
3	20	Adolat str.	4	6	1.5	1	3	+	-	cow:1	1.00	0.250	0.250	0.250	1.33	0.333	0.333	0.333	0.38	0.094		
4	11	Adolat str.	3	6	2	-	2	+	-	-	1.83	0.611	0.611	0.611	2.00	0.667	0.667	0.667				
5	19(129)	Adolat str.	1	6	1.5	2	4	+	-	-	0.71	0.714	0.714	0.714	1.00	1.000	1.000	1.000				
6	2	Adolat str.	5	6	2.5	1.5	3	+	-	sheeps:6	1.57	0.314	0.314	0.314	2.00	0.400	0.400	0.400				
7	4(54)	Adolat str.	6	6	2	1.5	3	-	-	-	1.14	0.190	0.190	0.190	1.50	0.250	0.250	0.250	0.75	0.125	0.125	0.125
8	7	Adolat str.	4	6	2	3	2	-	-	sheeps:2	1.17	0.292	0.292	0.292	1.50	0.375	0.375	0.375	0.50	0.125	0.125	0.125
9	8	Adolat str.	5	6	2	3	1	-	-	cow:1	1.50	0.300	0.300	0.300	1.67	0.333	0.333	0.333	0.75	0.150	0.150	0.150
10	9(38)	Adolat str.	8	6	2	2	3	-	-	-	1.14	0.143	0.143	0.143	1.50	0.188	0.188	0.188				
11	12	Adolat str.	5	6	1.6	1.5	5	+	-	-	29.86	5.971		5.971	35.50	7.100		7.100				
12	13	Adolat str.	4	6	2	1.5	2	-	-	-	1.57	0.393	0.393	0.393	1.50	0.375	0.375	0.375	0.25	0.063		
13	16	Adolat str.	5	6	2	1	1	+	-	cow,horse:1	1.43	0.286	0.286	0.286	2.00	0.400	0.400	0.400	0.38	0.075		
14	18	Adolat str.	5	6	1	4	1	-	-	hens:10	1.14	0.229	0.229	0.229	1.50	0.300	0.300	0.300	0.63	0.125	0.125	0.125
15	34	Adolat str.	5	6	2	2	1	-	-	-	0.57	0.114	0.114	0.114	0.83	0.167	0.167	0.167	0.50	0.100		
16	3	Adolat str.	5	6	2	3	3	-	-	hens:10	0.83	0.167	0.167	0.167	1.00	0.200	0.200	0.200				
17	21	Adolat str.	6	6	2	3	1	+	-	-	0.17	0.028			6.17	1.028		1.028				
18	16	Adolat str.	4	6	1	1.5	3	-	-	hens:100	2.57	0.643	0.643	0.643	1.83	0.458	0.458	0.458	1.13	0.281	0.281	0.281
19	20	Adolat str.	6	6	2	2.5	1	-	-	cow:1	9.00	1.500		1.500	9.83	1.639		1.639	1.13	0.188	0.188	0.188
20	1	Feruzs str	4	6	2	3	3	-	-	cow:1	15.00	3.750		3.750	8.33	2.083		2.083	6.38	1.594		1.594
21	2	Feruzs str	1	6	3	3	5	-	900 cu.m	hens:34	7.00	7.000		7.000	7.00	7.000		7.000	2.13	2.125		2.125
22	23	Adolat str.	4	6	2	2	3	+	-	-	0.86	0.214	0.214	0.214	1.33	0.333	0.214	0.214	0.50	0.125	0.125	0.125
23	10	Feruzs str	6	6	2	-	4	+	-	cows:2	1.86	0.310	0.310	0.310	2.33	0.389	0.389	0.389	1.00	0.167	0.167	0.167
34	11	Feruzs str	9	6	2.5	2.5	1	+	-	-	1.86	0.206	0.206	0.206	19.00	2.111		2.111	1.13	0.125	0.125	0.125
25	17	Adolat str.	2	6	2	3	2	-	-	cows:2	0.14	0.071	0.071	0.071	0.33	0.167	0.167	0.167	0.25	0.125	0.125	0.125
26	8	Adolat str.	3	6.5	2	3	3	-	300 cu.m	-	1.00	0.333	0.333	0.333	1.33	0.444	0.444	0.444	0.75	0.250	0.250	0.250
27	21	Adolat str.	3	6	2	3	6	+	-	-	1.14	0.381	0.381	0.381					0.63	0.208	0.208	0.208
28	2	Adolat str.	5	6	1	2	3	+	-	hens:20	0.71	0.143	0.143	0.143	1.67	0.333	0.333	0.333	0.38			
29	73	Adolat str.	7	6	2	2	1	-	-	-	1.00	0.143	0.143	0.143	1.17	0.167	0.167	0.167	0.50			
30	79	Adolat str.	3	6	0.8	3	3	+	-	-	1.14	0.381	0.381	0.381	1.17	0.389	0.389	0.389	0.50	0.167	0.167	0.167
31	16	Adolat str.	6	6	2	3	3	+	-	-	1.14	0.190	0.190	0.190	2.50	0.417	0.417	0.417	0.75	0.125	0.125	0.125
32	126	Adolat str.	5	6	2	3	3	+	-	-	0.29	0.057			0.67	0.133	0.133	0.133	0.38	0.075		
33	7	Adolat str.	6	6	2	3	3	-	-	-	1.86	0.310	0.310	0.310	2.17	0.361	0.361	0.361	1.88	0.313	0.313	0.313
34	9	Adolat str.	7	6	2	1.5	3	+	-	-	1.00	0.143	0.143	0.143	1.00	0.143	0.143	0.143	0.75	0.107	0.107	0.107
35	18	Adolat str.	5	6	2	3	2	+	-	cows:2	1.00	0.200	0.200	0.200	1.33	0.267	0.267	0.267	0.63	0.125	0.125	0.125
36	12	Adolat str.	5	6	2	2	2	+	-	-	1.29	0.257	0.257	0.257	1.67	0.333	0.333	0.333	1.00	0.200	0.200	0.200
37	2	Adolat str.	4	6	2	3	3	+	-	hens:10	1.57	0.393	0.393	0.393	1.83	0.458	0.458	0.458	1.00	0.250	0.250	0.250
38	9	Feruzs str	7	6	2	2	5	+	-	-	1.29	0.184	0.184	0.184	1.50	0.214	0.214	0.214	0.75	0.107	0.107	0.107
39	6	Adolat str.	4	6	2	2	1	-	-	-	0.57	0.143	0.143	0.143	0.83	0.208	0.208	0.208	0.38	0.094		
40	4	Feruzs str	5	6	2	2	3	+	-	-	2.00	0.400	0.400	0.400	1.67	0.333	0.333	0.333	0.63	0.125	0.125	0.125
41	6	Feruzs str	5	6	1.6	2	3	+	-	-	0.43	0.086			0.50	0.100			0.38	0.075		
42	8	Feruzs str	13	6	2.5	2.5	2	-	-	cows,bulls:2	0.71	0.055			0.83	0.064			0.63	0.048		
43	20	Adolat str.	6	6	2	1	2	+	-	hens:10	1.50	0.250	0.250	0.250	1.83	0.306	0.306	0.306	0.63	0.104	0.104	0.104
44	21	Adolat str.	5	6	2	3	6	+	-	sheep,cow:1	1.14	0.229	0.229	0.229	1.50	0.300	0.300	0.300				
45	2	Adolat str.	5	6	1	2	3	+	-	hens:20	0.71	0.143	0.143	0.143	1.50	0.300	0.300	0.300				
46	73	Adolat str.	7	6	2	2	1	-	-	-	1.00	0.143	0.143	0.143	1.17	0.167	0.167	0.167				
47	79	Adolat str.	3	6	3	3	3	+	-	-	1.40	0.467	0.467	0.467	1.17	0.389	0.389	0.389				
48	16	Adolat str.	6	6	2	3	3	+	-	-	1.14	0.190	0.190	0.190	2.17	0.361	0.361	0.361				
Average			5.1	6.0	1.9	2.3	2.7				2.351	0.617	0.279	0.668	3.052	0.714	0.326	0.755	0.917	0.250	0.173	0.302

 Flow meter attached house





## **2) Measurement for Houses Connected to Sewer Systems**

Additional measurement was carried out for certain of the houses which are already connected to sewer systems and metered. This measurement was proposed based on the opinion of Tashkent City Vodokanal saying that the houses connected to sewer systems recorded higher water consumption than the houses which are not connected.

Table 5.2.4 shows basic data of the 17 houses connected to sewer systems, and their water consumption data of two times measurement. The results indicate a much lower consumption than expected in spite of the fact that most of the houses surveyed have large premises, floor areas, private cars, and a high standard living. Many houses show low consumption especially in summer. These figures are much less than that in the area.

From the result, It seems that these houses have other sources of water supply like in other areas surveyed or water saving tendency due to the enforcement of the meter rate tariff system.

## **3) Measurement by Ultrasonic Flow Meter**

Figure D 5.2.2 presents the results of measurement of by an ultrasonic flow meter for 24 hours. Water consumption at this particular house was 3.25 cu.m/day for four persons, which is equivalent to 810 L/cap/day. This figure is higher than average consumption of 310 and 390L/cap/day as shown in Table 5.2.3 in the first and second measurements.

It is also observed that the residents leave their faucets open for a long time during the day.

Photo 5.2.6 shows an ultra sonic flow meter installed in a detached house.

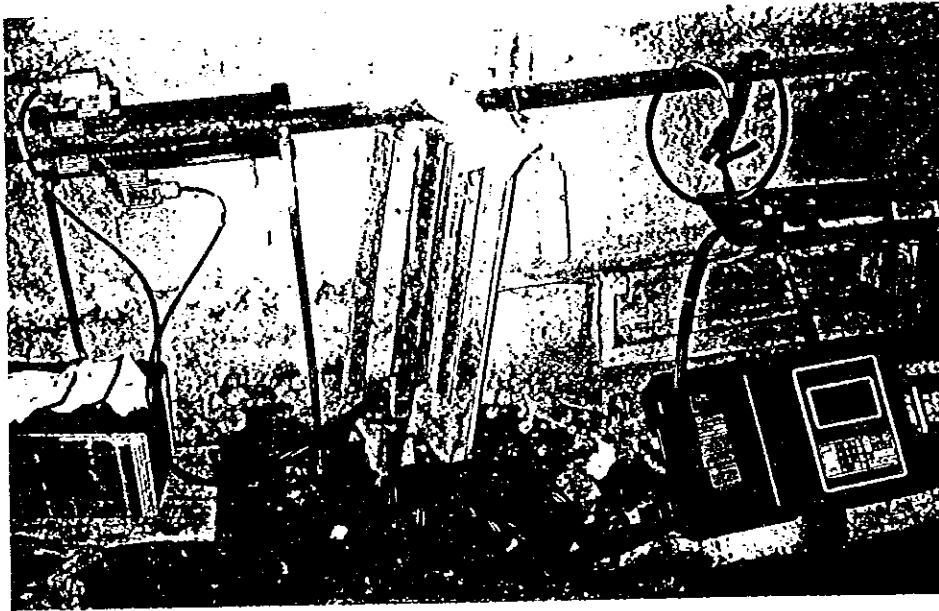
## **(3) Measurement of Apartment**

### **1) Meter Reading**

Table D.5.2.6 presents the results of the three times measurement for apartment buildings. Out of 15 water meters installed, three to five meters could not measure flows due to mechanical problems. The data from 12 buildings were collected as the first measurement of September 8 to 12, the data from 10 buildings were collected as the second of September 22 to 28 and the data from 11 houses were collected as the third of November 24 to 30.

Table 5.2.4 Housings Data and Water Consumption

No. House No.	Address	Number of Occupants	Total Area(x100sq.m)	No of taps	Other			Water Consumption Profile (1)			Water Consumption Profile (2)						
					Cars	Pools/ Fountains	Animals and hens	Aug 31 to Sep.6		Sep.23 to Sep.29		Cu.m/d	Omit too little and too much	Cu.m/capita/day	Omit too little	Omit too little	
								All	Omit too little and too much	All	Omit too little and too much						
1	6 Dari Salom St	4	8	1	1.5	3	+	-	-	Cow:1	0.57	0.143	0.143	1.33	0.333	0.333	0.333
2	15 Ditto.	5	8	2	1	2	-	Fountain			0.29	0.058		1.50	0.300	0.300	0.300
3	20 Ditto.	6	8	3	1	5	+	-	-	Cow:1	0.43	0.072		1.67	0.278	0.278	0.278
4	36 Zoir Mahsudov St.	8	8	1.5	1.5	3	+	-	-	Cows:2	0.43	0.054		1.83	0.229	0.229	0.229
5	3 Hajjakhav Otajonov St.	5	8	2	2	2	+	-	-		0.71	0.142	0.142				
6	28 Faizulla Abdullaev St.	7	6	2	-	5	+	3cu.m			0.71	0.101	0.101	2.00	0.286	0.286	0.286
7	11A. Fazil Odilov St.	5	5	1.5	1.5	3	+	-			1.00	0.200	0.200	1.00	0.200	0.200	0.200
8	13 Ditto.	6	6	2.5	1.5	4	+	-			1.00	0.167	0.167	3.17	0.528	0.528	0.528
9	24 Hudaberganov St.	24	6	8	-	3	+	-	-	Cows:2	1.14	0.048		5.33	0.222	0.222	0.222
10	11 Fazil Odilov St.	9	7	2	1	3	+	-	-	Sheeps:4	1.29	0.143	0.143	0.83	0.093		
11	29 Faizulla Abdullaev St.	5	6	2	1	4	+	-	-	Sheeps:2	1.86	0.372	0.372	1.50	0.300	0.300	0.300
12	29A Ditto.	6	8	3	1	7	+	-	-		2.14	0.357	0.357	5.17	0.861	0.861	0.861
13	61 Zoir Mahsudov St.	10	4	1.5	-	2	+	-	-	Cows:2	2.14	0.214	0.214	2.00	0.200	0.200	0.200
14	15 Hajjakhav Otajonov St.	3	4	2	0.5	2	+	-	-		3.29	1.097	1.097	1.00	0.333	0.333	0.333
15	1 Ditto.	7	6	2	0.5	5	+	-	-		4.14	0.591	0.591	4.17	0.595	0.595	0.595
16	13 Ditto.	6	6	2	0.5	3	+	-	-		4.71	0.785	0.785				
17	52 Faizulla Abdullaev St.	4	8	2	-	3	+	-	-		5.00	1.250	1.250	0.33	0.083		
Average		7.1	6.6	2.4	0.9	3.5					1.81	0.341	0.322	1.931	0.323	0.359	0.359



**Photo 5.2.6 Attached Ultra Sonic Flow Meter in Detached House**

Table 5.2.5 presents both the basic data and the three times measurement results for the selected apartment buildings. The total consumption for apartment buildings was measured at each building as the average of each building of units. The average consumptions of the first and second measurements were 617 and 603 L/capita/day, respectively, being smaller than that of detached houses. Water consumption tendency of each building was similar in each measurement, though water consumption per capita of two apartment buildings sharply decreased. This decrease brought the average water consumption per capita to 501 L/capita/day.

## **2) Measurement by Ultrasonic Flow Meter**

Table 5.2.6 presents the results of flow measurement as “water consumption (1)”, by water meter installed of first measurement in two buildings, No.23 in District and No.30 in Dustlik District. The table also shows a total consumption in 24 hours by an ultrasonic flow meter as water consumption (2).

Figure D.5.2.3 shows the variation in the water flow over 24 hours.

Photo 5.2.7 shows an ultrasonic flow meter installed in a in a 5 stories apartment building.

Table 5.2.5 Water Consumption of Apartment Buildings

Apart No.	Address	Stories	Occupied Units	Occupant	Average			Water consumption(1)		Water consumption(2)		Water consumption(3)	
					Unit area sq.m	No. of Occupant	Area/person	Sep.8 to Sep.12		Sep.22 to Sep.28		Nov.24 to Nov.30	
								Total cu.m/day	cu.m/person	Total cu.m/day	cu.m/person	Total cu.m/day	cu.m/person
4	Sergeri	5	40	188	4.7	21.3	140.5	0.747	136.29	0.725	136.17	0.724	
5	-2	4	56	179	3.2	22.9	101.7	0.568	95.00	0.531	99.83	0.558	
6		5	70	223	3.2	22.7	108.3	0.486	110.33	0.495	139.67	0.626	
14		5	70	197	2.8	25.7			109.33	0.555	103.33	0.525	
21		5	70	193	2.8	27.1	156.8	0.813					
23		5	40	184	4.6	21.7	98.0	0.533					
25		5	30	159	4.0	25.0							
26		5	30	94	3.1	20.3					66.17	0.704	
66		5	89	242	2.7	21.9	168.3	0.696	186.86	0.772	144.29	0.596	
67		5	80	241	3.0	21.9	128.5	0.533	113.29	0.470	38.00	0.158	
2	Dustlik	9	71	296	4.2	22.8	149.7	0.506			67.67	0.229	
13	-2	9	72	302	4.2	21.0	148.3	0.491	145.71	0.482			
24		9	71	296	4.2	22.8	161.7	0.546	157.71	0.533	127.57	0.431	
26		9	71	270	3.8	24.2	243.3	0.901	229.43	0.850	171.33	0.635	
30		9	36	150	4.2	21.6	99.5	0.663	95.71	0.638	95.83	0.639	
Total			896	3214			1704.7		1379.67		1189.86		
Average			59.7	214.3	3.6	22.9	142.1	0.617	125.4	0.603	108.2	0.501	

**Table 5.2.6 Water Consumption of Flow Meter Attached Apartment**

Apart No.	Address	Stories	Units		Occupants	Average		
			Units	Occupied Units		Flat area sq.m	Dweller	Area/person
23	Sergeri-2	5	40	40	184	100	4.6	21.7
30	Dustlik-2	9	36	36	150	90	4.2	21.6

Apart No.	Address	Water consumption(1)		Water consumption(2)	
		Total cu.m/day	cu.m/person	Total cu.m/day	cu.m/person
23	Sergeri-2	98.0	0.533	126.6	0.688
30	Dustlik-2	99.5	0.663	121.9	0.813



**Photo 5.2.7 Ultrasonic Flow Meter in an Apartment Building**

It is remarkable that both measurement results show level flows through the day. As consumption at night is normally minimal, these results show that there must be a substantial number of leaks in the apartment buildings.

Consumption measured by the ultrasonic flow meter is approximately 20 % of higher than that measured by the water meters. This may be because the measurement was conducted from Saturday (14 August) to Sunday (15 August) on a weekend when the occupants would likely consume more water.

## 5.2.5 Estimate of Water Consumption Tendency

### (1) Detached House

#### 1) Average Consumption

Table 5.2.7 shows the result of the survey made for the groups of "A" and "B" of detached houses. The group "A" stands for the house with a meter newly installed this time and without sewer connection. The group "B" stands for the house with an old meter and sewer connection. Table 5.2.8 shows the averages of water consumption per capita

**Table 5.2.7 Average Basic Data of Detached House**

Group	Number of house	Number of Occupants	Total Area(×100sq.m)			No of Taps	Possession	
			Total	House	Garden		Car	Livestock
A	48	5.1	6.0	1.9	2.3	2.7	56.30%	41.70%
B	17	7.1	6.6	2.4	0.9	3.5	94.10%	41.10%

**Table 5.2.8 Average Water Consumption Volume/ Capita**

Water Consumption \ Measurement		First	Second	Third
Measured Month		Aug.	Sep.	Nov.
A-Group: cu.m/cap./d	All Average	0.617	0.714	0.250
	Omit too Large and Little	0.279	0.326	0.173
	Omit too Little	0.688	0.755	0.302
B-Group: cu.m/cap./d	All Average	0.341	0.323	
	Omit too Large and Little	0.322	0.359	
	Omit too Little	0.463	0.359	

The results suggests the followings:

- The houses of group "B" are rather big and accommodate more people. The rate of car owner is also high.
- Water consumption of group "A" houses is extremely big at the beginning, but four months after the installation of water meters, in November, the consumption was drastically reduced.
- Water consumption of group "B" houses maintained small figures in two measurements, without significant variation.
- The measured figures of group "B" houses in November came close to the ones of group "B" houses.
- The results show the tendency of water saving with the water meter installation.

- It is needed to ensure if there are other causes, since the figure of reduction of group "A" houses is extreme, being one third of the first measurement.
- Due to the fact that the coverage of water meter in Tashkent City is less than one percent, the results of the survey made in November are applicable to the projection of future demand, but are not applicable to the estimation of the present water consumption, in the analysis of water consumption of detached houses,

## 2) Analyzing Water Consumption Tendency

The followings are the analysis of the water consumption tendency with the use of the average figures of the first and second measurements which were similar each other. Table 5.2.9 shows the tendency of water consumption (supplied volume) of each house. The table explains that 6.4 percents of the total houses in number consume 41.2 percent of total water consumption volume.

Table 5.2.10 shows the tendency of water consumption per head.

**Table 5.2.9 Water Consumption of Each Housing**

Classification Cu.m/day	Number		Average Volume Cu.m/day	Total Volume	
	Number	Rate %		Volume cu.m/day	Rate %
0.1-0.5	3	6.4	0.4	1.2	0.9
0.5-1.0	5	10.6	0.8	4.0	3.0
1.0-1.25	10	21.3	1.1	11.2	8.4
1.25-1.5	8	17.0	1.3	10.8	8.1
1.5-1.75	6	12.8	1.6	9.9	7.4
1.75-2.0	4	8.5	1.8	7.4	5.5
2.0-3.0	5	10.6	2.8	14.2	10.7
3.0-10	3	6.4	6.5	19.6	14.7
10>	3	6.4	18.3	54.8	41.2
Total	47	100.0		132.8	100.0

The column of total volume have been computed multiplying the number of the houses with the average consumption, so same resident numbers will get the same overall tendency. As shown in the table, the results explain that only the residents of 10.6 % consume more than 60 % of the whole consumption.

Total volume of the table multiplies house number by average consumption which shows whole consumption tendency if occupants of houses is same.



**Table 5.2.10 Water Consumption per Capita**

Classification cu.m/cap./d	Number		Average cu.m/cap./d	Total Volume	
	Number	Rate %		Volume Cu.m/day	Rate %
<0.15	6	12.8	0.108	0.650	2.0
0.15-0.2	6	12.8	0.172	1.033	3.3
0.2-0.25	4	8.5	0.228	0.913	2.9
0.25-0.3	7	14.9	0.278	1.943	6.1
0.3-0.35	7	14.9	0.333	2.330	7.3
0.35-0.4	5	10.6	0.376	1.882	5.9
0.4-0.5	3	6.4	0.418	1.253	3.9
0.5-1.0	4	8.5	0.644	2.574	8.1
>1.0	5	10.6	3.836	19.181	60.4
Total	47	100.0		31.759	100.0

Figure 5.2.3 shows the relation between land area per head (house lots in the districts for survey are almost same so that the figures are smaller with more residents ) and water consumption per capita. The figures are dispersed, although, the tendency is observed that more the house lot area per head (less residents), more the water consumption.

Figure 5.2.4 shows the number of each group classified by the consumption per capita and the average consumptions of the groups. The distribution is equally made into all the levels in this classification.

The analysis on the consumption of car owners and livestock owners:

- Total average of water consumption of both is 676 L/capital/day,
- 592L/capita/day for car owners only, and
- 816L/capita/day for livestock owners only, which shows the tendency of increment.

Figure 5.2.3 Relation of Water Consumption and General Area/ Capita

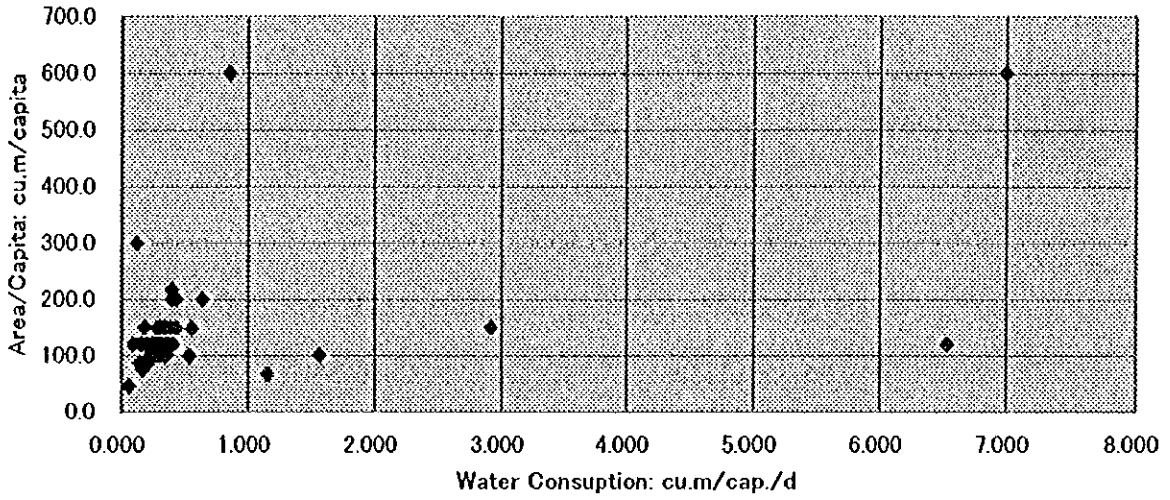


Figure 5.2.4 Water Consumption Tendency of Detached House

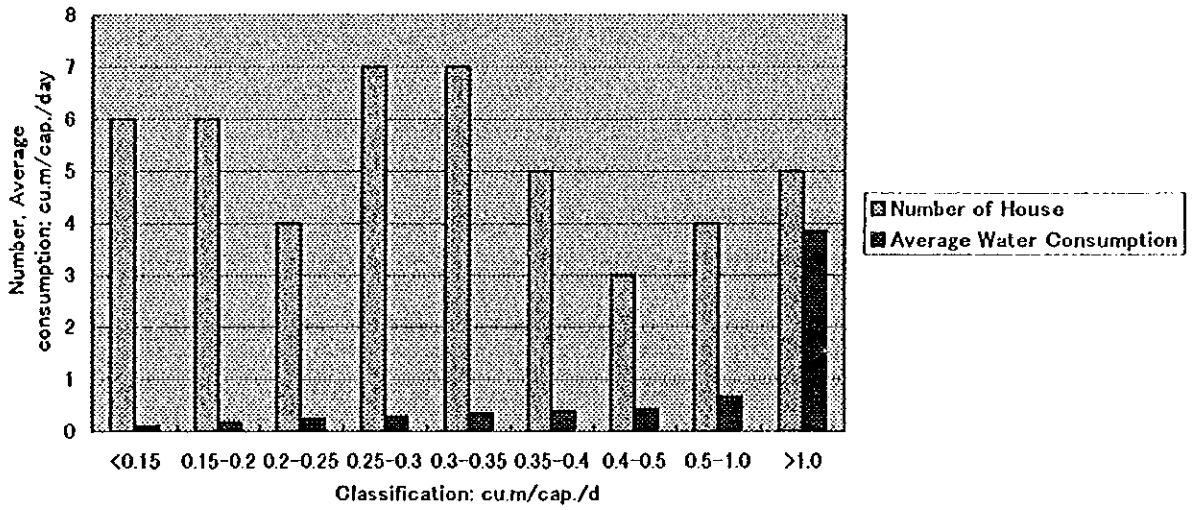
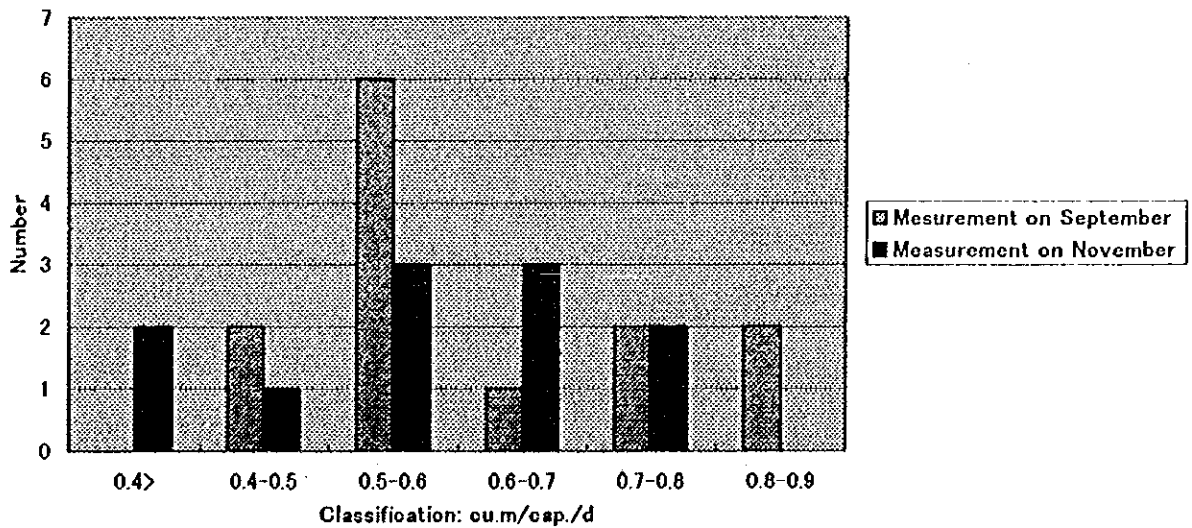


Figure 5.2.5 Water Consumption Tendency of Apartment Building



## (2) Apartment Building

### 1) Average Consumption

Table 5.2.11 shows the basic data of apartment buildings

The demand surveys have been made twice in September and once in November, of which results are shown in the Table 5.2.12. The results show the trend of gradual reduction.

**Table 5.2.11 Average Basic Data of Apartment Building**

Item	Occupied Units	Occupants	Average		
			Unit area sq.m	No. of Occupant	Area/person
Value	59.7	214.3	82.7	3.6	22.9

**Table 5.2.12 Water Consumption Volume/ Capita**

Item	Measurement		
	First	Second	Third
Consumption(cu. m/capita/day)	0.617	0.603	0.501

### 2) Analyzing Water Consumption Tendency

The averages of the results of the surveys of twice made in September are prepared , and compared them with the ones of November for the study of the distribution of the average water supply.

Table 5.2.13 shows the distribution of the classified water consumption per capita and the averages of those classified.

The figures of the survey made in November wholly shifted to the lower water consumption and shows that there are apartments with extremely low water consumption.

**Table5.2.13 Water Consumption per Capita**

Classification cu.m/cap./d	First/ Second Measurement			Third Measurement		
	Number		Average cu.m/cap./d	Number		Average cu.m/cap./d
	Number	Rate(%)		Number	Rate(%)	
0.4>	0	0.0		2	18.2	0.193
0.4-0.5	2	15.4	0.489	1	9.1	0.431
0.5-0.6	6	46.2	0.531	3	27.3	0.559
0.6-0.7	1	7.7	0.651	3	27.3	0.633
0.7-0.8	2	15.4	0.735	2	18.2	0.714
0.8-0.9	2	15.4	0.844	0	0.0	
Total	13	100.0		11	100.0	

Fig.5.2.5 shows the distribution of the above data.

### (3) Real Water Consumption in Tasheknt City

As analyzed in the Support 5.2.1, "Analyzing Water Consumption in Tashkent", individual water consumption per capita in Tashkent is shown in Table 5.2.14.

This is because the data are not available in Tashkent and the study has been made using Japanese basic water consumption.

There are big difference between the figures of the above and the actually surveyed. It is understood that the diffence is brought from the leakage and wasting in house.

The study is to be made for the volume of leakage by using the figures mentioned in the table below.

**Table 5.2.14 Real Water Consumption of Individual**

Item		All	Apartment Buildings	Detached House
Maximum	L/cap./d	300	270	390
Average	L/cap./d	240	230	300