

## 6.6 Present Status of Management and Operation of Waterworks

### (1) The Department for Operation and Maintenance of Tuyamuyun-Urgench Inter-regional Water Pipeline(DOMIWP-T/U)

This department is supervised by the MPU of the ROU through the RPADORWP. It is responsible for production and transmission of treated drinking water up to the distribution stations/reservoirs belonging to VodoKanal and AgroVodoKanal. Main revenue is from the sale of water and the losses are subsidized by the government budget. Tariff of water is fixed by the MPU of the ROU in concurrence with the MOF of the ROU. Revenue is collected through the bank in accordance with the mutual agreement on water sales concluded with the customers and based on water meter/pump records. Accounts are maintained in line with the standard practice in the ROU and these are analyzed monthly. Wages, social insurance, electricity, material supplies (chlorine, coagulants, fuel and lubricants), repair and maintenance cover the major expenditures. According to the latest data available, its cadre provides for a total staff strength of 882 (including by category, Supervisory: 63, Specialist: 62, Service: 10 and Worker: 747) including a permanent cadre of qualified engineers and technicians (Table 6.3 ) and workers hired for specific jobs on contract basis. The staff strength as of June 1996 is 710 of which 94 are Specialists and above (Fig. 6.6). In addition to the salary, the staff who work under unfavorable labor conditions are paid special allowances equivalent to 8~12% of the monthly salary. Among welfare incentives, workers are provided with 0.5 liters of milk free of charge per shift. Staff is given on-the-job training and selected persons are sent to Tashkent for refresher courses and advanced training.

The Director DOMIWP-T/U, feels that state of management affairs is generally satisfactory, if not for most of the prevailing problems due to lack of funds and facilities. Capital construction is delayed due to inadequacy of funds. While there are difficulties in procuring reagents, materials and spare parts which must be imported, possible efforts are made to maintain the quality of water produced. However, out of 273 samples of treated water that were tested over nine months of the year 1994, 140 samples had failed in hardness and suspended solids. Those tested between mid May to mid September only had satisfied the standards. Later, the USAID has donated water quality analyses equipment and reagent sets as well as equipment for chlorination at the treatment plant.

(2) The Department for Operation and Maintenance of Tuyanuyun-Nukus Inter-regional Water Pipeline (DOMIWP-T/N)

General conditions of this department with respect to management hierarchy, responsibilities, financing, fixing of water tariff, revenue and expenditure, organizational structure etc., are similar to that of the DOMIWP-T/U. According to the data available, its cadre provides for a total staff strength of 847 (including by category, Supervisory: 50, Specialist: 128, Service: 9 and Worker: 660) including a permanent cadre of qualified engineers and technicians (Table 6.4) and workers hired for specific jobs on contract basis. The staff strength as of June 1996 is 696 of which 554 are Workers (See Table 6.5) University graduates are employed as specialists and when there are no specialists, other suitable staff are recruited and sent to Tashkent for necessary operational level training.

Difficulties in collecting payments from some consumers and lack of funds, high energy (electricity) costs, shortage of coagulants and spare parts, transport and communication facilities are given among the problems faced by this department.

Besides VodoKanal, AgroVodoKanal and several industrial enterprises along the pipeline purchase water from this department. However, in spite of the recent decree that regulates timely collection of payments from the clients, it has been difficult to recover arrears from the AgroVodoKanal. Water supply to errant clients cannot be simply disconnected, as their ultimate consumers being poor farmers who cannot afford to pay for the water. It is not easy to deal with also the industrial enterprises who declare themselves bankrupt and refuse to pay.

Electricity cost has gone up by 4 to 5 times within a short period. Chemicals for the treatment plant, chlorine and the spare parts and materials necessary for repairs are all that must be imported, but transactions are very difficult due to limited funds and lack of hard currency.

As DOMIWP-T/N operates over a wide territory, efficient communication and transport facilities are necessary. An extensive telecommunication system that was planned during the FSU has not yet materialized. A radio link serves between Tuyanuyun and regional stations. When this goes out of order, messages are conveyed using facilities of other organizations if any such exists near by. With a fleet of 30-40 vehicles, a part of which is unserviceable, it is difficult to reach the remote stations. Condition of the plant and machinery is also said to be poor; for example, heavy pipes can not be handled for the want of repairs to a crane.

### (3) VodoKanal-ROK

The VodoKanal of the ROK in Nukus is managed under the MPUK and it is also responsible for reporting to the Central MPU through the MPUK. MPUK collects and compile information on all its operations in the ROK and reports to Tashkent. The Director, VodoKanal is obliged to submit monthly reports to the MPU of the ROU on its activities in water supply and sewerage services. The Director, DOMIWP-T/N also receives operational level information on VodoKanal.

Problems and issues of VodoKanal are resolved by the MPUK which can now handle the resources and funds more easily than before the reorganization. Lateral coordination between other agencies such as AgroVodoKanal and resolving of problems that may arise between such agencies are facilitated by a collegium of concerned ministers. Issues at ministerial level are resolved by the Council of Ministers of the ROK.

However, procurement of supplies has now become more difficult compared to when everything related to funds and supplies were planned by the GosPlan under the FSU. This now depends on the funds available with the VodoKanal-ROK and what is allocated to it. While production cost is rising on one side, VodoKanal-ROK has identified an urgent capital repair program costing 15 million sum which cannot be implemented due to lack of funds. This includes changes/repairs to intake pumps, first distribution station, pumping stations, filters.

VodoKanal-ROK which has a total staff strength of 893 (see Table 6.6 & Fig. 6.3) reports of no staff problems. Its staff is said to be content because their salaries are duly paid in contrast to many other organizations where salaries are not paid or the staff is send on compulsory vacation or no pay leave. In 1994, sensing a financial crisis, the senior management had discussed with the Financial Department to study countermeasures, and decided on the strategy not to have the staff cut down or sent on leave. About 350-400 of the staff in Nukus who work under difficult conditions are given free lunch as an incentive. A cafeteria, uniforms and a 50 ha. farm are also provided for the benefit of VodoKanal employees who can buy rice and other products of this farm much cheaper than market price.

Bill collection has become a serious problem as many consumer enterprises have declared themselves bankrupt. In some cases, arrears date back to three years. Indebted enterprises sometimes offer their real estate in stead of money to settle

arrears, but these being difficult to manage, are often of no use to VodoKanal. Water supply being an essential service, cannot be disconnected from defaulting consumers, and even the Presidential Decree on timely settlement of payments had not helped this VodoKanal very much. To improve bill collections, more incentives are given to the Dispatchers whose job is to visit households, check how much each household owes, leave them with invoices and remind the consumers to make early payment through the banks. Dispatchers in addition to their salary also get a bonus and about 50% of their transport fees is borne by the VodoKanal.

#### (4) VodoKanal of Khorezm Province (VodoKanal-Kz)

The VodoKanal-Kz in Urgench is managed under the TCMA of the Khokimiat of Khorezm Province and is also responsible for reporting to the MPU of the ROU. The TCMA assimilates and compiles on all operations in Khorezm Province and report to Tashkent. The Director of VodoKanalKz is obliged to submit monthly reports to the TCMA on its activities in water supply and sewerage services. The Director of the (DOMIWP-T/U) also receives operational level information on VodoKanal. This data is also supplied to the MPU of the ROU.

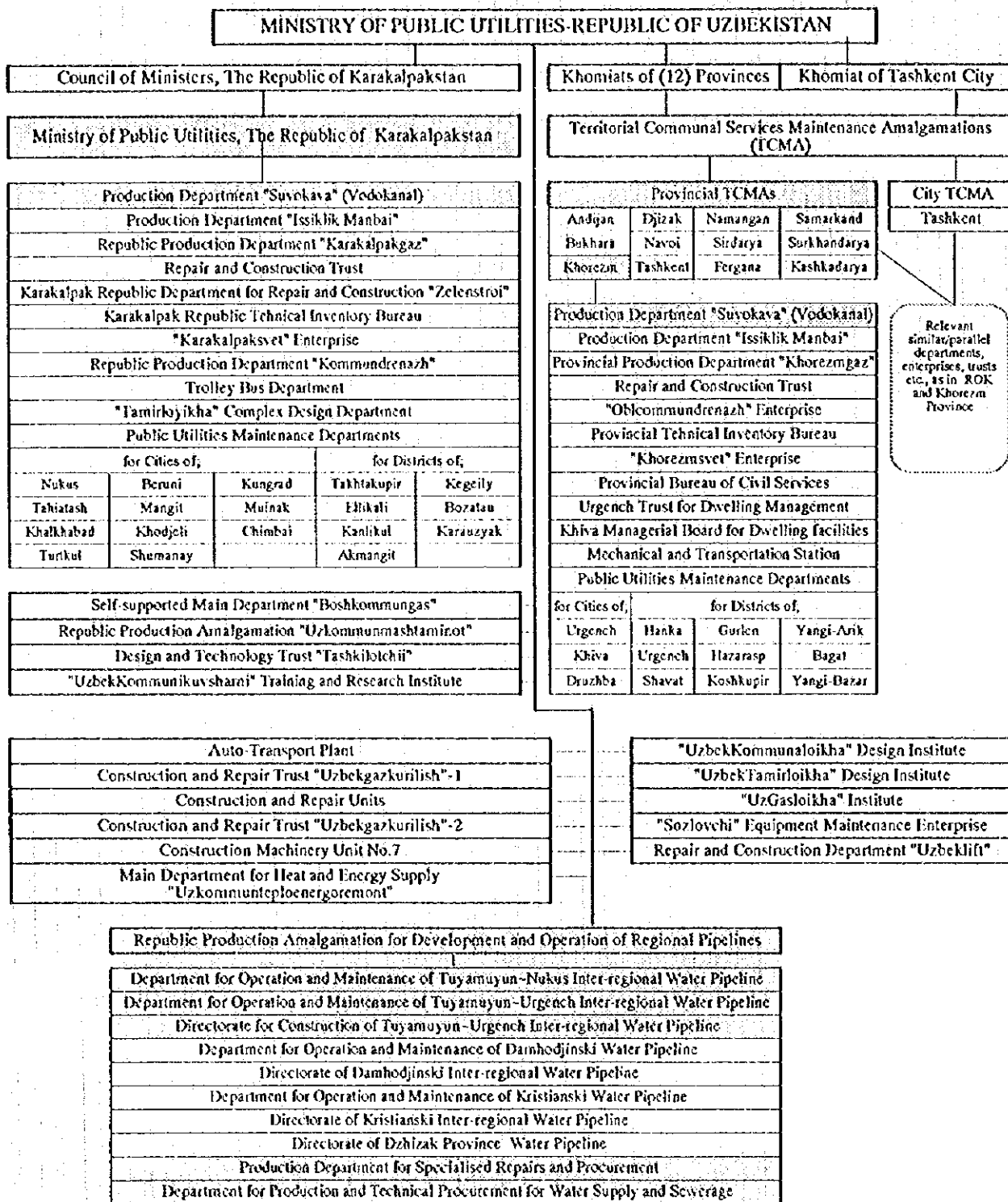
Problems and issues of VodoKanal are resolved by the Deputy Khokim who is now responsible for handling resources and funds and decision making. There is lateral coordination between other agencies such as AgroVodoKanal, SCNPKh, DOMIWP-T/U. Problems that may arise between such agencies and issues at provincial department level are resolved by the Deputy Khokim through discussions with the concerned Deputy Khokims.

Problems of funds and supply of materials are not an exception to this VodoKanal. The Presidential decree on timely settlement of payments has helped to a great extent in recovering arrears from defaulting customers and in making the VodoKanalKz more responsible. A new system of bill collection had been introduced recently on trial basis. Under that system, the residents need not be bothered by repetitive visits by dispatchers from the different public utility service agencies. Invoices for water supply, gas and heating are handed to the consumer during a single visit.

It is being considered to bring the peripheral rural water supply network, which is now operated by AgroVodoKanal, under the aegis of TCMA and to be operated by the VodoKanal. This is considered possible as major part of the rural pipeline network is ready and both these agencies receive water from a common source, the

Tuyamuyun System. However, problems are envisaged in maintaining a wide rural water supply network because the VodoKanalKz presently does not have necessary facilities unlike the AgroVodoKanal which maintained rural network supported by sister agencies of the MOA having large fleets of vehicles and machinery operating over a large region.

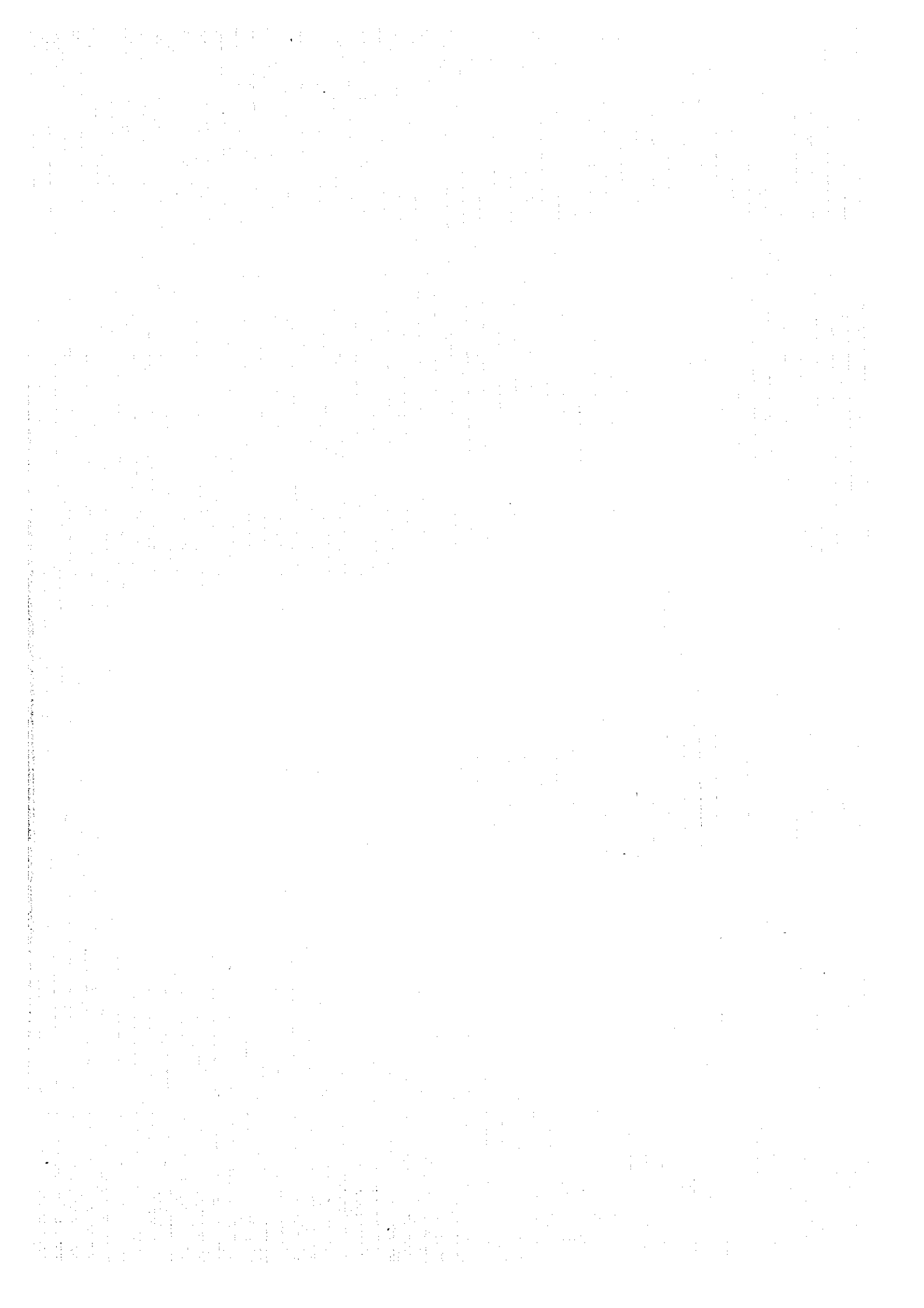
The staff distribution of VodoKanal-Kz is shown in Table 6.7.



Note: Shown by  are some of the key Institutions related to Water Supply and Sewerage Sector serving the Study Area

Fig. 6.1. Organization Structure of the Ministry of Public Utilities, The Republic of Uzbekistan

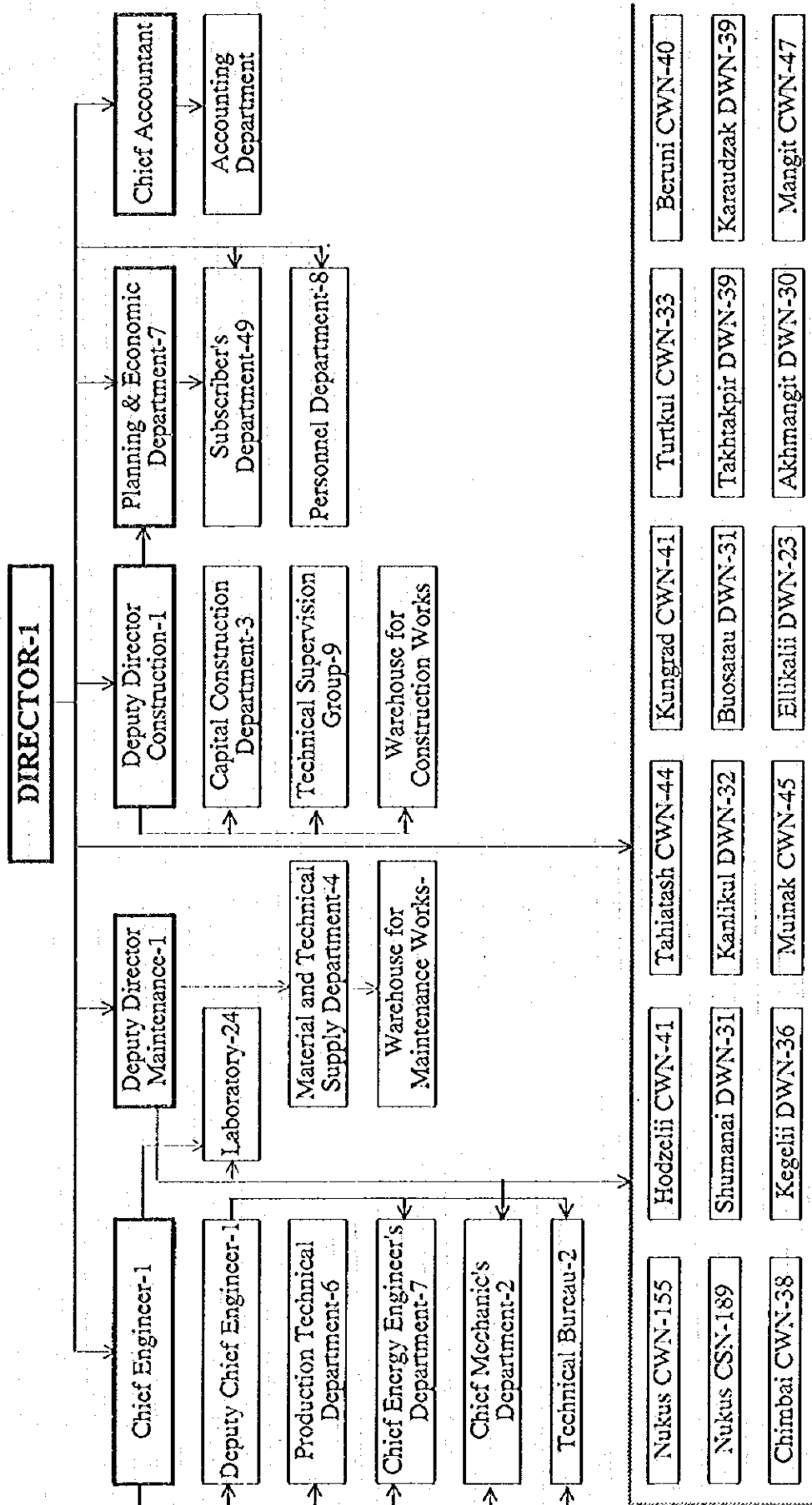
Source: MPU-ROU (July 1996)







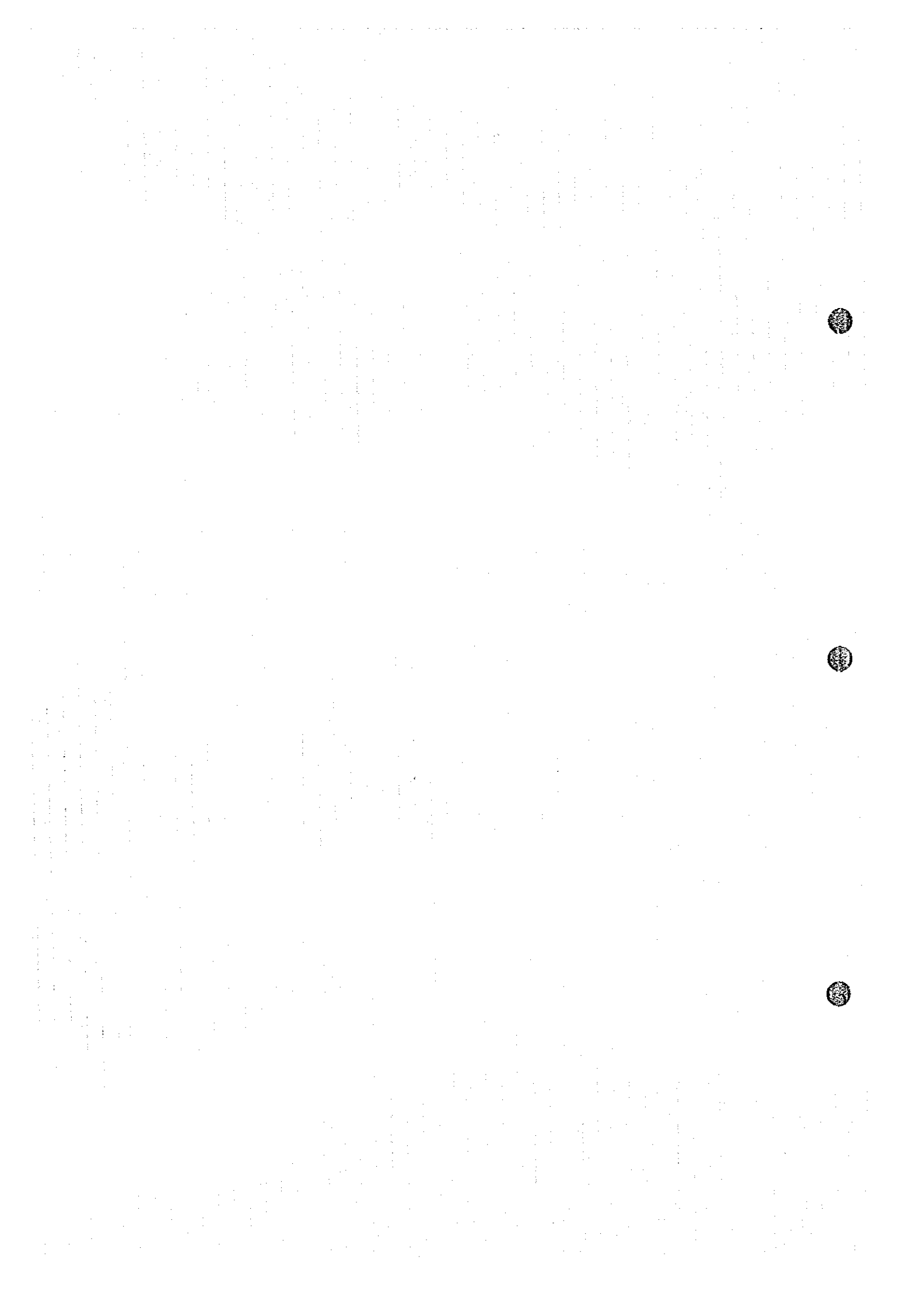


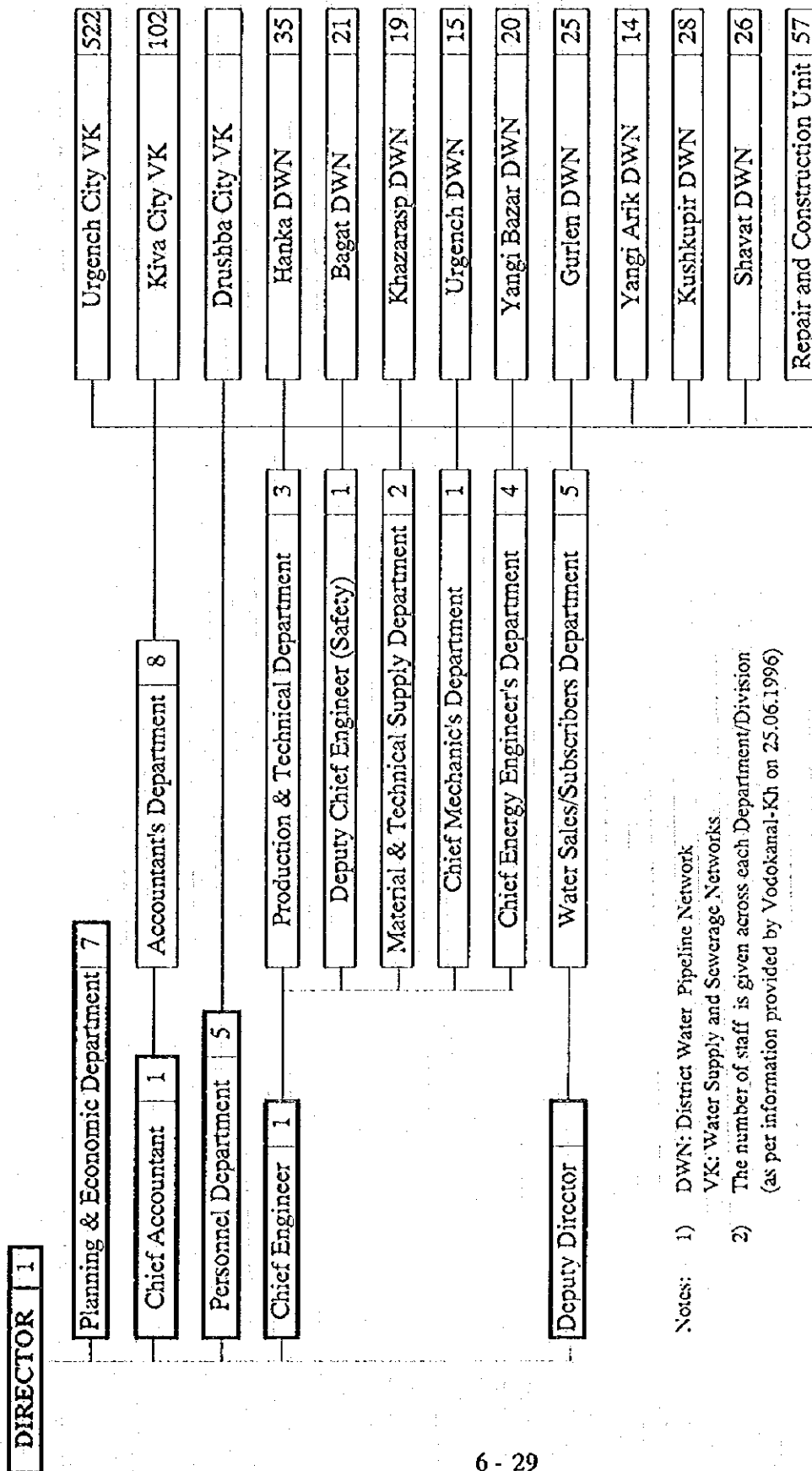


Note 1) DWN: District Water Pipeline Network  
 CWN: City Water Pipeline Network  
 CSN: City Sewerage Network

2) The number of staff is given across each Department/Division (Total staff:9)

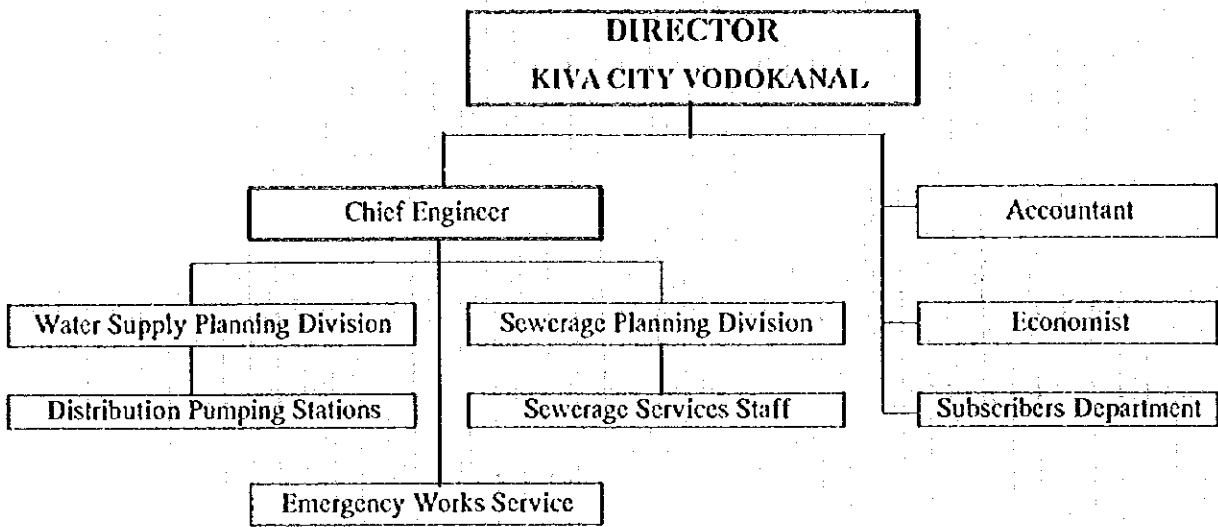
Fig.6.3 Organization Structure of the Productive Enterprise "Vodokanal" of the Republic of Karakalpakstan



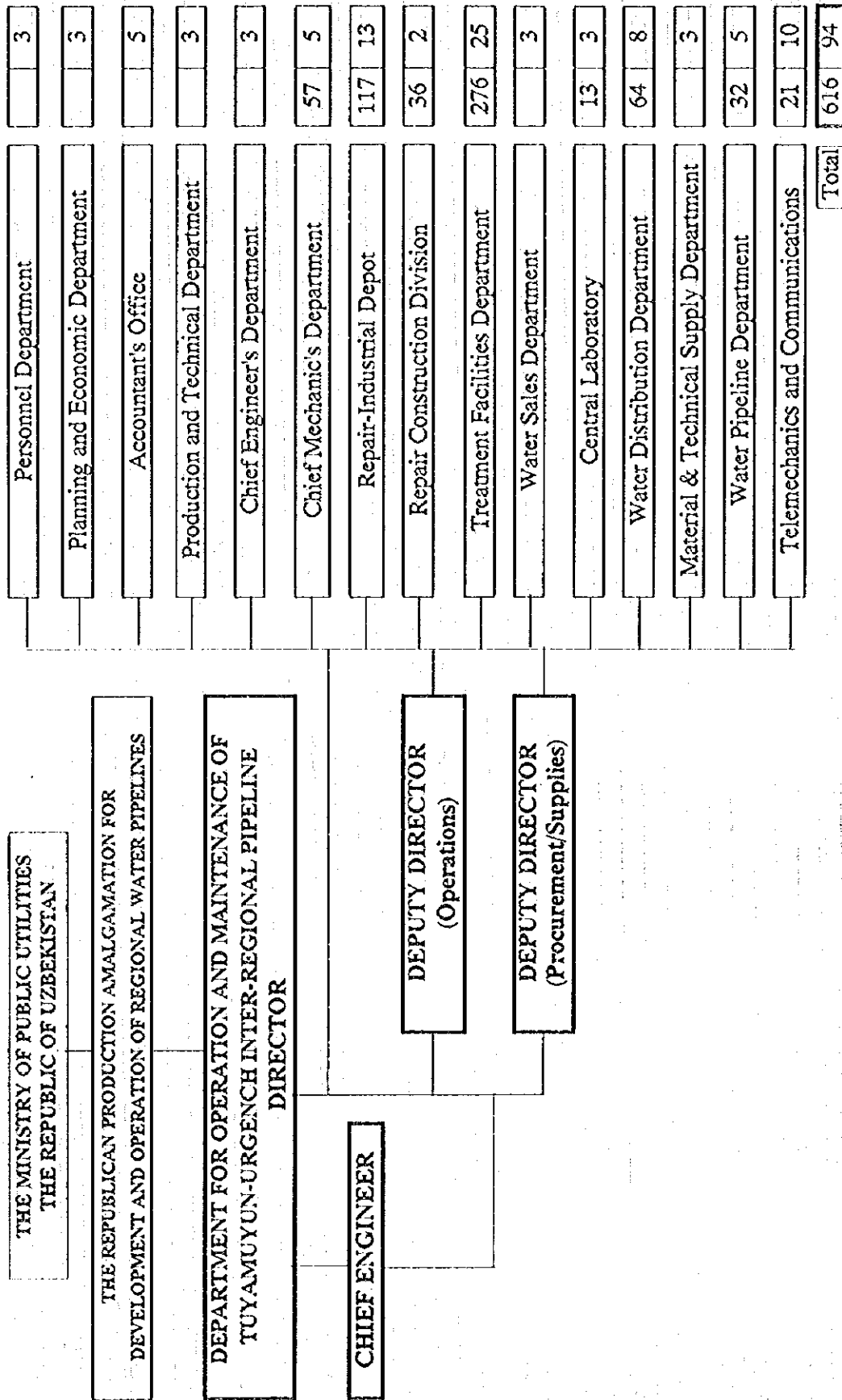


- Notes:
- 1) DWN: District Water Pipeline Network  
VK: Water Supply and Sewerage Networks
  - 2) The number of staff is given across each Department/Division  
(as per information provided by Vodokanal-Kh on 25.06.1996)

Fig.6.4 Organization Structure of the Productive Enterprise "Vodokanal" of Khorezm Province



**Fig. 6.5 Organization Structure of the Productive Enterprise "Vodokanal" of Khiva City**



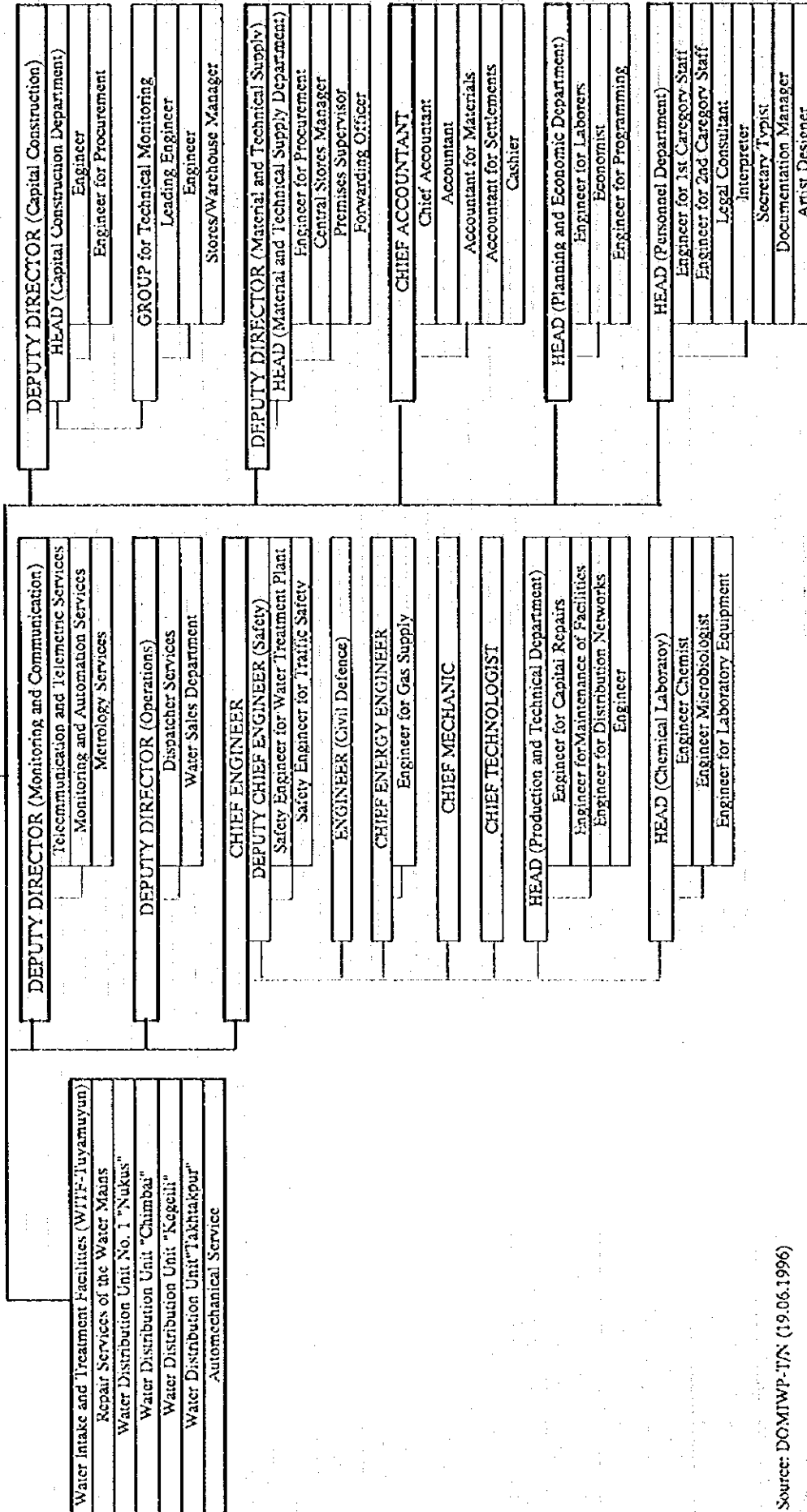
The number of general staff and specialist staff are given in the box across each department/division.

Fig. 6.6 Organization Structure of the Department for Operation and Maintenance of Tutamuyun-Urgench Inter-Regional Water Pipeline

Source: Director, DOMIWP-T/U 24.06.1996

THE REPUBLICAN PRODUCTION AMALGAMATION FOR DEVELOPMENT AND OPERATION OF REGIONAL WATER PIPELINES  
 DEPARTMENT FOR OPERATION AND MAINTENANCE OF TUYAMUYUN-NUKUS INTER-REGIONAL PIPELINE

DIRECTOR



Source: DOMIWP-T/N (19.06.1996)

Fig.6.7 Organization Structure of the Department for Operation and Maintenance of Tuyamuyun-Nukus Inter-regional Water Pipeline





Table 6.2. Authorities and Agencies Responsible/Involved in the Water Supply Sector

Authority/Agency	Functions/Responsibilities in Water Supply Sector	Remarks
<b>1. Inter-state and Central Government Agencies</b>		
Inter-state Coordinating Committee (ICC) for Water Management	Ministers in charge of Water Management from the 5 member states: Kazakhstan, Kirgizia, Tadzhikistan, Turkmenistan and Uzbekistan meet regularly to make decisions related to limits and distribution of the inter-state river waters.	Secretariat is in Leninabad in Tadzhikistan.
Interstate Water Basin Department of Amu Darya River (IWBDAK)	Maintenance and management of river flow, and distribution of water to the concerned three states Tadzhikistan, Turkmenistan and Uzbekistan. It reports quarterly on its activities and performance to the ICC, including results of water distributed against the limits set by the ICC for each year/season.	Established in 1988 with its headquarters in Urgench in Uzbekistan.
Central Asian Scientific Research Institute for Irrigation and Land Reclamation (SANIIRI)	Conducts research related to irrigation and land reclamation and offer scientific advice on these subjects to the relevant authorities in the member states.	Office located in Tashkent, Uzbekistan.
Ministry of Melioration & Water Management (MM&WM)	Overall management of water resources in Uzbekistan; Setting limits of water use and priorities, and allocation of water to the different branches. Activities are mainly governed by the laws on "Water & Utilization of Water Resources" and on Limited Water Use.	
Ministry of Public Utilities (MPU)	Development of policy, programs, concepts & norms in the sector, provision of consultancy services, and allocation of funds for the five Regional Water Pipeline Projects now under construction. Decentralized water supply sector activities in the regions are supervised by this ministry.	See Fig 6.1 for organization structure.
Ministry of Agriculture (MOA)	Allocation, distribution and supply of agricultural water and provision of drinking water supply to the rural areas (around farms).	Rural water supply is operated through regional enterprises "UzAgroVodoKanal"
Ministry of Health (MOH)	Mandated to monitor and control quality of drinking water supplied and warn and recommend to the relevant authorities to take control measures if necessary. It coordinates at regional level with respective water supply agency through its Sanitary and Epidemiologic Stations.	
State Committee for Nature Protection (SCNP)	Develop policies, regulations, programs, concepts & norms for nature protection, environmental monitoring, scientific research and provide consultancy services. Interacts with the water supply sector in the protection, rational use and recycling of water resources. Operates through 16 regional committees.	
State Committee for Geology and Mineral Resources (SCGMR)	Responsible for overall management of groundwater resources and control of their exploitation. Groundwater resources can be exploited only upon approval granted by the SCGMR.	SHE under the SCGMR operates in the Study Area through its subsidiaries PriAralskaya Hydrogeological Expedition (PHE) or Nukus Hydrogeological Expedition.
State Hydrogeological Enterprise (SHE)	Exploration, conservation and setting up norms for rational use of groundwater resources, construction of groundwater wells and provision of consultancy services on groundwater exploitation.	UzAgro is the expertise design institute under the MPU.
Uzbek Public Utilities Engineering Project Institute (Uzipro)	Planning, basic & detailed design of water treatment and distribution facilities and providing consultancy services to regional water works when requested.	Successor to the former State Planning Committee, it operates through the regional committees.
State Committee for Forecasting and Statistics (SCFS)	Preparation of Master Plans/Feasibility Studies, planning and allocation of capital quota and material supplies, monitoring of performance of the agencies concerned.	Established in 1961 but now is an independent institute affiliated to the SCNP
"UzTransGas" under Ministry of Petroleum & Gas Construction	Though its main role is in the gas and energy sector, it also produces water. Kungrad city is partly supplied with water produced by its subsidiary production enterprise "GasProm" and sold to the "VodoKanal".	
Tashkent Scientific Institute for Water Supply, Sewage, Hydro-engineering Facilities and Engineering Hydrology (VodGee)	Development of technology in water treatment and quality control, design of hydro-engineering facilities and dissemination of technical expertise	
State Special Inspection Agency for Analytical Control (GosSIK) of the SCNP	Inspection and monitoring of the quality of surface and ground water, waste waters discharged into the water sources and into the environment in general.	Operates centrally under the SCNP and in the regions through the regional committees of the SCNP.
<b>2. Regional Agencies</b>		
<b>(a) Republic of Karakalpakstan (ROK)</b>		
Ministry of Public Utilities of the ROK (MPU-ROK)	Administration of public water supply, approval of plans/proposals forwarded by VodoKanal, procurement of finance for capital construction of water supply facilities.	MPUK is subordinate to MPU of the ROU and the Council of Ministers -ROK.
State Committee for Forecasting and Statistics of the ROK (SCFSK)	Development of short term and long term forecasts of socio-economic development in the ROK, implementation of forecasting and analytical work on estimation of priorities and prospective of ROK's development under the market economy conditions.	
Ministry of Health of the ROK (MOHK)	Responsible for monitoring and control of the quality of drinking water supplied to the public, planning and implementation to ensure access by rural population to safety drinking water.	Laboratories are available under the ministry for epidemiological and sanitary hygiene.
Ministry of Water Management of the ROK (MWMM)	Allocation and management of water, maintenance of irrigation network through "VodRem" and allocation of budget for maintenance and capital construction. It operates through productive society "VodRem" & regional departments "RaiVodkhoz"	
Ministry of Agriculture of the ROK (MOAK)	Also responsible for supply of agricultural water and drinking water to the rural areas. Rural water supply is provided by its subordinate department "AgroVodoKanal" using canal water/groundwater.	Set up as per Decree No. 239/9 of 10.09.1993 of the Council Of Ministers of ROK
Productive Enterprise "VodoKanal ROK" (Water Supply Department) of the ROK	Basic planning, repairs & maintenance of water supply facilities, production/purchase and distribution of water, providing water connections and collection of water (and wastewater) charges.	Operates as a self-supported enterprise and reports to the MPU-ROK. (See Fig. 6-3)
ROK State Committee for Nature Protection (SCNPK)	Implements regional nature protection activities as directed by the Central SCNP. Quality of water sources and water supplied is monitored by its regional laboratory under supervision of GosSIK.	
PriAralskaya Hydrogeological Expedition (PHE)	Groundwater expedition, planning and construction of groundwater wells, specialized technological expertise services in the hydro-geological sector.	Operates under the State Hydrogeological Enterprise
<b>(b) Khorezm Province</b>		
Provincial Governor's Office (Khaldimat-Kz)	Overall responsibility of the administration of Khorezm Province. A Deputy Kholm in charge of Public Utilities is available and he is responsible for public water supply.	
Khorezm Provincial Committee for Forecasting and Statistics (PCFSKz)	Development of short term and long term forecasts and plans for socioeconomic development (including water supply sector) and, forecasting and analysis of priorities and prospective of economic development in the province.	
Khorezm Regional Committee for Nature Protection (SCNPKz)	Implements regional nature protection activities as directed by the Central SCNP. Quality of water sources and water supplied is monitored by its regional laboratory under supervision of GosSIK.	Reports to Khorezm Kholm and the MPU.
Khorezm Province Territorial Municipal Services Maintenance Amalgamation (TCMA-Kz)	Responsible for overall management of public utilities including water supply in Khorezm Province and guidance of provincial agencies responsible for public utilities.	
Productive Enterprise "VodoKanalKz" (Water Supply Department) of Khorezm Province	Basic planning, repairs & maintenance of water supply facilities, production/purchase and distribution of water, providing water connections and collection of water (and waste water) charges.	Administered under the Deputy Kholm in charge of Public Utilities and TCMA. (See Fig. 6-4)
Productive Enterprise "VodoKanal Khava" of Khiva City	Basic planning, repairs & maintenance of water supply facilities, purchase and distribution of water, providing water connections and collection of water (and waste water) charges at City level.	Reports to Director, VodoKanalKz. (See Fig. 6-5)
Productive Enterprise "UrTransGas" in Urgench	It has a water supply department in Kungrad which manages intake, treatment and distribution facilities. Sells water to the VodoKanal" in Kungrad City.	It is a regional agency of the "UzTransGas"
Agricultural Water Supply Department "AgroVodoKanal"	This subordinate department of the Ministry of Agriculture provides rural water supply in the province using canal water/groundwater.	
<b>(c) Others</b>		
Republican Production Amalgamation for Development and Operation of Regional Water Pipelines (RDADORWP)	A special department within the MPU and is responsible for management and overall supervision of all Regional Water Pipelines including Tuyamuyun-Nukus and Tuyamuyun-Urgench Inter-regional Water Pipelines	See Fig. 6-1 for organizations under this Amalgamation.
Department for Operation and Maintenance of Tuyamuyun-Urgench Inter-regional Water Pipeline, Urgench City (DOMTWP-UU)	With Tuyamuyun Reservoir as the water source, this unit is responsible for production and sale of water to "VodoKanal" and "AgroVodoKanal" in Khorezm Province (including Amudarya Region in the ROK), repair and maintenance of the water treatment and transmission facilities.	Directly managed by the MPU of the ROU. (See Fig. 6-6)
Department for Operation and Maintenance of Tuyamuyun-Nukus Inter-regional Water Pipeline, Nukus City (DOMTWP-TN)	With Tuyamuyun Reservoir as the water source, this unit is responsible for production and sale of water to "VodoKanal" and "Agro VodoKanal" in the ROK (excluding Amudarya region), repair and maintenance of the water treatment and transmission facilities.	Directly managed by the MPU of the ROU. (See Fig. 6-7)

Table 6.3 Summary Staff Schedule of  
the Department for Operation and Maintenance of Tuyamuyun-Urgench Inter-Regional Water Pipeline

Department or Division and the Number of Staff in the Supervisory, Specialist and Service Categories	Supervisory	Specialist	Service	Sub Units: Station/Laboratory/Workshop/Section and the Number of Staff in Worker Category	Number
Management Head Quarters	8	5	3	Water Intake Pump Station 1st Ascend	35
Personnel Department	1	3	0	Security of Restricted Zone of Pump Station	8
Planning and Economic Department	0	3	0	Radial Sedimentation Tank	18
Accountant's Department	2	3	1	Horizontal Sedimentation Tank (HST)	25
Production and Technical Department	0	3	0	Auxiliary Farm	9
Material & Technical Supply Department	2	3	2	Filtering Unit	30
Water Supply Department	1	2	0	Intersite Communications	19
Central Laboratory	1	4	0	Pure Water Reservoir	5
Treatment Plants	13	10	1	Pump Station 2nd ascend	17
Water Intake Structures (1st Ascend Pumping Station)	0	2	0	Pump Station for Own Needs	9
Laboratory of Treatment Plants	1	3	0	Structures for Reuseable Water	4
Water Pipeline (length 378km)	5	0	0	Pump Station for Backwash in HST	2
Telemechanics and Communications	2	14	0	Control Pump Station	4
Automechanical Service	2	2	0	Slurry/Sludge Pump Station	2
Water Distribution Unit in Urgench City	6	0	0	Chlorinator 1200kg/day	13
Line	2	0	0	Reagent Mixing Economy	26
Repair Construction Division	2	0	0	Dispatcher Service	9
Repair- Industrial Depot	13	5	3	Mechanical Workshop for Preventive and Emergency Repairs	20
Laboratory for Ultrasonic Devices	1	0	0	Laboratory for Treatment Plants	13
Laboratory for Oil Testing	1	0	0	Boiler	6
Total	63	62	10	Automotive Service-Durzba City	20
				Civil Construction Section	15
				Security of Restricted Zone of Treatment Plants	12
				Dining Room/Kitchen	3
				Water Pipeline	28
				Water Supply	2
				Water Distribution Unit in Urgench City	16
				?? (Name of unit not given )	11
				Chlorinator	13
				Pure Water Reservoir	2
				Intersite Communications	10
				Security Service	8
				Laboratory on Oil Testing	4
				Laboratory for Chemical Analyses- Central Laboratory	14
				Repair and Construction Section	34
				Telemechanics and Communications	10
				Service Team for High Voltage Lines	6
				Sewing Shop	13
				Weaving Section	8
				Auxiliary Farm	11
				Security Service	1
				Central Warehouse	6
				Automotive Service	79
				Laboratory for Ultrasonic Devices	5
				Plant- Mechanical Shop	37
				Procurement Section	5
				Pump Repair Section	12
				Technological Section for Manufacture of Non-standard Equipment	3
				Smith-Welding Shop	13
				Security Service	8
				Foundry Shop	11
				Electro-Technical section	17
				Heat Supply Service	25
				Dining Room /Kitchen	4
				Cleaners	7
				Total	747

Note: This table is summarized based on the Staff Schedules approved by the Director, DOMIWP-TU

**Table 6.4 Summary Schedule of Staff of  
the Department for Operation and Maintenance of Tutamuyun-Nukus Inter-Regional Water Pipeline**

Department or Division and the Number of Staff in the Supervisory, Specialist and Service Categories	Supervisory	Specialist	Service	Subtotal	Sub Units: Station/Laboratory/Workshop/Section and the Number of Staff in the Worker Category	Subtotal
Management Head Quarters	9	3	5	17	Procurement Section	4
Personnel Department	1	3	0	4	Central Laboratory	5
Planning and Economic Department	1	3	0	4	Hydraulic Engineering Structures	3
Production and Technical Department	1	4	0	5	Water Supply	6
Accountant's Office	2	7	0	9	Boiler	3
Material & Technical Supply Department	2	2	2	6	Water Intake (Pump Station 1st ascend)	39
Capital Construction Department	2	1	0	3	Boiler-Pump Station 2nd Ascend	13
Energy Engineers Department	0	1	0	1	Pump Station 2nd Ascend	27
Central Laboratory	1	3	0	4	Pump Station for Own Needs	4
Water Supply Department	1	0	0	1	Pump Station for Reusable Water	4
Water Intake Structures (1st Ascend Pump Station)	1	7	0	8	Slurry/Sludge Pump Station	4
Boiler	1	0	0	1	Pure Water Reservoir	4
Pump Station 2nd Ascend	1	7	0	8	Treatment Plants	20
Treatment Plants	4	18	0	22	Chemical Reagent Storage Facility	23
Chemical Reagent Storage Facility	0		0	0	Radial & Horizontal Sedimentation Tanks	13
Laboratory of Treatment Plant	1	2	0	3	Filtering Unit	17
Industrial Base of Treatment Plants	1	2	0	3	Emergency Team	12
On the Line Base	1	0	0	1	Chlorinator Plant	13
Sewerage Treatment Plants	1	1	0	2	Repair and Construction Section	4
Hydrotechnical Service	0	1	0	1	Industrial Base of Treatment Plant	28
Operation and Repair Service of Settlement	1	0	1	2	Boiler of Industrial Base of Treatment Plant	14
Water Pipelines	1	8	0	9	Auxiliary Farm of Treatment Plants	11
Water Pipeline Repairs Workshop	1	0	0	1	Distribution Unit in Chimbai	32
Telemechanics and Communications	1	7	0	8	Distribution Unit in Kegeili	32
Instrument and Equipment Service	2	4	0	6	Distribution Unit in Takhtakpur	33
Metrology Service	1	2	0	3	Sewerage System Treatment Plants	10
Fish Breeding Farm	0	1	0	1	Chlorinator of Sewerage Treatment Plant	4
Auxiliary Farm of Water Pipeline Service	0	1	0	1	Water Pipelines	63
Industrial Depot in Nukus City	4	6	0	10	Water Supply Service to Karauzyak Settlement	3
Water Distribution Unit in Nukus City	1	13	1	15	Repair Section of Water mains	6
Automechanical Service	0	4	0	4	Repair Construction Team	5
Distribution Unit-47km District	1	0	0	1	Distribution Unit in Nukus City	43
Distribution Unit-97km District	1	0	0	1	Transferring Station	6
Distribution Unit-Turtkul District	1	0	0	1	Automechanical Service in Nukus City	44
Distribution Unit in Chimbai	2	6	0	8	Automechanical Service for Treatment Plants	35
Distribution Unit in Kegeili	1	5	0	6	Electrotechnical Service fo Water Pipelines	4
Distribution Unit in Takhtakpur	1	5	0	6	Operation and Repair Service of Settlement	15
Staff Approved after April 1, 1996	0	1	0	1	Laboratory for Purification Plants	11
<b>Total</b>	<b>50</b>	<b>128</b>	<b>9</b>	<b>187</b>	Computer and Communications	13
					Substation in Kipchak	6
					Repair and Mechanical Shop	8
					Pumps and Pipes Repair Service	7
					Carpenter Workshop	5
					Staff Approved after April 1, 1996	4
					<b>Total</b>	<b>660</b>

Note: This table is summarized based on the Staff Schedules approved by the Director, DOMIWP-T/N.

Table 6.5 Staff Position (as of 20.06.1996) of the DOMIWP-T/N

Facility	Number Employed	
	Employees Engineering/ Technical Staff	Workers
Water Treatment Plant	28	31
Pumping Unit 1 of WTP	8	41
Pumping Unit 2 of WTP	7	118
Industrial Base (workshop etc.) of WTP	1	57
Laboratory of WTP	3	11
Waste Water Pumping Unit of WTP	1	11
Employees' Dwelling Settlement of WTP	2	9
Subtotal	50	278
Water Pipelines	9	57
Industrial Base (workshop etc.) in Nukus	6	6
Control, Monitoring and Automation Services	5	4
Automechanical Service in Nukus	4	31
Water Distribution Unit (WDU) in Nukus	15	57
Laboratory of WDU in Nukus	3	7
WDU in Kegcily	4	30
WDU in Chimbai	8	33
WDU in Takhtakupir	6	32
WDU at 47km Pumping Station 3	1	6
Administration	41	3
Subtotal	102	266
Total	152	544

Source: DOMIWP-T/N (20.06.1996)

Table 6.6 (a) Cadre of Vodokanal-ROK in Nukus

Serial Number	Category of Staff	System		District Water Pipeline Network								City Water Pipeline Network								Subtotal	Total	
		City/District		Takhtakbir	Kegechi	Elilikali	Karandzak	Bosatau	Akhmangit	Kanlikul	Shumanai	Subtotal	Mangit	Beruni	Chimbei	Tahiatash	Hodzeli	Kungrad	Turkul			Muinak
1	Administrative Staff			10	5	2	3	3	3	3	2	31	3	3	3	4	4	4	3	3	27	58
2	Controller			1	2	1	2	1	1	1	1	10	2	2	2	2	3	2		1	14	24
3	Electric/gas Welder			1	1	1	1	1	1	1	1	8	1	1	1	1	1	1	1	1	8	16
4	Electrician-Electrical Equipment Repairs			1	1	1	1	1	1	1	1	8	1	1	2	1	1	1	1	1	9	17
5	Electrician-Electrical Equipment Repairs (Stand by)			1								1								0	1	
6	Fitter-Control, Monitoring and Automation			1								1								0	1	
7	Fitter-Repairs					1				1		2		1		1	1		1	4	6	
8	Fitter/Plumber			5	10	4	7	5	7	8	5	51	8	8	8	14	8	10	10	8	74	125
9	Operator-Dispatcher Services			1	1		1	1	1	1	1	7	1	1	1	1	1	1	1	1	8	15
10	Operator-Heating Unit											0			1					1	1	
11	Operator-Pumping Units			4	4	4	5	5	5	9	4	40	6	9	4	4	8	4	5	9	49	89
12	Operator-Chlorination Unit					4	5	5		4	5	23	5	4		5	4	5	4	32	55	
13	Operator-Desalination Units			4								4								0	4	
14	Operator-Coagulation Unit											0	2							2	2	
15	Excavator Operator			1	1	1	1	1	1	1	1	8	1	1	1	1	1	1	1	8	16	
16	Tractor Operator			1	1	1	2	1		1		7	1	1	2			1	1	7	14	
17	Driver			2	2		3	1	3	2	2	15	1	2	3	2	2	2	1	2	15	30
18	Lab Assistant Chemical/Bacteriological Analysis			2	2	2	3	1	2	3	3	18	5	2	2	2	2	2	3	20	38	
19	Sample Collector				1					1		2			1	1	1	1	1	4	6	
20	Cleaner/Janitor			1	1	1	1		1	1	5	11	1	1	1	1	1	1	1	8	19	
21	Guard/Watcher			1	4		4	5	4	7		25	9	3	7	5	3	4	5	7	43	68
22	Labourer			1								1								0	1	
<b>Total</b>				<b>38</b>	<b>36</b>	<b>23</b>	<b>39</b>	<b>31</b>	<b>30</b>	<b>45</b>	<b>31</b>	<b>273</b>	<b>47</b>	<b>40</b>	<b>38</b>	<b>44</b>	<b>41</b>	<b>41</b>	<b>37</b>	<b>45</b>	<b>333</b>	<b>606</b>

(32)

(593)

Remarks : Total number of staff at Kanlikul DWN is given elsewhere as 32. Breakdown given above needs rechecking with source data.

Table 6.6 (b) Cadre of Vodokanal Staff for Nukus City

System	Nukus City Water Pipeline Network	Nukus City Sewerage Network	
Administrative Department	4	3	
Dispatcher Service	11	13	
Electrical Workshop	4	8	
Automobile Transport Department	30	15	
Water Treatment Plant	61		
Intake and Treatment Facilities	30		
Sewerage Network Department		19	
Sewerage Treatment Facilities		76	
Sewerage Treatment Facilities		45	
Cleaner/Janitor	3	3	
Guard/Watcher	12	7	Total
<b>Subtotal</b>	<b>155</b>	<b>189</b>	<b>344</b>

Source: VodoKanal -ROK (20.06.1996)

Table 6.7 Summary Staff Schedule of the Vodokanal-Khorezm Province

Department/Division	Category and Number of Staff					Total
	Head	Engineer	Technician	Employee	Worker	
Headquarter Senior Management	5					5
Planning and Economy Department	1	7				8
Accountant Department	2	8		1		11
Personnel Department	1	1		3		5
Production and Technical Department	1	2				3
Capital Construction Department	1	3				4
Material & Technical Department	1	1				2
Subscribers Department	1	4				5
Chemical & Bactriological Laboratory	1	2			15	18
Urgench City Vodokanal	1	2				3
Head Water Intake Facilities	1				46	47
Auto-mechanical Services	1				68	69
Chief Energy Engineer's Department	1	3			21	25
Treatment Facilities	1	4			45	50
Charish Water Intake	1				27	28
Hanka District Water Pipeline Network	1				35	36
Hazarap Water Pipeline Network	1				19	20
Gurulen District Water Pipeline Network	1				25	26
Shavat District Water Pipeline Network	1				26	27
Yangi Arik District Water Pipeline Network	1				14	15
Yangi Bazar District Water Pipeline Network	1				20	21
Urgench District Water Pipeline Network	1				15	16
Koshkupir District Water Pipeline Network	1				28	29
Bagat District Water Pipeline Network	1				21	22
Khiva City Water Pipeline Network	3	2				5
Dispatchers Division					10	10
Water Sales					15	15
Industrial Zone					9	9
Repair and Construction Department	2	3	2		52	59
Water Supply Network					46	46
Central Repairs Workshop					13	13
Subsidiary Facilities					20	20
Water Pumping Station					12	12
Urgench City Sewerage Network	1				20	21
Booster Pumping Station-1					10	10
Booster Pumping Station-3					9	9
Booster Pumping Station-4					10	10
Booster Pumping Station-Airport					5	5
Booster Pumping Station-5					11	11
Booster Pumping Station-7					11	11
Booster Pumping Station-11					11	11
Booster Pumping Station-13					9	9
Booster Pumping Station-Near Gas Pipeline					3	3
Total Number in Sewerage Network	1	0	0	0	99	100
Total Number in Water Supply Activities	34	42	2	4	602	684
Total of Vodokanal	35	42	2	4	701	784

Source: Vodokanal Khorezm Province. (Summarized from Approved Staff Schedules Received on 25.06.1996)

## **CHAPTER 7**

# **FINANCIAL AND MANAGERIAL ASPECTS**





## CHAPTER 7 FINANCIAL AND MANAGERIAL ASPECTS

### 7.1 General Trend

With the promulgation of the Decree of the President of the Republic of Uzbekistan in 1990 "On the Improvement of Drinking Water and Natural Gas Supply for Rural Population of the Republic of Uzbekistan", Water Supply Service in Uzbekistan was given highest importance and national priority as a public utility service. It has been defined by law as a subject of State Ownership and National Wealth.

However, according to the Decree of Oily Mazhlice (Supreme Council) of the Republic of Uzbekistan of August 31, 1995, infrastructure facilities, including water supply and sewerage, have been added to the list of facilities and enterprises, which can be privatized only on the basis of decision of the Cabinet of Ministers of the Republic of Uzbekistan.

Under this situation, Water Supply Service in Uzbekistan, especially after the country's independence in 1991, has newly started and been promoted dynamically with the initiative of the Central Government.

In accordance with the Decree of the President of the Republic of Uzbekistan of July 15, 1993: "On Improving Management of Public Utilities in the Republic of Uzbekistan" and the Decree No. 371 of the Cabinet of ministers of the Republic of Uzbekistan of July 22, 1993 on the same matter, public water supply and sewerage in cities, towns and regional centers of the Republic of Uzbekistan are being managed by the Territorial Communal Services Maintenance Amalgamations (TCMA) of the Khokimiats of the provinces and Tashkent city, and in the Republic of Karakalpakstan by the Ministry of Public Utilities of the Republic of Karakalpakstan of the Council of Ministers of the Republic of Karakalpakstan.

In the area of public water supply and sewerage, the Ministry of Public Utilities of the Republic of Uzbekistan carries out overall supervision of these utilities, coordinates the activities of these newly organized amalgamations, develops, within the limits of its competence, normative documents, State Programs for Development of Water Supply and Sewerage Facilities, etc.

Considering that regional water pipelines (Tuyamuyun-Nukus-Chimbay-Takhtakupyr, Tuyamuyun-Urgench-Gurlen-Mangit, Damkhodzha-Navoi-Bukhara, Krestiyansky

Group Water Pipeline) supply drinking water to urban and rural population of two or more provinces, Departments for Operation and maintenance and Management Offices for Construction of these pipelines were not included into the Territorial Communal Services Maintenance Amalgamations (TCMA) of the Provincial Khokimiats, but after the reorganization which took place in July 1993, were reporting directly to the Ministry of Public Utilities of the Republic of Uzbekistan.

The management of water & sewerage works of rural settlements in the Republic of Uzbekistan (except the Republic of Karakalpakstan) is being conducted by the Republican Production Amalgamation "Uzagrovodokanal" of the Ministry of Agriculture of the Republic of Uzbekistan and the joint-stock Investment Company "Obi-Hayot".

The management of water & sewerage works of rural settlements in the Republic of Karakalpakstan is being conducted by the Council of Ministers of the Republic of Karakalpakstan.

The MPU, through the newly established TCMA's, undertakes the development (designing and construction) of water pipe-lines in each territory as well as operational, economic and financial activities. There are Departments for Operation and Maintenance of Inter-regional Water Pipeline (DOMIWP) and these are members of the Republican Production Amalgamation for Development and Operation of Regional Water Pipelines (RPADORWP) which exists under the MPU of the Republic of Uzbekistan.

## **7.2 Present Situation**

### **7.2.1 Financial Support by the Government of Uzbekistan**

During 1990~1992, since after the recovery of the Republic's sovereignty, financial expenditures for capital construction investment on the water supply works were enormous.

Before 1994, the finance for capital construction of water supply and sewerage facilities was allocated only through the MPU of Uzbekistan from the State Budget. But, after the reform of MPU organization by the Decree No.371 of July 22, 1993, and in accordance with the Government policy for promoting more independence and responsibility of local administrative bodies in deciding matters concerning everyday life of the population, this kind of financial support has been decreasing. The new

administration system in which local VodoKanal under the supervision of Regional Mayor's office or Khokimiat should follow in order to extend its management not only on maintenance & operation, but also on some part of the capital construction under decreasing financial support of the MPU, is taking root in step by step, and in the near future, financial support from the Central Government is planned to be brought down to zero.

In order to promote economic effectiveness in the operation of water supply systems, development of new forms and methods of management of such facilities were needed, taking into consideration the international practices for transferring such facilities to other existing/new organizations for managing, lease or concession.

For embodying the above process, the Government has issued Resolution No.54 on February 7, 1994 by which it has intended to realize "Staged Conversion of Public Utility Services on Self-sufficient Basis" and has given the right to the Provincial Khokimiats, and the Khokimiat of Tashkent City and to the Council of Ministers of ROK to approve the consumption norms, limits & tariffs of utility services provided to the general public in the territories.

On the other hand, it has been resolved to effect a staged reduction of the Government subsidies by ten (10) percent annually on the average. The Resolution states that a stage-by-stage transition of public utilities to self-sufficiency is carried out together with social welfare measures such as subsidies for partial payment of rent & public utilities within the norms.

This resolution No.54 can be said, as a basic guideline for the improvement of the Public Utility Services.

In this way, concrete measures have been taken one by one in order to convert the local Vodokanals into self-supporting organizations in its territory.

However, the DOMIWPs, the organizations responsible for inter-regional main pipelines, such as Tuyamuyun-Nukus (T-N) and Tuyamuyun-Urgench (T-U) and others are still being financially supported by the Central Government (MPU) for their management of maintenance, operation by approx. eighty (80) percent and capital Construction by hundred (100) percent.

The above process of transition was explained to the Study Team by the respective officials concerned during the First Survey (Sep.-Nov.1994), the Third Survey

(May~Jun. & Oct. 1995) of the First phase, and the Fifth Survey of the Second phase (Jun.-Jul. 1996) in Uzbekistan. It is fully worthwhile to watch with attention the progress from time to time.

In rural areas, branches of Agrovodokanal do not receive financial support from the Government except for capital construction and that made it necessary for them to raise water tariffs for industrial enterprises and other organizations in order to keep the low level of water tariffs for the general public just similar to the Provincial VodoKanal.

In some cases, for example, in the ROK, as the farmers who depend on seasonal income (after the crop season) find it difficult to make monthly payments for the water consumed, Agrovodokanal receives special loan from the Government for its management and repay later after farmers have settled with the Collective Farms.

It is very much inconvenient for the water supply enterprises to obtain finance from the current banking system due to high rate of interest.

#### **7.2.2 Management System**

Since the reform of the MPU organization in 1993, each local VodoKanal such as VodoKanal ROK and VodoKanal Kz is under the respective administration of the Council of Ministers of ROK or the Khokimiat of Khorezm Province.

Therefore, VodoKanal is now obligated to apply for approval to such local administrators regarding the establishment of Capital Investment Program, Financial Documents (Budget and Balance Sheet), Setting up the New Water Tariff, Application for Government subsidies and so on.

Regarding the entities of inter-regional main pipelines, the management is wholly in the hands of the RPADORWP of the MPU in Tashkent, because of their capital investment program not being fully implemented and the amount of investment being large. Only the management of maintenance & operation is entrusted to the respective office at site i.e: DOMIWP T-U at Urgench and DOMIWP T-N at Nukus. Each office at site is obligated to make monthly progress report to the RPADORWP of the MPU, Tashkent. For these Entities, it is too early to consider the convertibility of themselves into self-sufficient enterprises due to their transitional organization, their situation being at the stage of implementation and being subsidized.

### **7.2.3 Accounting system**

According to the explanation of the accountant of Vodokanals, there seems no special accounting system adopted for the water works. Account books are principally based on "cash basis" income and expenditures, and most of the daily work is composed of issuing vouchers, booking of receipts and payments. As for payment fund, besides the daily petty cash, most of the delivery and receipts are made in cash through the dealing bank account, or sometimes by bank cheque, too.

As the statements of accounts, reports of income and expenditure, annual and quarterly, are usually used. But at present such documents as the Balance Sheets and/or Inventory Lists are understood as not habitually used for reporting purposes and these are prepared specially upon request.

Due to the high rate of inflation, there hardly exist the usage of "loan or borrowed money", and in case of a shortage of operational money or budget deficiency, it may be helped by the Provincial Khokimiat in Urgench or the Council of Ministers, ROK as exceptionally.

VodoKanal sometimes faces a shortage of funds for payment due to accumulation of delayed settlement of bills and when even the local Government can not afford to assist VodoKanal financially due to budgetary reasons, the activities of Water Services cannot be helped from being adversely affected and suspended for some time. Thus due to non availability of funding sources, cash position of VodoKanal is confronted with difficulty even for the daily working expenses.

As a special case, The GOU provides "no-interest loans" to MPU in order to buy certain types of equipment and materials supplied from the CIS countries (disinfectants, reagents for water treatment, etc.), After receiving the mentioned equipment and materials, Vodokanals and the regional pipelines pay the loans back.

### **7.2.4 Financial Progress**

Since the reform of the MPU organization in 1993, Vodokanals have been trying to aim a solid financial status as for "Regular Services" such as maintaining water quality & quantity, operation and repairs of the facilities, settlement of claims by the consumers, collection of water charges etc. based practically on the revenue from water charges.

Corresponding financial progress of Vodokanals in the budgetary year of 1994 , 1995 and of the first quarter of the year 1996 including some forecast can be referred in Table 7.1 and Table 7.2.

As far as these latest data are concerned, the balance is basically favorable under the conditional situation that the expenditures for both repairs and materials (mainly chemical products) are not fully disbursed as anticipated in the budget due to the shortage of sufficient supply of materials and means which are necessary for the improvement of water supply services.

The above situation is understood as transitory and when the activities of Vodokanals are normalized with less constraints, the details of proportional expenditures will be changed both in items and amounts.

It will be rather difficult for Vodokanals hereafter to continue to keep a solid financial status under the limitation that the support of the Central Government for capital construction are being gradually reduced finally down to zero in the near future and that the supports of the local budget are not certain.

Provincial Khokimiats should secure the sources of VodoKanal budget by reviewing and revising the current tariffs timely and by giving the financial support from the Provincial budgets, which may still not satisfy the required amount.

As for the DOMIWPs (T-N & T-U), some accounting statements of both entities (T-N & T-U) have been prepared and collected only recently, and due to that their data are partly inconsistent, therefore, the financial analysis was not made in a enough way and only summary sheets have been prepared by the study team. Because the DOMIWPs (T-N & T-U) are under the organization of MPU, the principal part of their budget is supported by the Central Government (MPU). The only revenue from the sales of water produced at Tuyamuyun Facilities cover approximately twenty (20) percent of the budget of "Regular Services" for maintenance & operation, and the Central Government is supporting the remaining portion of the budget including the money for "capital construction" as a form of subsidies and allocations. For some details, refer to Table 7.3 and Table 7.4.

The Government of Uzbekistan plans to gradually reduce to zero the subsidies (financial support) to the DOMIWPs for maintenance and operation of the facilities by the year 2000, in view of self-sufficiency plan.

Table 7.1 Financial Progress

Vodokanal KKP "SUUAKABA"														
Item	Unit	1994		1995				1996 Q1				1996 Q1'Q2		
		Actual	%	Forecast	%	Actual	%	Forecast	%	Actual	%	Forecast	Actual	
1.Total Supply	Ths.m <sup>3</sup>	68,919		61,168		63,103		N.A		13,210		32,281	30,153	
2.Total Water Sales	*	54,224	100%	47,006	100%	47,109	100%	10,675	100%	10,689	100%	21,340	21,360	
including:														
Grp-(1) Residents	*	22,656	41.8%	21,960	46.7%	22,015	46.7%	5,227	49%	5,237	49%	10,703		
(2) Pub. Services	*	22,579	41.6%	18,048	38.4%	18,093	38.4%	3,989	37%	3,992	37%	7,720		
(3) Industry	*	8,989	16.6%	6,998	14.9%	7,001	14.9%	1,459	14%	1,460	14%	2,917		
3.Water Sales/Supply	*	78.7%		76.8%		74.7%		N.A		80.9%		66.1%	70.8%	
※(E · W · R)														
4.Purchased Water	*													
5.Total Revenues	Ths. Sum	15,518	100%	132,652	100%	132,776	100%	46,884	100%	31,721	100%	97,626		
including:														
Grp-(1) Residents	*	342	2%	4,831	3.6%	4,843	3.65%	1,295	3%	1,075	3.4%	3,658		
(2) Pub. Services	*	12,096	78%	91,356	68.9%	91,461	68.88%	32,985	70%	22,310	70.3%	67,302		
(3) Industry	*	3,080	20%	36,465	27.5%	36,472	27.47%	12,604	27%	8,336	26.3%	26,666		
6.Profit & Loss	*	+3,102	20.0%	+15,721	11.9%	+25,045	18.9%	+4,886	10.4%	+4,724	14.9%	+9,500		
7.Total Expenditures	*	12,416	100%	116,931	100%	107,731	100%	41,998	100%	26,997	100%	88,126	87,365	
including:														
8.Electricity	*	1,048	8%	17,325	14.8%	16,984	15.77%	6,089	14.50%	5,200	19.26%	13,215	12,996	
9.Wages(Labour Fund)	*	1,556	13%	8,481	7.3%	9,612	8.92%	3,228	7.69%	2,139	7.92%	6,281	6,538	
10.Social Ins.	*	559	5%	3,392	2.9%	3,845	3.57%	1,227	2.92%	812	3.01%	2,512	2,615	
11.Depreciation	*	375	3%	5,756	4.9%	5,868	5.45%	1,494	3.56%	1,195	4.43%	2,983	3,083	
12.Purchased Water	*	3,126	25%	41,633	35.6%	38,995	36.20%	16,260	38.72%	9,505	35.21%	34,916	42,222	
13.Repair Fund	*	4,027	32%	20,990	18.0%	17,071	15.85%	6,478	15.42%	3,181	11.78%	7,907	6,746	
14.Disinfectants(material)	*	393	3%	2,691	2.3%	1,818	1.69%	1,640	3.91%	492	1.82%	2,781	2,321	
15.Fuel,Gas,Lub.	*	220	2%	2,676	2.3%	2,536	2.35%	751	1.79%	499	1.85%	1,998	1,940	
16.Transportation	*	502	4%	4,004	3.4%	3,301	3.06%	1,772	4.22%	1,110	4.11%	3,112		
17.Other Operating Cost	*	610	5%	7,761	6.6%	5,271	4.89%	2,867	6.83%	1,741	6.45%	12,027	8,904	
18.Others(non-operational)	*			2,222	1.9%	2,430	2.26%	193	0.46%	1,124	4.16%	389		
19.Revenues/Expenditures	Ratio	1.25		1.13		1.23		1.12		1.17		1.11		
20.Water Sales/Water Supply	*	0.79		0.77		0.75				0.81		0.66	0.71	
21.Unit Cost	sum/m <sup>3</sup>	0.23		2.49		2.29		3.93		2.53		4.13	4.09	
22.Ave.Tariff	*	0.29		2.82		2.82		4.39		2.97		4.57		
23.Actual Tariff	*													
Grp-(1)	*	0.02				0.22				0.22		0.50		
Grp-(2)	*	2.40				6.70				9.64		9.64		
Grp-(3)	*	2.40				6.70				9.64		9.64		
		(As of Dec.1994)				(As of Dec.1995)				(As of Mar.1996)				(As of Jun.1996)

※ E · W · R : Effective Water Ratio

Source : Vodokanal-The Rep.of Karakalpakstan

MPU-Tashkent, ROU

Table 7.2 Financial Progress

Vodokanal KZ "SUVOKAVA"													
Item	Unit	1994		1995				1996 Q1				1996 Q1-Q2	
		Actual	%	Forecast	%	Actual	%	Forecast	%	Actual	%	Forecast	Actual
1.Total Supply	Ths.m <sup>3</sup>	73,272		66,840		68,622		N.A		N.A		28,506	29,316
2.Total Water Sales	"	66,673	100%	60,503	100%	61,778	100%	13,527	100%	13,873	100%	26,451	27,091
including:													
Grp-(1) Residents	"	27,189	40.8%	26,200	43.3%	26,571	43.0%	5,936	43.9%	5,936	42.8%		
(2) Pub. Services	"	23,497	35.2%	14,076	23.3%	14,586	23.6%	3,318	24.5%	3,691	26.6%		
(3) Industry	"	15,987	24.0%	13,727	22.7%	13,414	21.7%	2,518	18.6%	2,525	18.2%		
Agro Vodokanal	"			6,500	10.7%	7,207	11.7%	1,755	13.0%	1,721	12.4%		
3.Water Sales/Supply *(E · W · R)	"	91.0%		90.5%		90.0%						92.8%	92.4%
4.Purchased Water	"					40,765	66.0%						
5.Total Revenues	Ths Sum	13,052	100%	59,657	100%	59,982	100%	15,022	100%	15,185.6	100%	N.A	N.A
including:													
Grp-(1) Residents	"	563	4.3%	2,270	3.8%	2,559	4.3%	1,484	9.9%	1,484	9.8%		
(2) Pub. Services	"	6,350	48.7%	26,670	44.7%	27,557	45.9%	6,302	42.0%	6,454.8	42.5%		
(3) Industry	"	6,139	47.0%	29,500	49.4%	28,503	47.5%	6,798	45.3%	6,816.6	44.9%		
Agro Vodokanal	"			1,217	2.0%	1,363	2.3%	438	2.9%	430.2	2.8%		
6.Profit & Loss	"	+3,205	24.6%	+6,212	10.4%	+6,913	11.5%	+3,467	23.1%	-1,232.4	7.5%		
7.Total Expenditures	"	9,847	100%	53,445	100%	53,069	100%	11,555	100%	16,418	100%	37,082	44,502
including:													
8.Electricity	"	1,455	14.8%	20,851	39.0%	18,529	34.91%	5,169	44.7%	2,380	14.50%	12,718	13,074
9.Wages(Labour Fund)	"	1,890	19.2%	7,298	13.7%	7,888	14.86%	1,316	11.4%	2,224	13.55%	4,663	5,527
10.Social Ins.	"	816	8.3%	2,919	5.5%	3,155	5.95%	526	4.6%	2,651	16.15%	1,885	2,211
11.Depreciation	"	1,515	15.4%	3,555	6.7%	3,454	6.51%	599	5.2%	829	5.05%	1,522	1,748
12.Purchased Water	"	1,732	17.6%	7,633	14.3%	8,104	15.27%	1,796	15.5%	4,226	25.74%	7,796	9,906
13.Repair Fund	"	891	9.0%	2,296	4.3%	1,792	3.38%	429	3.7%	798	4.86%	2,091	1,604
14.Disinfectants(material)	"	299	3.0%	4,834	9.0%	2,897	5.46%	526	4.6%	959	5.84%	1,940	2,230
15.Fuel,Gas,Lub.	"	335	3.4%	1,099	2.1%	2,004	3.78%	402	3.5%	1,048	6.38%	1,354	2,201
16.Workshop	"			1,073	2.0%	2,466	4.65%	193	1.7%	65	0.40%		
17.Other Operating Exp.	"	500	5.1%	1,887	3.5%	2,780	5.24%	90	0.8%	84	0.51%		
18.Others	"	414	4.2%		0.0%		0.0%	509	4.4%	1,154	7.03%	3,113	6,001
19.Revenues/Expenditures	Ratio	1.33		1.12		1.13		1.30		0.92		N.A	N.A
20.Water Sales/Water Supply	"	0.91		0.91		0.90		N.A		N.A		0.93	0.92
21.Unit Cost	sun/m <sup>3</sup>	0.15		0.88		0.86		0.85		1.18		1.40	1.64
22.Ave.Tariff	"	0.20		0.99		0.97		1.11		1.09		N.A	N.A
23.Actual Tariff	"												
Grp-(1)	"	0.02				0.25				0.55		0.55	
	"									★(0.35)		★(0.35)	
Grp-(2)	"	0.60				2.50				4.28		6.70	
Grp-(3)	"	0.72				2.70				5.13		7.90	
		(As of Dec.1994)				(As of Dec.1995)				(As of Mar.1996) (As of Jun.1996)			

\* E · W · R : Effective Water Ratio

★ Data from MPU

Source : · Vodokanal-Khorezm Region

· MPU-Tashkent, ROU



Table 7.3 Tuyamuyun-Nukus (T-N) : Financial Performance

	Unit	June, 1996.									
		1994		1995		1996 Q1		1996(Q1-Q2)		1996	
		Forecast	Result	Forecast	Result	Forecast	Result	Forecast	Result	Forecast	
a) Production	10 <sup>3</sup> m <sup>3</sup>		45,900	43,844	43,924	7,644	7,644	21,444	21,444	46,248	
b) Water Sales	10 <sup>3</sup> m <sup>3</sup>	31,457	35,117	34,121	35,088	6,903	6,915	17,605	18,183	37,121	
including:											
-Vodokanal KKP	10 <sup>3</sup> m <sup>3</sup>	30,333	33,427	31,895	32,481	6,370	6,218				
	%	96.43%	95.19%	93.48%	92.57%	92.28%	89.92%				
-Agro Vodokanak	10 <sup>3</sup> m <sup>3</sup>	1,124	1,689	2,226	2,607	420	584				
	%	3.57%	4.81%	6.52%	7.43%	6.08%	8.45%				
-Other Consumers	10 <sup>3</sup> m <sup>3</sup>	—	—	—	—	113	113				
	%	—	—	—	—	1.64%	1.63%				
(b/a) Effectiveness	%		76.51%	77.82%	79.88%	90.31%	90.46%	82.10%	84.79%	80.27%	
c) Revenue	10 <sup>3</sup> sum	1,511	1,740	8,083	8,281	4,654	4,725				
including:											
-Vodokanal KKP	10 <sup>3</sup> sum	1,378	1,536	6,530	6,578	3,920	3,809				
	%	91.20%	88.30%	80.79%	79.43%	84.23%	80.62%				
-Agro Vodokanal	10 <sup>3</sup> sum	133	204.5	1,553	1,703	259	360				
	%	8.80%	11.75%	19.21%	20.57%	5.57%	7.62%				
-Other Consumers	10 <sup>3</sup> sum	—	—	—	—	475	555.1				
	%	—	—	—	—	10.21%	11.75%				
d) Profit or Loss(c-f)	10 <sup>3</sup> sum	-14,946	-8,775	-101,367	-75,676	-27,816	-21,445				
e) Revenue Rate(c/f)	%	9.18%	16.55%	7.39%	9.86%	14.33%	18.06%				
f) Expenditure	10 <sup>3</sup> sum	16,457	10,515	109,450	83,957	32,470	26,170	72,475	64,684	159,239	
Σ (g/e~n/e)	%	100%	100%	100%	100%	100%	100%	100%	100%	100%	
(including)											
g) B. Power	10 <sup>3</sup> sum	6,132	6,000	58,840	57,881	13,412	12,350	35,847	34,786	87,734	
(g/e)	%	37.26%	57.06%	53.76%	68.94%	41.31%	47.19%	49.46%	53.78%	55.10%	
(g/b)	sum per m <sup>3</sup>	0.19	0.17	1.72	1.65	1.94	1.79	2.04	1.91	2.36	
h) Depreciation	10 <sup>3</sup> sum	33	39	8,535	3,007	2,777	2,774	5,555	5,555	14,063	
(h/e)	%	0.20%	0.37%	7.80%	3.58%	8.55%	10.60%	7.66%	8.59%	8.83%	
(h/b)	sum per m <sup>3</sup>	0.001	0.001	0.25	0.09	0.40	0.40	0.32	0.31	0.38	
i) Labour Fund	10 <sup>3</sup> sum	1,920	1,870	9,408	8,023	4,367	4,367	9,641	8,269	18,639	
(i/e)	%	11.67%	17.78%	8.60%	9.56%	13.45%	16.69%	13.30%	12.78%	11.71%	
(i/b)	sum per m <sup>3</sup>	0.06	0.05	0.28	0.23	0.63	0.63	0.55	0.45	0.50	
j) Disinfectants	10 <sup>3</sup> sum	2,718	133	19,425	3,341	1,534	499	3,984	1,656	6,678	
(j/e)	%	16.52%	1.26%	17.75%	3.98%	4.72%	1.91%	5.50%	2.56%	4.19%	
(j/b)	sum per m <sup>3</sup>	0.086	0.004	0.569	0.10	0.22	0.07	0.23	0.09	0.18	
k) Repair Fund	10 <sup>3</sup> sum			2,476	1,760	1,020	526	3,165	3,261	6,225	
(k/e)	%			2.26%	2.10%	3.14%	2.01%	4.37%	5.04%	3.91%	
(k/b)	sum per m <sup>3</sup>			0.07	0.05	0.15	0.08	0.18	0.18	0.17	
l) Social Ins	10 <sup>3</sup> sum	768	751	3,763	3,209	1,590	1,590	3,856	3,308	7,456	
(l/e)	%	4.67%	7.14%	3.44%	3.82%	4.90%	6.08%	5.32%	5.11%	4.68%	
(l/b)	sum per m <sup>3</sup>	0.02	0.02	0.11	0.09	0.23	0.23	0.22	0.18	0.20	
m) Fuel & Oil	10 <sup>3</sup> sum	293	356	3,843	3,299	1,975	1,030	4,932	2,784	8,332	
(m/e)	%	1.78%	3.39%	3.51%	3.93%	6.08%	3.94%	6.81%	4.30%	5.23%	
(m/b)	sum per m <sup>3</sup>	0.01	0.01	0.11	0.09	0.29	0.15	0.28	0.15	0.22	
n) Others	10 <sup>3</sup> sum	4,593	1,366	3,160	3,437	5,795	3,034	5,495	5,065	10,112	
(n/e)	%	27.91%	12.99%	2.89%	4.09%	17.85%	11.59%	7.58%	7.83%	6.35%	
(n/b)	sum per m <sup>3</sup>	0.15	0.04	0.09	0.10	0.84	0.44	0.31	0.28	0.27	
o) Unit Cost(e/b)	sum per m <sup>3</sup>	0.52	0.30	3.21	2.39	4.70	3.78	4.12	3.56	4.29	
p) Ave. Tariff(c/b)	sum per m <sup>3</sup>	0.05	0.05	0.24	0.24	0.67	0.68				
q) Water Tariff											
1) KKP/V.K			0.06*0.05		0.1*0.25		0.25		0.80		
2) Agro.V.K			0.02*0.05		0.1*0.25		0.80		0.80		
3) others			0.26*0.51		0.9*3.2		4.20		4.20		

Source : • Tuyamuyun-Nukus, ROK  
• MPU-Tashket, ROU

Table 7.4 Tuyamuyun-Urgench (T-U) : Financial Performance

June, 1996.

	Unit	1994	1995Q1		1995		1996(Q1-Q2)		1996
		Actual	Forecast	Result	Forecast	Result	Forecast	Result	Forecast
a) Production	10 <sup>3</sup> m <sup>3</sup>	73,105	18,000	18,000	69,620	71,377	36,200	36,400	73,000
b) Water Sales	10 <sup>3</sup> m <sup>3</sup>	66,465	16,200	16,320	62,320	63,438	32,580	33,102	65,700
(b/a) Effectiveness	%	90.92%	90.00%	90.67%	89.51%	88.88%	90.00%	90.94%	90.00%
c) Revenue	10 <sup>3</sup> /sum	2,858	1,620	1,632	12,340	12,630	16,245	16,509	34,461
	Receivable	535							
d) Profit or Loss(c-f)	10 <sup>3</sup> /sum	-8,604	-11,554	-8,268	-85,553	-78,153	-69,242	-58,733	-148,719
e) Revenue Rate(c/f)	%	24.93%	12.30%	16.48%	12.61%	13.91%	19.00%	21.94%	18.81%
f) Expenditure Σ(g~n)	10 <sup>3</sup> /sum	11,462	13,174	9,900	97,893	90,783	85,487	75,242	183,180
Σ(g~n)/f	%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
(including)									
g) E. Power	10 <sup>3</sup> /sum	5,007	4,925	4,468	50,307	49,560	49,267	45,279	105,589
(g/f)	%	43.68%	37.38%	45.13%	51.39%	54.59%	57.63%	60.18%	57.64%
(g/b)	sum per m <sup>3</sup>	0.08	0.30	0.27	0.81	0.78	1.51	1.37	1.61
h) Depreciation	10 <sup>3</sup> /sum	501	375	375	6,700	6,563	4,274	4,247	8,550
(h/f)	%	4.37%	2.85%	3.79%	6.84%	7.23%	5.00%	5.64%	4.67%
(h/b)	sum per m <sup>3</sup>	0.01	0.02	0.02	0.11	0.10	0.13	0.13	0.13
i) Labour Fund	10 <sup>3</sup> /sum	1,333	1,180	1,153	8,954	7,937	8,355	7,748	18,198
(i/f)	%	11.63%	8.96%	11.65%	9.15%	8.74%	9.77%	10.30%	9.93%
(i/b)	sum per m <sup>3</sup>	0.02	0.07	0.07	0.14	0.13	0.26	0.23	0.28
j) Disinfectants	10 <sup>3</sup> /sum	2,022	2,379	1,612	13,075	11,101	8,060	6,574	16,404
(j/f)	%	17.64%	18.06%	16.28%	13.36%	12.23%	9.43%	8.74%	8.96%
(j/b)	sum per m <sup>3</sup>	0.03	0.15	0.10	0.21	0.17	0.25	0.20	0.25
k) Repair Fund	10 <sup>3</sup> /sum	280	75	71	4,700	4,614	3,467	2,496	7,254
(k/f)	%	2.44%	0.57%	0.72%	4.80%	5.08%	4.06%	3.32%	3.96%
(k/b)	sum per m <sup>3</sup>	0.004	0.005	0.004	0.075	0.073	0.106	0.075	0.110
l) Social Ins	10 <sup>3</sup> /sum	449	472	461	3,582	3,175	3,342	3,036	7,279
(l/f)	%	3.92%	3.58%	4.66%	3.66%	3.50%	3.91%	4.03%	3.97%
(l/b)	sum per m <sup>3</sup>	0.01	0.03	0.03	0.06	0.05	0.10	0.09	0.11
m) Fuel, Oil & Gas	10 <sup>3</sup> /sum	714	2,426	1,410	4,639	3,598	5,090	2,609	11,756
(m/f)	%	6.23%	18.42%	14.24%	4.74%	3.96%	5.95%	3.47%	6.42%
(m/b)	sum per m <sup>3</sup>	0.01	0.15	0.09	0.07	0.06	0.16	0.08	0.18
n) Others	10 <sup>3</sup> /sum	1,156	1,342	350	5,936	4,235	3,632	3,253	8,150
(n/f)	%	10.09%	10.19%	3.54%	6.06%	4.66%	4.25%	4.32%	4.45%
o) Unit Cost(f/b)	sum per m <sup>3</sup>	0.17	0.81	0.61	1.57	1.43	2.62	2.27	2.79
p) Ave. Tariff(c/b)	sum per m <sup>3</sup>	0.04	0.10	0.10	0.20	0.20	0.50	0.50	0.52
Water Tariff									1996.6 0.55

Source : • Tuyamuyun-Urgench, Khorezm

• MPU-Tashkent, ROU

However, this plan of GOU is quite difficult to realize, considering the present revenue coverage over the expenditures for maintenance and operation, with the current water tariff to the consumers through the Vodokanals.

On the other hand, the operation of provincial production enterprises "Suvokava" and "Suukaba" (Vodokanals) should be self-sufficient in accordance with the Resolution No. 54 of Feb. 1994. Vodokanals may increase their water tariff up to the maximum extent within the affordability of the consumers including the population.

On the other hand, water tariffs of DOMIWPs are set up politically by the GOU through MPU, mainly considering a kind of the social security of the population and not procuring its' self efficiency.

Thus, there is a limit of revenue increase on both Vodokanals and DOMIWPs.

Therefore, as far as the self-efficiency of Vodokanals are maintained within the limited tariff, then DOMIWPs revenue deficiency will not be covered by the water tariff, and should be supported as subsidies by the GOU.

#### **7.2.5 Water Tariff System**

Water tariff herein means the Tariffs for the piped tap water (drinking, domestic, heating etc.), and there are different kinds of taps such as street taps, yard taps, In-house taps etc. Depending on housing conditions (centralized sewerage system, bath with individual water heating facilities or centralized hot water supply) normative documents fix the specific water consumption to satisfy the needs of population and the payments for consumption are charged on this basis.

##### **(1) Basic Concept**

Basic framework of the settlements with the residents for tap water and sewerage services is established according to the Letter of Instructions "On the Proceedings for Settlements with the Residents for Tap Water and Sewerage Services in the Republic of Uzbekistan", approved by the Decree of the Council on Prices of the Ministry of Finance of the Republic of Uzbekistan No. 31/22 dated September 22, 1992. The basic concept of the calculations is: "Quantity of consumed water will be determined by water gauges. If they are not available, by the effective water consumption ration, approved by the Ministry of Utilities of Uzbekistan".

This elaborated list of the effective water consumption ration was modified thereafter, but the principle of this concept has remained unchanged. Namely beneficiaries should pay for the water they consume.

In order to grasp the correct consumption volume of each household, the water metering system was finally adopted by law as the supplement to the Decree No. 185, May 26, 1995 for all the populations. And, now the water metering system is being applied to all of the consumers.

With this concept, the Government of Uzbekistan from the beginning has been establishing exceptionally low tariffs to the residents for the sake of social security, and higher tariffs to the other consumers like budgetary institutions, self-sufficient enterprises, and industrial organizations in order to cover the corresponding gaps of the tariffs between consumers.

As a result, there have been producing year by year a bigger difference in tariffs between the residents and other beneficiaries, which is one of the special features of the ROU.

Therefore, water supply services have almost naturally been deemed by the residents as a kind of social welfare to be conducted by the Central Government.

## **(2) Current Water Tariff System**

In Vodokanals, consumers are classified in three (3) categories with different basic tariffs.

They are;

- Group (1): The Residents (basically without an individual water meter).
- Group (2): Budgetary Institutions, Self-Sufficient Sanatoria and Health Resorts, Medical and Sanitation Institutions, Public Dietary Enterprises, Municipal and Public Services Enterprises, Collective Farms and State Farms (partly with a water meter).  
More detail as per Table 7.5.
- Group (3): Industrial, Construction, Commercial and other Enterprises, Organizations and Establishments (with water meters in general).

## Table 7.5 List of Group (2) Water Consumers

Second group of consumers includes budget supported institutions, self-sufficient sanatoria and health resorts, health care and rehabilitation organizations and institutions, public catering enterprises and enterprises providing municipal and public services, collective and state farm.

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### (I) Organizations and institutions supported by the state budget:

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- a) Scientific and research institutes, laboratories, design bureaus and other scientific and research institutions;
  - b) Hospitals, clinics, prophylactoria, special clinics, maternity houses, sanatoria and other health care institutions;
  - c) Schools, boarding-schools, higher educational establishments, secondary technical schools;
  - d) Kindergartens, day nurseries, orphanages, children's camps and other children's institutions;
  - e) Museums, exhibitions, libraries, planetaria, clubs, Houses of culture and other cultural and educational as well as entertainment institutions;
  - f) Parks of Culture and Rest, public gardens, botanical gardens and zoos;
  - g) Stadia, hippodromes, swimming pools, gyms and other sports facilities;
  - h) Military units, enterprises and educational establishments affiliated to the Ministry of Defense, Ministry of Internal Affairs and National Security Service of the Republic of Uzbekistan except for trade, industrial and construction enterprises;
- 

Note: Settlements with the institutions, listed in points a), c) and f) but enjoying self-sufficient status, are practiced on the basis of tariff, fixed for the 3-rd group of consumers.

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### (II) Self-sufficient sanatorium and resort institutions and establishments (clinics, sanatoria, Houses of Rest, Boarding Houses, Tourist Camps, encampments etc.)

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### (III) AGRICULTURAL ENTERPRISES:

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- a) Collective farms, state farms;
  - b) Independent farms and Subsidiary farms affiliated to State, Cooperation and Public enterprises and establishments;
  - c) Pilot production, experiment and training agricultural enterprises (Farms under scientific and research institutions as well as educational establishments);
  - d) Veterinary laboratories (stations and points), veterinary clinics, pest control and live stock diseases control stations, veterinary and sanitation stations, mobile veterinary and sanitation stations, boundary and check-up veterinary posts, meat and milk reception centers.
- 

### (IV) Public catering enterprises: canteens, snack bars, tea houses, cafeteria, restaurants, beer bars, cook-houses and other public catering establishments.

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### (V) Enterprises providing municipal and public services for the population:

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- a) Production trusts (hotels, motels, camps)
- b) Bodies for dwelling areas operation (for own needs)
- c) Trusts, offices, bureaus providing funeral services including those possessing production units (workshops) to produce monuments, gravestones, wreaths and other funeral attributes, cemeteries;
- d) Gas management enterprises (Managerial Boards, Trusts, Offices, Posts), Water supply and sewerage agencies, agencies for city good arrangement, public electric transport enterprises, energy supplying agencies (municipal electric power suppliers, district and ward heating centers)
- e) Repair and construction trusts, managerial boards, units undertaking repair and construction of dwelling facilities under the orders of population;

- f) Public service centers, public bath houses, Laundries, linen treatment and hire centers, dry cleaning shops, self-service centers, hiring shops.
  - g) Hairdresser's shop, photo-studios, dress and shoe repair shops, for repairs of household facilities and other attributes.
- 

In case of Group (1), due to non availability of water meters at the moment and due to large complications and costs involved in installation of meters in multi-storied houses as well as in private houses, a system for calculation of the effective water consumption ration has been adopted, wherein the tariff and the norms of consumption volume per capita per month are decided based on the number of family members and data of water-use inventories such as lavatory, bath, sink, sewerage pipe, cattle, vehicles, garden, heating system etc. in the household.

In this case, there exist slight differences between Vodokanals with regard to the basic tariff, unit volume of consumption and the classification of housing categories. (For details, refer to Table 7.6 and Table 7.7.

According to the Decree No. 54, VodoKanals are in a position to apply for the adjusted preferential rates to the local government, and tariff setting procedures have become more flexible and convenient than before, with no intervention of the MPU, the State Committee for Prices and the Ministry of Finance of the Republic of Uzbekistan.

Usually, VodoKanals decide first the tariff to be charged from the residents, then gets them approved by Khokimiats and on this basis, starts to enter into negotiation with the consumers of Group (2) & Group (3). But with the reduction of financial support from the MPU, now that VodoKanals must secure major part of their budgetary fund from the water charges, they will naturally be compelled to raise the tariff for all groups.

Besides tariffs from the final consumers, there is another water tariff charged by the DOMIWP from the local Vodokanals for the treated water produced at Tuyamuyun. This is the so-called "Wholesale Price" from the producer (the DOMIWP) to the retailer (VodoKanal), which is determined on the lower level regardless of the water cost by the Central Government (the MPU) based on policy reasoning, taking the ultimate retail price level to the residents (consumers) into consideration.

Table 7.6 Evolution of Water prices-Vodokanal ROK(per cubic meter)

Year	Date of Introduction & Currency		Consumers Group			
			(1)	(2)		(3)
			Resident	Budget	Selfsufficient	Industrial
1990	01.01.'89	Kopek	4.00	7.00	7.00	12.00
1991	01.01.'91	- / -	4.00	7.00	24.00	28.00
	16.01.'91	- / -	8.00	—	—	—
1992	16.01.'92	sum/coupon	—	1.08	2.95	2.95
	16.08.'92	- / -	0.50	—	—	—
	16.08.'92	- / -	—	1.08	2.95	2.95
	01.10.'92	- / -	0.50	—	—	—
	01.10.'92	- / -	—	7.40	10.91	10.91
1993	01.01.'93	- / -	0.50	—	—	—
	01.01.'93	- / -	—	14.56	16.64	16.64
	01.06.'93	- / -	1.00	—	—	—
	01.06.'93	- / -	—	14.56	16.64	16.64
	01.07.'93	- / -	1.00	—	—	—
	01.07.'93	- / -	—	29.00	33.00	33.00
	01.08.'93	- / -	1.00	93.00	105.00	105.00
	16.11.'93	- / -	2.00	93.00	105.00	105.00
1994	01.01.'94	- / -	2.00	93.00	105.00	105.00
	01.02.'94	- / -	20.00	251.00	251.00	251.00
	01.07.'94	sum	0.02	0.43	0.43	0.43
	01.09.'94	- / -	0.02	0.92	0.92	0.92
	01.10.'94	- / -	0.02	2.40	2.40	2.40
1995	01.01.'95	- / -	0.22	2.40	2.40	2.40
			[0.09]	{2.20}	{2.20}	{2.20}
	20.04.'95	- / -	0.22	6.70	6.70	6.70
			[0.09]	{6.66}	{6.66}	{6.66}
1996	10.02.'96	- / -	0.22	9.64	9.64	9.64
	01.06.'96	- / -	0.50	9.64	9.64	9.64

Note: Since 16.01.1992, negotiated pricing system has been applied to consumer groups (2)&(3).

Figures in parentheses are Tariff Rate of Sewerage.

Source; Vodokanal-The Rep. of Karakalpakstan

Table 7.7 Evolution of Water Price-Vodokanale Kz (per cubic meter)

Year/Price Basis	Introduction Date	RriceUnit	Group(1)	Group(2)		Group(3)
				Budget	Selfsufficient	
1990 - Tariff	01.01.90	kop.	4.00	4.00	9.00	15.00
1991 - Tariff	01.01.91	kop.	4.00	9.00	16.00	25.00
1992 - Tariff	01.01.92	kop.	8.00	0.90	1.20	1.20
- Tariff	01.09.92	kop.	0.50			
- Agreement	01.12.92	s/coupon	0.50	2.00	6.00	8.00
1993 - Tariff	01.01.93	- / -	0.50 [0.50]			
- Agreement	- / -	- / -		5.00	12.00	17.00 [20.00]
- Tariff	01.07.93	- / -	1.00 [0.60]			
- Agreement	- / -	- / -		15.00	24.00	40.00 [54.00]
- Tariff	01.08.93	- / -	1.00 [0.60]			
- Agreement	- / -	- / -		60.00	70.00	95.00 [120.00]
- Tariff	01.11.93	- / -	2.00 [1.50]			
1994 - Tariff	01.01.94	- / -	2.00 [1.50]			
- Agreement	- / -	- / -		60.00	70.00	95.00 [120.00]
- Tariff	01.04.94	- / -	20.00 [15.00]			
- Agreement	- / -	- / -		298.00	301.00	334.00 [501.00]
- Tariff	01.06.94	- / -	20.00 [15.00]			
- Agreement	- / -	- / -		335.00	320.00	362.00 [533.00]
- Tariff	01.07.94	soum	0.02 [1.50]			
- Agreement	- / -	- / -		0.34	0.32	0.40 [0.53]
- Tariff	01.08.94	- / -	0.02 [1.50]			
- Agreement	- / -	- / -		0.40	0.40	0.48 [0.64]
- Tariff	01.10.94	- / -	0.02 [1.50]			
- Agreement	- / -	- / -		0.60	0.60	0.72 [0.96]
1995 - Tariff	01.01.95	- / -	0.02 [1.50]			
- Agreement	- / -	- / -		0.60	0.60	0.72 [0.96]
- Tariff	01.02.95	- / -	0.02 [1.50]			
- Agreement	- / -	- / -		1.10	1.35	1.35 [1.91]
- Tariff	01.03.95	- / -	0.10 [0.14]			
- Agreement	01.04.95	- / -		2.04	2.36	2.25 [3.08]
- Tariff	01.06.95	- / -	0.10 [0.14]			
- Agreement	- / -	- / -		2.50	2.36	2.70 [3.08]
- Tariff	01.06.95	- / -	0.25 [0.30]			
1996 - Tariff	01.03.96	- / -	0.55(★0.35) [0.60]			
- Agreement	- / -	- / -		4.28	4.40	5.13 [5.00]
- Tariff	01.05.96	- / -	0.55(★0.35) [0.60]			
- Agreement	- / -	- / -		6.70	6.05	7.90 [7.30]

Figures in parentheses are Tariff Rate of Sewerage.

★ Data from MPU

source: Vodokanal-Khorezm Region



Besides the tariff to local VodoKanal, DOMIWPs (T-N in this case) set up another selling price upon negotiation directly with other bulk-consumers mainly like industrial organizations, and others, located near the main-pipeline of Tuyamuyun System. These tariffs are set on the basis of contracts directly between the Offices of DOMIWPs and the consumers.

In 1994, the basic selling rate for Vodokanals by Tuyamuyun system authorized by the Central Government was four tiins (0.04Sum) per m<sup>3</sup>, while Vodokanal's tariff to Group (1) was only two tiins (0.02Sum), which compels VodoKanal to absorb the deficient portion plus some overhead charges from the tariffs to Groups (2) and (3). During the 2nd half of 1994, the tariff for Groups (2) & (3) varied from twenty (20) to hundred twenty (120) times the tariff for Group (1), and as of April 1995, this was approximately thirty (30) times both in KZ and ROK.

The current situation is favorable to the Group (1) consumers whereas the consumers of Group (2) & (3) have to pay higher charges.

Thus, the general framework of water tariff is not well balanced.

### **(3) Billing & Collection System**

As for Group (1), the residents should go to VodoKanal office every month with their consumers' booklet before the due date for making payment against the bill which has been calculated based on the effective water consumption ration according to each consumer's inventory data. These inventory data are renewed every half a year.

In case of a collective house and/or apartment building where a single common water meter of bigger diameter is installed, the consumption ration for each household will be worked out proportionally in terms of the fixed effective water consumption volume by the classified consumers' list (Refer to Table 7.8 and Table 7.9).

As to consumers of Groups (2), & (3) who have a water meter in general, each consumer himself should read and inform the recorded figure to VodoKanal and pay the corresponding charges calculated, and if the water meter is out of order not to be attributable to the consumer then for the sake of convenience, he is authorized to make a payment equivalent to the average of the amounts paid in the past two months. There is a special formula to be applied, depending the case.

Table 7.8 Water Tariff Rates for Residents-Vodokanal Kz (as of Mar.1995)

NO	Kind of Water Consumption	Monthly Water Consumption (m <sup>3</sup> /capita)	Tariff sum/m <sup>3</sup>	Monthly Charge (sum)	Annual Charge (sum)
1	Street Water Taps	1.50	0.10	0.15	1.80
2	Yard Taps and Faucets	3.00	0.10	0.30	3.60
3	In-House Taps	4.20	0.10	0.42	5.04
4	In-House Network,Sink,bath Local Sewerage Network	6.90	0.10	0.69	8.28
5	In-House Network,Sink,bath Central Sewerage System (Without Hot Water Supply)	7.50	0.10	0.75	9.00
	--for Sewerage	7.50	0.14	1.05	12.60
6	--ditto--with Hot Water Supply	10.50	0.10	1.05	12.60
	--for Sewerage	10.50	0.14	1.47	17.67
(Since Feb.1,1995 Water Use for the following purpose is fixed as 1m <sup>3</sup> /month/1.10sum)					
7	Vehicle Washing(Vehicle/day)	0.25	1.10	8.25	99.00
8	Water for Cattles(head/day)	0.012	1.10	0.40	4.80
9	Gardens and Orchards (m <sup>3</sup> /watering)	3.2m <sup>3</sup> /m <sup>2</sup>	1.10	0.29	3.40

Source; Vodokanal Kz, Province of Urgench

Table 7.9 Water Tariff Rates for Residents - Vodokanal ROK (as of Jan. 1995)

NO	Location of Water Consumption	Monthly Water Consumption (m <sup>3</sup> /capita)	Tariff sum/m <sup>3</sup>	Monthly Charge (sum)	Annual Charge (sum)
1	Street Water Taps Houses Without Sewerage System	1.24	0.22	0.27	3.24
2	Yard Water Taps All the Cities and Settlements	2.30	0.22	0.50	6.07
3	In-House Water Pipes, Sink and Bath All the Cities and Settlements	3.00	0.22	0.66	7.92
4	-ditto but with Lavatory- All the Cities and Settlements	4.50	0.22	0.99	11.88
5	In-House Water Pipes,Sink,Wash Basin Bath or Shower with individual Water Heating Facilities	5.30	0.22	1.16	13.99
6	-ditto but with Lavatory-	6.80	0.22	1.50	17.95
7	Houses With Sewerage System	3.50	0.22	0.77	9.24
	In-House Water Pipes with Sink,Wash Basin		0.09	0.31	3.78
8	ditto but with Sink, Lavatory	4.40	0.22	0.77	11.62
			0.09	0.40	4.75
9	-ditto but with Sink,Bath or Shower and Individual Water Heating	6.10	0.22	1.34	16.10
			0.09	0.54	6.59
10	--ditto but with Sink,Bath and Shower Lavatory with Individual Water Heating	7.00	0.22	1.54	18.48
			0.09	0.63	7.56
11	Houses With Sewerage System and Central Water Supply	8.10	0.22	1.78	21.38
	In-House Water Pipes,Sink,Bath Shower Lavatory	10.53	0.09	0.95	11.37

Source : Vodokanal ROK,Rep. of Karakalpakstan

Vodokanal's Service Department which is engaged in the collection of water charges checks the delayed and/or defaulted payers, and is taking every possible measures to secure the payment.

There is a delicate problem, however. According to the regulations though it is possible to suspend water supply to the defaulted consumers, there is a difficulty in doing so in case of Group (1) consumers because of a matter of life and humanity, when compared with Groups (2) & (3), thereby resulting as a whole in a constant shortage of revenue. According to VodoKanal, some kind of consumers such as school teachers, war participants, the handicapped, war veterans, certain grades of pensioners, etc. are exempted or discounted from the payment for water by fifty (50) or thirty (30) percent.

#### **7.2.6 Management Analysis**

According to the Financial Progress of Vodokanals (Table 7.1 and Table 7.2), Vodokanals, both in Khorezm Province and Karakalpakstan, have achieved balanced management as explained in Section 7.2.4, which was made possible by timely adjusting the water tariffs so as not to produce a deficit.

However, At the same time, due to insufficient revenue by low tariffs and debts of consumers of drinking water, Vodokanals do not have the means (finances) for timely major repairs of malfunctioning distribution networks and facilities, and for procuring the machinery, equipment and reagents for supplying of quality water to consumers.

It is to be noted that within the expenditures very small or rather negligible service improvement cost for capital construction and/or renewal of the existing facilities has been recorded. It is understandable that Vodokanals can not obtain such large amount of money required for capital works, repairs etc. from its own revenue sources and still more, at the same time they can hardly get allocation for foreign currency in order to purchase the necessary equipment from outside Uzbekistan. Due to shortage of funds, their capital construction program is being delayed and particularly the implementation of new water pipe-line network (distribution) is suffering the most.

Under these circumstances, Vodokanals can not extend sufficient services mainly because of the shortage of funds, and therefore in general it will be difficult to expect them to maintain a more flexible management on the expected complete self-supporting basis for the time being.

It is advisable that special measures shall be taken by the Government of Uzbekistan for the establishment of new funds for water supply agencies in the form of domestic and/or foreign loans with medium-long terms and with lowest interest rates as much as possible. On the other hand, it is necessary for Vodokanals to be authorized to raise the water tariffs more drastically so as to be able to secure sufficient funds for complete self-supporting system.

According to the Financial Performance (Table 7.3 & Table 7.4), both Tuyamuyun Organizations (T-N and T-U), have been operating on the deficit basis from the beginning, subsidized annually by the GOU through MPU.

Current Tuyamuyun Organizations (DOMIWPs) are still transitory entities under construction with enough logistics by the support of the GOU.

Average water cost is approx. five (5) times the average water tariff. Even though the GOU plans to gradually decrease the corresponding subsidies aiming the maximum efficient management, decision of the water tariff is in the hand of the GOU and the GOU should set up the favorable tariff to the residents through local Vodokanals.

Even under this paradoxical situation, management of DOMIWPs shall have to be done under the necessary support of the GOU, just like similar entities in other countries.

### **7.3 Consumers' Survey on Water Supply Services and on Water Use**

#### **7.3.1 Method & Object of Survey**

**(Period)** June 1995 (1st), June, 1996 (2nd).

**(Object)** A total 123 households in the Six (6) Cities, including 54 households installed with testing water meters exclusively for the Study.

**Table 7.10 Number of Households Interviewed in Each City**

June 1995	VodoKanal ROK					VodoKanal KZ			Total
	Nukus	Chimbay	Kungrad	Muynak	Sub-total	Urgench	Khiva	Sub-total	
Without Water Meter	34	13	14	19	80	8	7	15	95
With Water Meter	(14)	(12)	(14)	(6)	(46)	(6)	(2)	(8)	(54)
June 1996									
Without Water Meter	9	5	4	0	18	5	5	10	28
Total	43	18	18	19	98	13	12	25	123

Source : JICA Study Team

**(Method)** The survey was conducted by collecting the answers for questionnaire through direct interviewing the corresponding households by the JICA Study Team accompanied by staff of the VodoKanal (Field Survey System) and supplementing them with additional households' data collected with the collaboration of VodoKanal.

### 7.3.2 Summary of the Results

#### (1) General Trend

The general trends observed from the results of survey (1st and 2nd) are as shown in Table 7.11.

**Table 7.11 Summary Observed from the Household Survey**

1st Survey]	As of June, 1995	
Question	Answer,	Nos of households (as %)
1 Are you satisfied with present water supply services	No, 89(94%),	Yes, 6(6%)
2 If not satisfied, the reason is.....,	- Irregular Supply, 62 (65%) - Quantity, 55 (58%)	- Quality, 50 (53%)
3 Do you boil water before drinking ?	Yes, 52 (55%)	No, 43 (45%)
4 Do you have an outside tap?	Yes, 51 (54%)	No, 44 (46%)
5 How is the level of water tariff ?	- Low, 26 (28%) - High, 4 (4%)	Acceptable, 64 (68%)
<b>(Willingness to Pay)</b>		
6 Are you willing to pay more for the improvement of water supply services ?	-Yes, 88 (93%)	No, 7 (7%)
7 Do you prefer a payment system by an individual water meter?	- Yes, 74 (78%) No answer, 3 (3%)	No, 18 (19%)
8 What do you desire most from the water supply services ?	- Regular Supply, 65 (68%) - Quality (w/o Saltiness, turbidity) 50 (53%)	

### Observations from the 1st Survey.

- (a) The residents are ready to pay higher water tariff if the services are to be improved.  
(Positive Willingness to pay) See "2nd Survey".
- (b) The majority of the residents are not satisfied either with quantity or quality. Most desired and urgent subject for the improvement of water services is to provide "Regular Supply", and the second is to improve "Water Quality".
- (c) Eighty (80) percent of the residents are in favor of a payment system using individual water meters.
- (d) To ninety-five (95) percent of the residents, the present water tariff is not high and acceptable.

### [2nd Survey] Interviewed with 28 households

No.	Question	Answer,	Nos. of household(%)
<b>(Meter installation)</b>			
1.	Are you willing to install a water meter at your own cost within the short period?	"No",	--- 28 (100%)
2.	The reason of "No" in No.1 question	1) Prefer the existing billing system --- 3 (11%) 2) Will install within a few years --- 2 (7%) 3) Majority of cost should be borne by Vodokanal--- 23 (82%)	
3.	What do you desire most to Vodokanals? Note: Answer includes duplication	1) Regular Supply --- 15 (54%) 2) Quality --- 6 (21%) 3) Satisfied --- 8 (29%) (Kungrad 3, Urgench 4)	
4.	Do you enjoy some discounted rate for water payment?	1) No discount --- 13 (46%) 2) 30% discount --- 1 (4%) 3) 50% discount --- 14 (50%)	
<b>(Affordability)</b>			
5.	What is your affordable charge for 1 m <sup>3</sup> water under improved water service?	Karakalpakstan s/1-3 --- 3 s/5-10 --- 5 s/14 --- 1	Khorezm s/1-3 --- 6 s/2.4-4 --- 2
<b>Affordability :</b>			
	Average	s/6.5/m <sup>3</sup> --- 9	s/2.3/m <sup>3</sup> --- 8
	As per Tariff	--- 7	--- 2
	No idea	--- 2	--- 0
	<b>Total</b>	<b>16 + 2</b>	<b>---10</b>

### Observations from the 2nd Survey

- (a) More than 90% of the interviewed consumers are not willing to bear 100% cost for water meter installation.

- (b) Only 10% of the interviewed consumers prefer to continue the current billing system.
- (c) Approx. 50% of the consumers enjoy some discounted water charge. (50% discount in almost all cases)
- (d) Affordability vary widely and scattering depending on the income position. Needs to devise optimum survey in another opportunity

## **(2) Characteristics by Area and Cities.[1st Survey]**

\* As for the requests:

- Khorezm
- Urgench & Khiva: All the households interviewed: "Improvement of Water Quality"
- Khiva: All households interviewed: "Regular Supply" besides "Water Quality".
- Karakalpakstan
- Chimbay & Muynak: All the households interviewed: "Regular Supply".
- Kungrad: 13 out of 14 households interviewed: "Improvement of Water Quality".
- Nukus: 70% of the households interviewed: "Improvement of Quality "  
53% of the households interviewed: "Regular Supply"

\* As for the style of living :

- Only in Nukus & Muynak, more people drink water without boiling, but in the other four (4) cities 70% of the households interviewed boil the water before drinking
- In Chimbay & Muynak: Residents of all the individual houses depend on the only one outside tap.

## **(3) Other Findings.[1st and 2nd Survey]**

### **(3)-1. Data on the share in the household economy.**

From the results of the survey, the average monthly income of the households interviewed and the share of household expenditure on public utility services are found to be as shown in Table 7.12.

**Table 7.12 Average Monthly Income and Household Expenditure on Utility Services**

[1st Survey]		As of June, 1995									
City	Unit	Nukus	Chimbay	Kungrad	Muyna k	KKP Ave.	Urgench	Khiva	KZ Ave.	Average [Total]	
Ave. Income	sum / month [in US\$]	1,005	1,220	940	1,225	1,081 [\$36.0]	1,388	1,336	1,363 [\$45.4]	1,186 [\$39.5]	
Ave. Expense on Water % per income	sum / month	5.06 [0.5%]	3.87 [0.32%]	3.21 [0.34%]	3.4 [0.28%]		3.26 [0.27%]	3.37 [0.25%]		3.7 [0.31%]	
Ave. Expense on Electricity % per income	sum / month	17 [1.8%]	8.8 [0.7%]	22.7 [2.4%]	20 [1.6%]		34.8 [2.5%]	34 [2.5%]		22.9 [1.9%]	
Ave. Expense on Gas % per income	sum / month	17.7 [1.8%]	15.4 [1.3%]	22.1 [2.4%]	15 [1.2%]		29.1 [2.1%]	19.6 [1.5%]		19.8 [1.7%]	
Aggregated Amount [Water + Gas + Electricity]	sum / month	49.76 [4.0%]	28.07 [2.3%]	48.01 [5.14%]	38.4 [3.13%]		67.16 [4.87%]	56.97 [4.25%]		46.37 [3.91%]	

[2nd Survey]		As of June, 1996									
	Unit [in US\$]	Nukus	Chimbay	Kungrad	Muyna k	KKP Ave.	Urgench	Khiva	KZ Ave.	Average [Total]	
Ave. Income by City	sum / month	2,312 [\$61]	3,427 [\$90]	3,144 [\$83]	N.A.	2,807 [\$74]	5,252 [\$139]	2,794 [\$74]	4,023 [\$106]	3,241 [\$85.3]	
Ave. Expense on Water	sum / month	5.9 [\$0.16]	8.21 [\$0.22]	10.54 [\$0.28]	N.A.	7.57 [\$0.20]	41.7 [\$1.10]	14.7 [\$0.39]	28.2 [\$0.74]	15.6 [\$0.39]	
% per income	%	0.26%	0.22%	0.34%	N.A.	0.27%	0.80%	0.53%	0.70%	0.48%	

Ex-rate : 1995. Jun. 1 US\$ = 30 Sum  
1996. Jun. 1 US\$ = 37.9 SUM

### (3)-2. Observations of Household Expenditure on Utility Services

[1st Survey]

The characteristics of the share of expenditure on each public utility service as a ratio of the average household income, are analyzed below;

- 1.- Ratio: Electricity vs Water: Average  $22.9\text{Sum}/3.70\text{Sum} = 6.91/1$
- 2.- Ratio: Gas vs Water: Average  $19.8\text{Sum}/3.70\text{Sum} = 5.35/1$
- 3.- Share of Expenditure on Water in the aggregated Expenditure on Public Utilities:  
Average  $(3.70\text{Sum}/46.37\text{Sum}) \times 100 \approx 8\%$

- The above figures show that expenditure on water is not a big burden on the household and on the contrary, should be higher when compared with that of electricity and gas.



[2nd Survey]

1.- Khorezm Region shows higher average income and more water consumes than KKP region by approx. 40% more. (Especially water consumption of Urgench City is distinguished probably by gardening).

**(3)-3. Data from testing water meters.**

The average consumption of water as recorded by testing water meters was compared with the average water consumption rations fixed by the Vodokanal in Table 7.13.

**Table 7.13 Comparison of average recorded consumption against ration fixed by VodoKanal in the Six Cities**

City and Territory	No.of Household	(1) Average Recorded volume by meter reading (m <sup>3</sup> )	(2) Average consumption ration fixed by VodoKanal (m <sup>3</sup> )	(1) / (2) (%)
Khiva	2	7.4	27.3	27%
Urgench	6	33.1	35.1	94%
(a) Khorezm	8	26.7	33.2	80%
Nukus	14	16.0	22.4	71%
Chimbay	12	35.3	16.8	210%
Muynak	6	34.6	14.6	237%
Kungrad	14	11.9	14.6	82%
(b)Karakalpakstan	46	22.2	17.6	126%
[(a) +(b)]/2	54	22.9	19.9	115%

(For further details, refer to Table 7.14, collected data of Actual Water Consumption).

**Observations from Table 7.13**

1. Some residents in Khiva are supposed to be delivered less volume of water than the norm consumption.
2. Some residents in Chimbay and Muynak consume exceptionally huge quantity of piped water for unknown use.  
(Exact reason is not derived.)
3. Except Chimbay and Muynak, the residents consume less quantity than the fixed norm, and Seventy-five (75)% of the interviewed family in the area are using less water than the fixed norm.
4. With the metering system in the future, approx. 20 to 30 percent of domestic water consumption will be reduced by proper water usage.

Table 7.14 Collected Data of Actual Water Consumption by water meter of the households in the Study Area As of June 1995

City	House hold No.	by Water Meter (m <sup>3</sup> )	by Vodokanal (m <sup>3</sup> )	City	House hold No.	by Water Meter (m <sup>3</sup> )	by Vodokanal (m <sup>3</sup> )
Nukus	1	14.0	28.0	Kungrad	1	8.2	30.0
	2	4.3	35.0		2	6.0	12.0
	3	14.6	28.0		3	8.0	18.0
	4	60.0	21.0		4	10.0	12.0
	5	9.7	28.0		5	14.0	15.0
	6	7.5	28.0		6	16.0	9.0
	7	4.0	15.0		7	11.0	12.0
	8	8.0	15.0		8	18.0	21.0
	9	16.0	9.0		9	6.0	18.0
	10	11.2	24.0		10	25.0	12.5
	11	15.3	44.0		11	15.0	15.0
	12	6.2	18.4		12	10.0	6.0
	13	12.8	11.5		13	9.0	12.0
	14	40.0	9.2		14	11.0	12.0
sub - total		223.6	314.1	sub - total		167.2	204.5

City	House Hold No.	by Water Meter (m <sup>3</sup> )	by Vodokanal (m <sup>3</sup> )
Urgench	1	24.6	29.4
	2	10.8	25.2
	3	3.0	21.0
	4	32.4	45.0
	5	101.6	45.0
	6	26.3	45.0
sub - total		198.7	210.6

City	House Hold No.	by Water Meter (m <sup>3</sup> )	by Vodokanal (m <sup>3</sup> )
Khiva	1	2.7	21.0
	2	12.2	33.6
sub - total		14.8	54.6

Average in Khorezm/cities		
Urgench	33.1	35.1
Khiva	7.4	27.3
Khorezm(b)	26.7	33.15

City	House hold No.	by Water Meter (m <sup>3</sup> )	by Vodokanal (m <sup>3</sup> )	City	House hold No.	by Water Meter (m <sup>3</sup> )	by Vodokanal (m <sup>3</sup> )	
Chimbay	1	13.5	24.0	Nuinak	1	163.0	6.0	
	2	13.0	21.0		2	8.0	17.8	
	3	60.0	18.0		3	11.5	13.0	
	4	80.6	39.0		4	11.6	13.8	
	5	94.0	9.0		5	8.7	23.0	
	6	22.0	9.0		6	4.6	13.8	
	7	25.6	9.0		sub - total		207.4	87.4
	8	5.8	18.0					
	9	10.0	18.0					
	10	38.6	18.0					
	11	1.0	9.2					
	12	59.0	9.2					
sub - total		423.1	201.4					

Average in Karakalpakstan/cities			
Nukus	14	16.0	22.4
Chimbay	12	35.3	16.8
Kungrad	14	11.9	14.6
Muinak	6	34.6	14.6
ROK(a)	46	22.2	17.6

Average in the Study Area			
(a) ROK	46	22.2	17.6
(b) Khorezi	8	26.7	33.15
		22.9	19.9
		15%	

## **7.4 Observation & Evaluation of the Water Works**

### **7.4.1 Securing of the Sufficient Budgetary Fund**

This subject is most fundamental and urgent because the current revenue of Vodokanals from the water consumers covers only the minimum necessity of "operation & maintenance and administration" expenses, but can scarcely be allotted to the improvement of services, major repairs of the existing distribution network and facilities, renewal of machinery and equipments and to the extension of the distribution network which forms the core part of local Capital Investment Program. Implementation of this Program is to be carried out basically at the expense of local budget of the Territory.

Plans of improvement of water supply in Aral Sea Area in terms of both quantity and quality include the construction of water intake facilities at Kaparas Water Reservoir and further extension of inter-regional water pipelines as well as the rehabilitation of the existing water treatment facilities and the construction of additional water treatment facilities.

Construction of all these facilities of inter-regional scale will be carried out at the expense of capital investments to be allocated by the Government of the Republic of Uzbekistan involving foreign investments. As for the present construction program, however, its progress is very slow due to insufficiency of funds.

### **7.4.2 The Way to the Autonomous Enterprises**

Under the current system, local government (Khokimiat) must make up for the corresponding deficit by their own budget money or by raising the water tariffs.

Bigger expenditures, therefore, are intentionally shifted to the later stage so as not to have a negative balance. Likewise as for the expansion of Vodokanal's organization via employing more staffs and workers, it is not practical for similar reasons. However, in view of the renovation time schedule of the obsolete equipments and facilities, it is quite necessary to prepare reserve money each year either in Vodokanal and/or in the budget of local government (specially limited to such a purpose) as duly planned in advance.

The establishment of new funds as already proposed in Section 7.2.6 "Management Analysis" is truly worthy to study, and every effort to seek new sources of money besides revenue from consumers' water charges must be made by all means.

In case of DOMIWPs, these entities are being operated under the full support of the GOU, and in spite of the self efficiency plan of the GOU in the public Utilities Service, Water supply by DOMIWPs cannot be wholly commercialized provided that the GOU continue putting much importance to the aspect of social protection of the population, considering the affordability of the household specially in the Study Area. This is also pre-analyzed in Section 7.2.6.

#### **7.4.3 Policy for Water Consumption Tariff**

Vodokanals in determining their water tariffs, has given much favor to the residents than anything else considering, first off all, the paying capacity of the consumers, and not giving much consideration either to the cost of treated water, or the necessary costs of giving constant improvement of water services. As a result, it has given a preconceived image to the minds of residents that drinking water is very cheap and enjoyable almost free of charge.

Ever since 1990, the difference of water tariff between Group (1) and Groups (2) & (3) was considerable and has been growing larger every year. Consequently, the absolute value of drinking water is smaller than those of electricity and gas in the household economy, i.e: 1/7 of electricity, 1/5 of gas as of June, 1995. On the other hand, majority of the residents are ready to pay higher water charges provided the Vodokanal's services should be improved [See Section 7.3.2.(1) Willingness To Pay].

Under the present system, in case of Group (1), consumers have to pay for the volume of water based on fixed effective consumption ration of VodoKanal regardless of the actual volume consumed. This phenomenon has implanted in the residents, the sense of gain if they spend more water than the estimated consumption volume, and not reminded the sense of economizing the water volume. However, with the introduction of metering system by law of May, 1995, fair and correct billing will be made according to the recorded water consume hereafter. This will produce economizing the water usage and prevent wastage.

Notwithstanding the above, Group (1) consumers are exceptionally favored in water expenses in every point, and it is more urgent to establish the balanced tariff system among other public utility charges.

#### **7.4.4 Effective Water Volume (EWV) and Effective Water Ratio (EWR)**

Effective water volume (EWV) consists of "accounted-for water" and "Unaccounted-for water".

Effective water ratio (EWR) comes out from accounted-for water divided by the amount of water supply.

Under the present system, the proper method for measuring water production and/or supply volume is not prepared in both Vodokanals and production/supply volume was given, on the estimation basis.

According to the only available data of "Financial Progress" Table 7.1 and 7.2, EWR stands approx. 80% (V•K/KKP) and 90% (V•K/KZ).

Total supply on the Table is supposed to include not only the part of "ineffective water volume" such as leakage from pipe-lines and loss from other trouble, injury of the facilities, but also the effective unaccounted-for water such as meter under-reading, illegal connection use, and at public parks, pipe flushing, fire fighting.

Normally Vodokanals are billing for the total water sales to the respective consumers, but the delayed or unsettled portion of the billed money reach annually to minimum. 25-30% sometimes even more at each end of the budgetary year.

Under the present situation, however, there are still many difficulties in making strict accounting of water consumption, because of unmetered consumers (residents) and billing is based on the estimated consumption ration. It must be checked at the appropriate stage about the difference of percentage of Effective Water Ratio (EWR) between Vodokanal KKP (80.0%) and Vodokanal KZ (90.0%), probably caused by the life of the facilities, and grade of maintenance.

Similar situations are found between T-N (80%) and T-U (90%) regarding the difference of EWR in Table 7.3 and 7.4.

#### **7.4.5 Difficulty of the Procurement of Necessary Materials & Equipments**

After gaining independence and the change of procurement system which had been controlled by Gosplan of FSU, Vodokanals are facing permanent problem of

obtaining the supplies, particularly the materials such as chemical products like chlorine, coagulants etc. as well as equipment units like pumps & valves required for the water supply services.

This problem is caused by the lack of foreign currency in the ROU or the suspension of production by manufacturers due to their financial problems. Besides, Vodokanals are not in a position to deal directly with each supplier, but MPU in Tashkent undertakes to arrange such procurement.

Main problems at present are the difficulty of making definite service improvement plan by material supply, and the current services are concentrated on the rehabilitation/repair of the absolute distribution networks of approx. 30Km (Vodokanal KZ), and 200Km (Vodokanals KKP) respectively as a most urgent section within the whole networks.

## **7.5 Step for Improvement of Management & Finance**

### **7.5.1 Need to Raise Countable Water Consumption Volume by Installing Water meters**

As currently regulated in the Decree No. 185 (May 26, 1995), staged introduction of metering instruments as a base of settlements with the consumers is quite agreeable and appraisable for grasping the correct consumed volume and for making the right billing system as a whole.

By raising the number of metered consumers, it makes easier to make budgetary forecast plans and to give technical services to individual consumers. This process contributes to form a more efficient management system. It is advisable, however, to define the method of cost sharing of meter installation between Vodokanals and the consumers including considerations for a deferred repayment system, or a partial sharing system through some subsidies given to specific households who can not afford to pay depending on their family income and living expenses.

### **7.5.2 Need to Establish Unified Accounting System.**

Between the Vodokanals there seems to exist different ways of documenting and reporting the financial results and this should recommendably be unified by common formats. For one example, annual revenue by water sales should include both billed - paid money and billed-non-paid money, which is based on the principle of the accrual

basis. Likewise, all accounting systems should be in accordance with the accrual basis instead of cash basis.

As a unified system, introduction of double entry Accounting system is recommended in the preparation of financial statements. Under this system, water price will include not only the ordinary operation and maintenance costs, but also depreciation and payments of interest besides tax and profit. This is a standard practice all over the world. Besides, it is the only way to show the true picture of financial conditions of an entity.

### 7.5.3 Need to Revise the Share of the Household Expenditure on Quality Water (limit of burden in the family budget)

In general, the ratio of expenditure on water payment in the monthly family budget in economically developed countries is less than one (1) percent (e.g. in Japan, this ratio is about 0.6%).

However, according to the consumers survey conducted in June 1995, and June, 1996 the situation in the Study Area can be summarized as in Table 7.15

**Table 7.15 Share of the Expenditure in the Household Economy**

[1st Survey] (As of June, 1995.)

Utility Item	Area: Nukus Chimbay Kungrad	Muynak	Urgench Khiva	Six Cities (Average)	Japan (Average)
1) (W+E+G) *	3.70%	3.10%	4.60%	3.90%	4.80%
2) W	0.38%	0.28%	0.24%	0.31%	0.60%
3) E	1.53%	1.60%	2.53%	1.90%	2.40%
4) G	1.74%	1.20%	1.79%	1.70%	1.80%
5) W/(E+G+W)	1/9.5	1/11	1/19	1/13	1/7
6) W * *	x 1.7	x 2.1	x 2.5	x 1.9	1
7) W/(E+G+W) * *	x 1.4	x 1.5	x 2.7	x 1.9	1

[2nd Survey]

	Nukus Chimbay Kungrad	Muynak	Urgench Khiva	Six Cities (Average)	Japan (Average)
8) W	0.27%	N.A	0.73%	0.48%	
9) E	2.87%	--	2.30%	--	
	Except Nukus				
10) W/E	1/10.6	--	1/3.2	--	

\* W = Water. E = electricity. G = Gas.

\* \* Necessary Ratio to get same level with Japan

From the above table, possible range of the limits of burden on the family budget can be foreseen as under.

- (1) Expenditure on water can be raised at least to double within the family budget.
- (2) Share of expenditure on water (W) among the three major utility expenses (E+G+W) also can be increased proportionately at least to double.
- (3) In Karakalpakstan, ratio of water to Electricity is expanded greatly, and in Khorezm region this rate reduced to half, but this ratio may not be treated as representative of the whole area.

According to the World Bank report "Investing in Development, Lessons of World Bank Experience"-1985 Edition, indicative percentage of the ratio of expenditure on drinking water and sewerage in the family budget in developing countries is as follows;

- Drinking Water : Max 4.0%
- Sewerage : Max 2.0%

Compared with these data, expenditure on water in the Study Area still stands at a relatively low level. Also, normally quoted ratio is understood as between 2 and 4% among the developing countries.

#### 7.5.4 Water Tariff of DOMIWPs

At present, revenue from water sales of DOMIWPs T-U & T-N makes up to approximately 17~20% of its production cost. This is because, based on a political decision, the water is sold to the VodoKanals, and other consumers at a rather low rate so as not to affect the ultimate consumers. This system of tariff decision need to be changed by introducing staged increase in tariff, considering the actual unit cost of water and the intended transition to self-sufficient enterprise system by decreasing subsidies as envisaged by the Government of Uzbekistan. At the same time, its tariff should be established in balance with those of Vodokanals, which should basically be self-sufficient and self-supporting, with due consideration to their financial situations.

In this connection, it is advisable to pursue the maximum affordable tariff by Vodokanals considering the social protection of the population in accordance with the occasional standard of living.



## **7.6 Conditions to "Self-sufficient" & "Self-financed" Enterprises**

### **7.6.1 Need to Formulate Solid Budget Plan**

Now, water sales are the only revenue source to Vodokanals who should manage to give "Regular Services" of operation and maintenance to the consumers based on this revenue. As discussed in the Section 7.5, water tariff can be raised at least to double in the household economy under the present situation even when comparing with the present price levels of electricity and gas.

At the same time, with increasing of the number of metered consumers, it makes easier to suspend water supply to the defaulted payers (consumers) urging the due payment.

In short, both raising of water tariff and raising of billed-paid ratio are fundamental for building a solid budget.

Other necessary measures should also be taken regarding institutional and organizational aspects for improved management.

### **7.6.2 Need to Improve the Bill Collection ratio**

At present the bill collection rate is only about 70% of the total bills as an end of each budgetary year and this is not adequate. To improve the financial condition of VodoKanal, this ratio must be improved. However, the household (general public) water metering system has been just introduced by law in 1995 and it will take several years to realize the installation of water meters to a majority of the consumers.

Under the current system, it is somewhat unjustifiable and rather difficult to force the payments without a proper metered system and when the consumers are faced with frequent irregular service. Therefore, improvement of the bill collection ratio is closely related not only with raising the number of metered consumers, but also with an improved service delivery.

However, the delayed or suspended payment for bill are not corresponding to the portion of the Group (1) the residents, and there is a bigger problem of settlements among the Group (2) & (3). (According to Vodokanals)

Group (1) has only 5~10% of the total revenue as seen in Table 7.1 & 7.2.

In principle, water charges must be collected from all the households (including those in the lowest income groups) as far as possible, because, if the water is provided free of charge, the water cost must still be recovered by some other means. Otherwise water will be taken granted for by the consumer as a kind of social security which is not habitual to the market economy.

In the near future, however, it will be necessary to adopt a special low tariff for the lower income consumers including rural areas who can not afford to pay, but will be benefited by the improved water supply system. This will be tema for medium or long term period.

### **7.6.3 Needs to Have Alternative Financial Sources for Vodokanals**

With the reduction of subsidies from the Central Government, the Vodokanals may request for financial support, if necessary, from the Local Government (Khokiniat), for operation and maintenance and also for capital construction. But due to budgetary reasons, this may not always be workable.

In order to give constant satisfactory service to the consumers, it is a prerequisite that Vodokanals will not be faced with difficulties in their cash position. Therefore, besides the support of local Government, there should be other financial sources with special low interest available in the domestic market especially for water supply enterprises, which are mainly supported by the Central Government.

With the introduction of metering system, Vodokanals may adopt as an alternate way to develop the money source, newly "house connection works" based on the cost table of pipe length for the new consumers.

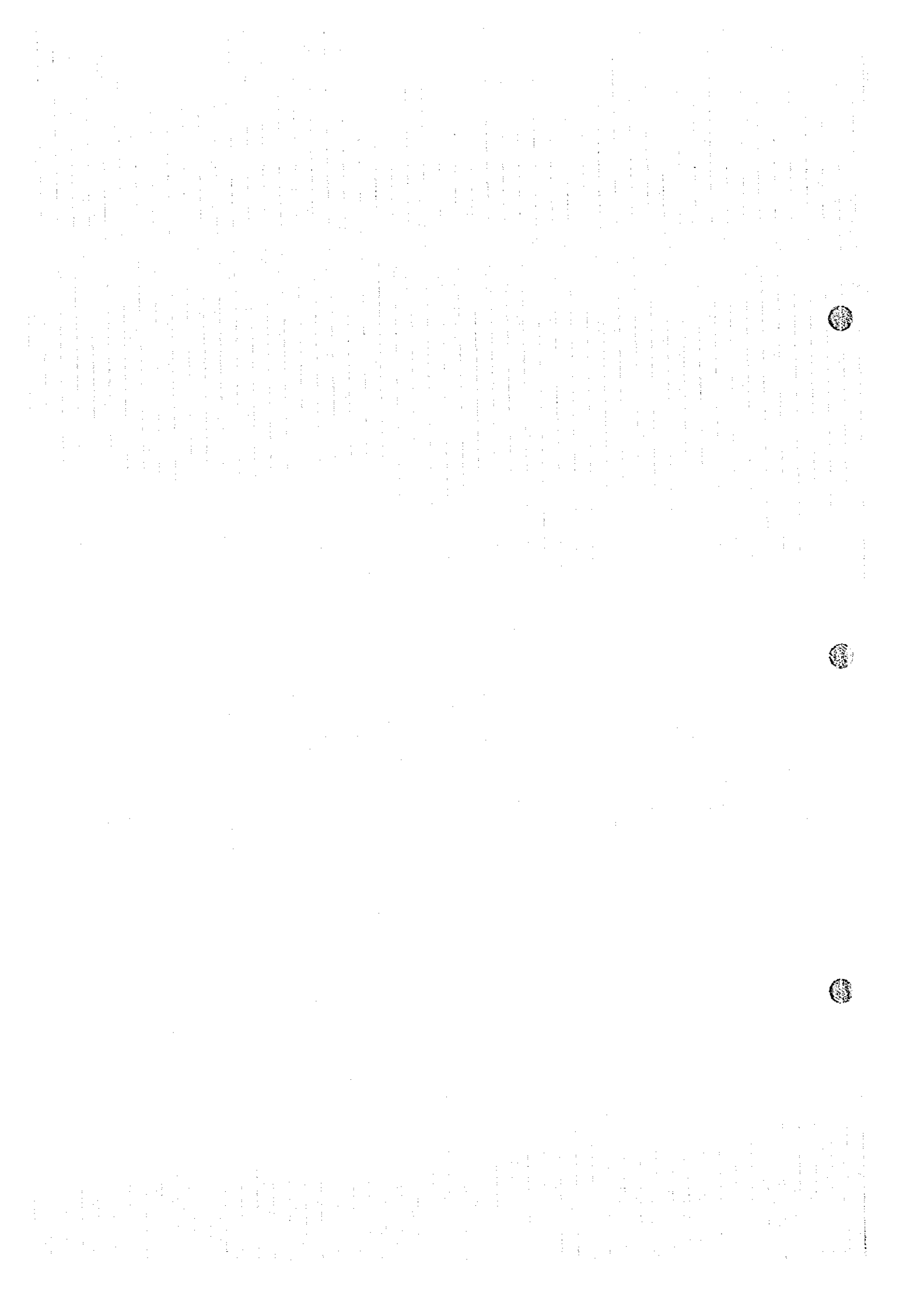
### **7.6.4 The Future Options for Private Sector Involvement and Privatization**

In the market economy, efficiency is most essential, and in order to raise the economic effectiveness of the enterprises, there are some options in the management as a future subject.

Management with the combination of the services of private companies is one of the realistic options.

This is the primary method of improving the management on the operation and maintenance such as new services like reading, inspection, repairing and replacement of water meter, and expediting the settlement of payment, and as the case may be, higher-grade services like inspection, repairing and operation the individual facilities in the form of agreement and/or sub-contract.

Another way to introduce market principles into water works is through privatization, transferring assets out of the public sector which is prevailing in developing countries such as Argentina, Malaysia.



## **CHAPTER 8**

# **WATER SUPPLY IMPROVEMENT PLAN**

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## **CHAPTER 8 WATER SUPPLY IMPROVEMENT PLAN**

### **8.1 Planning Conditions**

#### **8.1.1 Target Year**

This project may start in 1997, the year after the Study is completed, and this construction starts from 1998. The target year for this plan is 2010, as stated in the section 4.5.1.

#### **8.1.2 Planning Concept of Water Supply System**

Chapter 2 focused on the status of diseases that prevailed frequently in this region and that might be caused by the deterioration in the quality of drinking water; Chapter 3 dealt with existing treated water systems and facilities; Chapter 4 gave predictions of future water demand; and Chapter 5 evaluated the possibilities of water sources for water supply systems. In this chapter, long-term plans for improving the water supply to the Study Area are proposed, based on the data of the above-mentioned chapters.

As mentioned previously, water supply systems are being constructed in two regions in the Study Area according to the water supply master plan, namely the Karakalpakstan Water Supply Plan and the Khorezm Water Supply Plan. The master plan envisages unification of the water supply systems of both regions with the Tuyamuyun water supply system (Tuyamuyun WSS). However, many projects progress behind the schedule because of the difficulties in procuring funds. Moreover, the water supply system of UzTransGas also exists on the left bank of the Amudarya river.

This plan aims to establish the most appropriate water supply improvement plan for the Study Area, based on the already-constructed water supply systems and facilities. This plan should also carefully take into account the two existing plans.

In principle, the plan decided for the Study Area covers only the Six Cities. As mentioned above, however, a plan cannot be framed that neglects the water supply plan of both the regions. Consequently, the water supply improvement plan for the six cities of the Study Area is proposed after carefully considering the future water supply plans of both regions.

In the Study Area, there are two major water supply systems: the Tuyamuyun system and the Vodokanal system which are responsible for inter-regional and regional water supply respectively. In the selection of an optimum water supply system, attention is focused mainly on the Tuyamuyun system.

### **8.1.3 Objectives of Improving the Water Supply System**

Various methods may be considered for resolving the problem of supplying drinking water faced by this area. For instance, measures already implemented by aid organizations such as distribution of potable water purifiers to facilities and areas where safe and clean water is needed especially; distribution of clean and safe drinking water in water bottles being considered in the water supply plan for Uzbekistan; improvements in water treatment methods of water supply systems; ensuring safe water sources and many other methods may be considered. However, this plan does not propose temporary measures to avert emergencies but proposes long-term measures for stable water supply which is essentially required for the basic water supply system. Consequently, short-term measures such as the two methods mentioned above, namely the distribution of potable water purifiers, and the distribution of bottles filled with drinking water, are not considered. The objective of the plan is to make radical improvements to the water supply system.

### **8.1.4 Improvement Measures in the Quality of Drinking Water**

As described in Chapter 5, the problems in the quality of water sources in the Study Area, when the water from these sources is used as drinking water, are high mineralization and hardness of water that occurs seasonally. The two methods listed below are considered for solving these problems.

- i) Store a quantity of water that is equivalent to the annual demand in seasons when the water quality is good, and purify the water by conventional methods.
- ii) Introduce advanced treatment methods in addition to the conventional treatment methods. Methods for reducing mineralization and hardness of water and producing fresh water, particularly for reducing the former, or desalination, include evaporation, reverse osmosis, and electrodialysis. Methods other than these are practically non-existent. The characteristics of these methods are described briefly in Table 8.1.



This plan is constituted on the premise of the use of the reverse osmosis method, which offers the lowest energy consumption and which is most commonly used as an advanced water treatment method. As mentioned earlier, a reverse osmosis facility has been established in Takhtakupyr in the Study Area with the assistance of the German Red Cross.

**Table 8.1 Principle and Characteristics of Desalination Methods**

Method	Principle	Characteristics
Evaporation	Water is heated; the steam generated is cooled to obtain fresh water.	Since considerable energy is consumed, this method is suitable for oil-producing countries only.
Reverse osmosis	Container is partitioned by a semi-permeable membrane that allows water to pass through but not salts. Water is filled on one side of the container, and pressure applied on the water so that only fresh water passes through the membrane.	Amount of electric energy consumed is small; and the method is an energy-saving technique. Costs for producing fresh water can be reduced if salt water with low salt content is purified to obtain fresh water.
Electrodi- alysis	Water is passed between cation-exchange membrane and anion-exchange membrane, and DC voltage is applied on the outer sides of both membranes. The chloride and sodium ions in the water are removed through the membranes and fresh water is obtained.	The energy consumption is about ten times higher compared to the reverse osmosis method. However, if salt water with low salt content is purified to obtain fresh water, the costs for producing fresh water can be reduced.

### 8.1.5 Adequate Use of Existing Facilities

Considering that the water supply plans of Uzbekistan are delayed excessively because of the economic status of the country and the Study Area, the basic constraints proposed are: adequate use of existing facilities, and economical water supply systems and facilities.

The existing facilities, treatment plants, transmission pipelines, pumping stations, etc., are to be used effectively in future. Among these facilities, however, water treatment plants producing poor quality of water should be discarded. Taking into consideration the quality of the water sources, the treatment process, the existing plant condition and discussions with the MPU, the capacities of existing water treatment plants to be used in future are as shown in Table 8.2. In addition, the distribution capacity of Nukus and Urgench water treatment plants and Chalish wells are to be expanded to 90,000, 90,000 and 30,000 m<sup>3</sup> /day respectively. Consequently, water treatment plants with a

capacity of 128,000 m<sup>3</sup> /day in Karakalpakstan and 120,000 m<sup>3</sup> /day in Khorezm will be used in future. Further expansion of the plants to meet future water demand are described in a subsequent section together with selection of water sources and introduction of an advanced treatment process.

**Table 8.2 Capacity of Existing Water Treatment Plants To be Used and Expanded in Future**

(unit : thousand m<sup>3</sup>)

No. Name	Design capacity	Distribution Capacity			total	Source of water	Type of Treatment process
		Capacity operated at present	Capacity used in future	Capacity expanded in future			
<b>Karakalpakstan</b>							
1 Nukus (V.K)	65.0	60.0	60.0	30.0	90.0	canal	sedimentation & filtration
2 Turtkul (V.K)	8.4	8.4	8.4		8.4	ground water	
3 Beruni (V.K)	4.6	4.6	4.6		4.6	ground water	
4 Chimbai (V.K)	5.7	1.0	2.0		2.0	ground water	
5 Kegeili (V.K)	2.5	1.0	1.0		1.0	ground water	
6 Beruni (A.V)	-	8.0	8.0		8.0	ground water	
7 Turtkul (A.V)	-	14.0	14.0		14.0	ground water	
sub total		97.0	98.0		128.0		
<b>T-Nukus</b>	200.0 (170.0)	140.0	170.0		170.0	canal	sedimentation & filtration
total	-	237.0	268.0	30.0	298.0		
<b>Khorezm</b>							
Vodokanal							
1 Urgench	50.0	45.0	45.0	45.0	90.0	canal	sedimentation & filtration
2 Chalish	-	10.0	10.0	20.0	30.0	ground water	
sub-total	-	55.0	55.0	65.5	120.0		
<b>T-Urgench</b>	200.0	180.0	180.0		180.0	canal	sedimentation & filtration
total	-	235.0	235.0	65.0	300.0		

## **8.2 Alternatives of Water Supply Systems**

### **8.2.1 Water Supply Block**

#### **(1) Block formation**

In order to construct an optimum water supply system for the future in both the regions, the entire area may be divided into several water supply blocks. The points mentioned below were considered, and the area was divided into four water supply blocks as shown in Table 8.3 and Fig. 8.1.

##### **a) Existing water transmission pipeline**

This is the most important point to be considered when preparing the water supply plan. The existing water main pipelines of Tuyamuyun-Nukus, Tuyamuyun - Urgench and UzTransGas were considered on priority.

##### **b) Existing water supply master plan for the two regions**

The existing water supply plan has been framed based on the water supply master plan. This plan needs to be considered carefully.

##### **c) Geography and topography**

The water supply systems in the Study Area cannot be planned without considering the Amudarya river, which is a natural boundary and a source for water supply. Moreover, since the land area of Karakalpakstan is vast, it should be divided into several blocks.

##### **d) Administrative district boundaries**

In principle, constructing a water supply system that surpasses administrative district boundaries leads to management problems. However, water supply from the Tuyamuyun-Urgench water transmission pipeline, which is the transmission pipeline for Khorezm, the Amudarya region located on the left bank of Karakalpakstan, is ideal considering the geographic point of view. This is also stated clearly in the existing water supply master plan of the Uzbeki side.

**Table 8.3 Water Supply Blocks**

Territory	Block Name	Area included in block	Major Cities
Khorezm Province	Khorezm	All Khorezm Provinces and Amudarya region in Karakalpakstan	<b>Urgench, Khiva, Gurlen, Yangibazar, Koshkupyr, Khanka, Yangiaryk, Bagat, Khazarasp, Druzhba, Mangit *</b>
Republic of Karakalpakstan	KKP Right	Amudarya river right bank area in Karakalpakstan	<b>Nukus, Chimbai, Akmangit, Khalkabad, Kegeili, Karauzyak, Takhtakupyr, Kazanketken, Bustan, Beruni, Turtkul</b>
	KKP Left	Amudarya river left bank area in Karakalpakstan excluding Muynak	<b>Kungrad, Lehinabad, Shumanai, Khodjeili, Takhiatash</b>
	Muynak	Muynak region	<b>Muynak</b>

Notes: Mangit is a territory of Karakalpakstan.  
City names in bold letters are the Six Study Cities.

**(2) Water Demand by Block**

Table 8.4 shows the average and daily maximum water demand by block for the future.

**Table 8.4 Future Water Demand by Block**

Block and Item	(unit: thousand m <sup>3</sup> /day)			
	1995	2000	2005	2010
<b>Khorezm</b>				
Ave. water demand	279.4	322.2	409.6	484.5
Max. water demand	321.3	370.5	471.1	557.2
<b>KKP Right</b>				
Ave. water demand	161.5	209.3	263.0	334.6
Max. water demand	185.7	240.7	302.4	384.8
<b>KKP Left</b>				
Ave. water demand	65.9	87.5	108.1	132.4
Max. water demand	75.8	100.6	124.4	152.3
<b>Muynak</b>				
Ave. water demand	6.1	7.2	8.5	10.5
Max. water demand	7.0	8.2	9.8	12.1
<b>Total</b>				
Ave. water demand	512.8	626.2	789.3	962.0
Max. water demand	589.7	720.1	907.7	1,106.4

### (3) Water Sources

The most important constraint on the method of supplying water to the above-mentioned water supply blocks is the water source. Table 8.5 shows the major existing water sources and treatment plants.

**Table 8.5 Major Existing Water Sources by Block**

Block Name	Water Source	Water Treatment Plant(W.T.P.)
Khorezm	- Amudarya river at Tuyamuyun hydro-unit - Irrigation canal	Tuyamuyun-Urgench W.T.P. Urgench W.T.P. Several local W.T.Ps. and wells
KKP right	- Amudarya river at Tuyamuyun hydro-complex - Irrigation canal	Tuyamuyun-Urgench W.T.P. Nukus W.T.P. Several local W.T.Ps. and wells
KKP Left	- Irrigation canal	Takhiatash W.T.P. Kungrad W.T.P.
Muynak	- Irrigation canal	Muynak W.T.P.

According to the water supply plan of Uzbekistan for the Study Area, the water sources to the two regions are likely to be unified into the Kaparas reservoir. However, considering the existing water transmission system and the water quality of the water sources, some of the existing water sources in each block can be used. Table 8.5 shows the countermeasures that need to be adopted if the Kaparas reservoir and/or the existing water sources in each block are used.

**Table 8.6 Potential Water Source by Block**

Block Name	Water Source	Countermeasures for Drinking Water Source
Khorezm	Kaparas reservoir	Store a quantity of good-quality water during three months (Jun., Jul., Aug.) sufficient for satisfying annual demand, and supply this water through the existing Tuyamuyun-Urgench water supply system.
KKP Right	Kaparas reservoir	Store a quantity of good-quality water during three months (Jun., Jul., Aug.) sufficient for satisfying annual demand, and supply this water through the existing Tuyamuyun-Nukus water supply system.
KKP Left	Kaparas reservoir	Connect the KKP Right and KKP Left water supply systems across the Amudarya river.
	Existing water source	Introduce advanced treatment method (RO). Store a quantity of good-quality water during two months (Jul., Aug.) sufficient for satisfying annual demand, and supply this water through the existing water supply system.
Muynak	Kaparas reservoir	Extend the pipeline from Kungrad to receive the water supply.
	Existing water source	Introduce advanced treatment method (RO). Located at the downstream end of the Amudarya river; possibility of storing the required quantity of good quality water is poor.

**(4) Potential Drinking Water Sources for Reservoirs**

If reservoirs are used as water sources, a simple check should be made to verify whether good quality water in certain months in a year can be stored to satisfy the annual water demand. The two cases listed below should be investigated.

- i) During the months June, July and August when good-quality water is available, water is stored at the Kaparas reservoir to satisfy the total water demand of Karakalpakstan and Khorezm in the year 2010.
- ii) During the months when good-quality water is available, water is stored in KKP Left block to satisfy the total water demand of KKP Left and Muynak in the year 2010. The storage point in KKP Left block is assumed to be the southern part in the block; the opposite bank of Sumanbay is located in KKP Right block.

Table 8.7 shows the average daily water demand and the annual water demand required for the new water sources. These figures do not include the capacity of existing sources of 128 thousand m<sup>3</sup>/day of KKP Right and 120 thousand m<sup>3</sup>/day of Khorezm, which will be used in future as stated above.

**Table 8.7 Average Daily Water Demand and Annual Water Demand Required for the New Sources**

(unit: million m<sup>3</sup>/year)

Block name	Average Daily Water Demand			Annual Water Demand		
	2000	2005	2010	2000	2005	2010
Khotezm	202.2	289.6	364.5	73.8	105.7	133.0
KKP Right	81.0	135.0	206.6	29.6	49.3	75.4
KKP Left	87.5	108.1	132.4	31.9	39.5	48.3
Muynak	7.2	8.5	10.5	2.6	3.1	3.8
Total	377.9	541.2	714.0	137.9	197.6	260.5

Note: Actual annual water demand including water required for water treatment plants is calculated by multiplying the annual water demand by 1.1.

Table 8.8 shows annual water demand and storable water quantity, together with the outflow at the downstream canals. Since the data collected for outflow at the downstream canals was insufficient, the expressions for outflow quantity differs for Kaparas reservoir and KKP Left block (Sumanbay) in the Table below.

**Table 8.8 Possibilities of Storing Annual Water Supply Demand in 2010**

(unit: million m<sup>3</sup>/year)

Probability year (Return Period)	Kapas reservoir			KKP Left block (Sumanbay)		
	Probable Amudarya river discharge rate (total for 3 months)	Annual water demand (2010)	Outflow rate at the downstream canals (total for 3 months)	Probable Amudarya river discharge rate (total for 3 months)	Annual water demand (2010)	Outflow rate at the downstream canals (total for 2 months)
2	17,317	286.6	Max.(14,151)	3,088	57.3	abundant
5	12,117		Ave.(10,385)	485		(260)
10	10,062		Min.(5,406)	70		normal (36)
15				29		drought (0)
20	8,635			16		

note: abundant: canal outflow rate in abundant flow of Amudarya river  
 normal : canal outflow rate in normal flow of Amudarya river  
 drought: canal outflow rate in drought flow of Amudarya river

### Kapas reservoir

The annual water demand (286.6 million m<sup>3</sup>) for Kaparas reservoir is 2.4% of the discharge rate of Amudarya river for the 5-year probability (return period) and also less than 3.3% for the 20-year probability. This demand is also extremely small compared to the outflow rate at the downstream canals. Consequently, even when the

probability year increases and the discharge rate of the Amudarya river decreases, an adequate quantity of water can be assured if the water at the downstream end is utilized efficiently.

#### **KKP Left block (Sumambay)**

The annual water supply demand (57.3 million m<sup>3</sup>) for KKP Left in Sumanbay is less than 12% of the discharge rate of Amudarya river for the 5-year probability and 82% of the discharge rate for the 10-year probability, therefore, adequate quantity of water can be stored. If the discharge rate is more than the 15-year probability, adequate quantity of water cannot be stored. However, the discharge rate for the 20-year probability for Kaparas reservoir, which is 8,635 million m<sup>3</sup>, is extremely high compared to the annual water demand. Consequently, even if the probability year increases and the discharge rate of the Amudarya river decreases, an adequate quantity of water supply can be ensured if the water at the upstream end is utilized efficiently. However, the storage condition of this reservoir is more severe than that of the Kaparas reservoir.

### **8.2.2 Alternative Water Supply Systems (hereafter called "Alternatives")**

#### **(1) Alternative Water Supply Systems**

Considering the water sources in each block, all blocks can be integrated to form a new water supply block. This new integrated block is called a zone. A zone can be divided into four water supply systems, as illustrated below.

**Alternative 1:** All four blocks mainly use the Kaparas reservoir as the water source. The Tuyamuyun water supply system supplies water to the blocks. (Khorezm zone, KKP zone)

**Alternative 2:** Khorezm, KKP Right and KKP Left use mainly the Kaparas reservoir as the water source, and the Tuyamuyun water supply system supplies the water. Water is supplied independently to Muynak, using the existing water source.

**Alternative 3:** Khorezm and KKP Right mainly use the Kaparas reservoir as the water source, and the Tuyamuyun water supply system supplies the water. Both KKP Left and Muynak use the same water source for water supply. (Khorezm zone, KKP Right zone, KKP Left Muynak zone)



**Alternative 4:** Khorezm and KKP Right mainly use the Kaparas reservoir as the water source, and the Tuyamuyun water supply system supplies the water. Water is supplied independently to KKP Left and Muynak using the existing water sources. (Khorezm zone, KKP Right zone, KKP Left zone, Muynak zone)

Options of installing reservoirs or RO plants may be added to Alternatives 3 and 4 and the six Alternative Water Supply Systems may be considered (Table 8.9) from the overall aspects. Figures 8.2 to 8.7 show the conceptual plans for the Alternative Water Supply Systems. The optimum system is to be selected after investigating these Alternatives.

**Table 8.9 Alternative Water Sources**

Alternative	Block name			
	Khorezm	KKP Right	KKP Left	Muynak
1	Kaparas	Kapas		
2	Kaparas	Kapas		Existing (RO)
3	Kapas	Kapas	Existing	
3-1			(RO)	(RO)
3-2			Reservoir	
4	Kapas	Kapas	Existing	Existing
4-1			(RO)	(RO)
4-2			(Reservoir)	(RO)

Note: The item in bracket indicates a countermeasure when using existing water sources of the region.  
 RO: Reverse osmosis plant  
 Reservoir: Installing a reservoir for storing good-quality water in a specific season.

**(2) Water Demand in the Alternatives**

Table 8.9 shows the daily maximum water demand in the year 2010 for each zone in the Alternatives.

**Table 8.10 Maximum Water Demand in 2010 in the Alternatives**

(Units: 1000 m<sup>3</sup>/day)

Alternative	Block name			
	Khorezm	KKP Right	KKP Left	Muynak
1	557.2	549.2		
2	557.2	537.1		12.1
3	557.2	384.8	164.4	
4	557.2	384.8	152.3	12.1

### (3) Major works for Alternatives

To improve and reconstruct the existing water supply system for the Alternative Water Supply Systems, installation of new facilities, expansion, repairs and improvements to existing facilities are necessary. Table 8.11 shows the major new facilities, improvements, repairs and expansions to facilities for the Alternative Water Supply Systems. The facilities included in the Alternatives are necessary for improving the water supply systems of the entire Study Area. Installation and improvement of distribution networks and service pipes within cities are not included.

**Table 8.11 Major Works for Alternatives**

Alternative	Block name			
	Khorezm	KKP Right	KKP Left	Muynak
1	1. Intake 2. Raw water main 3. T-U W.T.P. 4. Pumping station 5. Transmission pipeline	1. Intake 2. Raw water main 3. T-N W.T.P. 4. Pumping station 5. Transmission pipeline	1. Transmission pipeline (Nukus to Takhiatash)	1. Transmission pipeline (Kungrad to Muynak) 2. Pumping station
2	same as above	same as above	same as above	1. Muynak W.T.P 2. RO 3. two way distribution system for RO
3	same as above	same as above		
3-1			1. Khodjeili W.T.P 2. RO and 3. two way distribution system for RO	1. Pumping station 2. Transmission pipeline (Kungrad to Muynak) 3. RO and 4. two way distribution system for RO
3-2			1. Reservoir 2. Khodjeili W.T.P	1. Pumping station 2. Pipeline (Kungrad to Muynak)
4	same as above	same as above		
4-1			1. Khodjeili W.T.P 2. RO 3. two way distribution system for RO	same as Alternative2
4-2			1. Reservoir 2. Khodjeili W.T.P	same as Alternative2

Note: Capabilities of facilities vary even if facilities are the same.  
RO: Reverse Osmosis plant

Specifications of major facilities are given below.

## **1. Intake pumping station (hereafter referred to as "Kaparaz pumping station") and raw water mains to Tuyamuyun water treatment plants**

Intake pumping station and 4 raw water mains (Refer to Fig. 8.8) should be constructed.

Presently, one line from intake pumping station to Tuyamuyun Urgench water treatment plant is under construction.

## **2. RO Plant**

### **i) Quantity of water to be treated**

The quantity of water to be treated should be considered in the plan for RO plants, that is, whether the plant should supply the total water demand of the region, or whether it should supply a specific water demand, such as drinking water or water used in the kitchen and for drinking. Considering the economic status of the Study Area, a plan for plants supplying the demand for water used for the kitchen alone would be appropriate. Preliminary cost estimates were made, but satisfying the total demand is not possible considering cost aspects. The daily water consumption per person for water used for drinking and in the kitchen should be taken as 30 liters. The population considered is not the planned population served by water supply system but the entire population.

### **ii) Water supply method**

To cover only a part of the water demand, water supply methods different from the ones used in existing water supply networks need to be implemented. The following three methods are considered:

- a) Use dual pipeline system and supply water to each household separately
- b) Install water service tanks at various locations, distribute treated water to these tanks using tank lorries, and then supply water to the residents
- c) Install water service tanks at various locations, lay new pipelines from the treatment plant to the water service tanks and supply water to the residents

Considering above methods, the method a) requires considerable time for constructing the facilities, and the costs are generally high, therefore it is inappropriate for the Study Area. The method b) is appropriate considering the construction period and the cost. However, it is appropriate only for comparatively small water supply systems and not for large-scale water supply systems. On the other hand, method c) will require a longer construction period and incur higher costs than method b), but it is within the permissible range and suitable for comparatively large-scale water supply systems.

### iii) Pre-treatment

The water from the source to be subjected to RO treatment, should be pre-treated adequately to reduce the load before RO treatment.

#### a) RO plant in Muynak

Water supply quantity is 1,015 m<sup>3</sup>/day.

Method b) above is to be adopted for the water supply method considering the characteristics of the block.

#### b) RO plant in the KKP Left bank area

Water supply quantity is 13,593 m<sup>3</sup>/day.

Method c) above is to be adopted for the water supply method considering the characteristics of the block.

### 3. Construction of reservoir in the KKP Left block

For constructing a storage reservoir in the KKP Left block, the reservoir should be excavated without embankment so that the water from the Amudarya river flows naturally into the reservoir. If possible, a natural depression like Kaparas reservoir should be found for the reservoir.

### 4. Muynak water treatment plant

The existing Muynak water treatment plant has only a sedimentation basin excavated on ground; therefore, sufficient water treatment is not possible. If Muynak has to treat the water independently, RO treatment is necessary, for which pre-treatment is indispensable. Consequently, a new treatment plant capable of treating the total water demand should be installed.

### 5. Water treatment plant in KKP Left block

For providing RO and storage reservoirs, the existing treatment plants should be improved.

## 8.2.3 First Screening of the Alternatives

Six alternatives were proposed in previous section. Before cost comparison, the first screening of the Alternatives is carried out to eliminate unrealistic alternatives.

The Alternatives 3-2 and 4-2 for constructing the new reservoir in the KKP left block should be eliminated in the present circumstances because of the following reasons;