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Environmental Policy and Technology Project

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NEW INDEPENDENT STATES

FINAL PROJECT REPORT SUMMARY

RIMDESS Applied Demonstration Projects 8.1, 8.2, 8.3, and 10

Delivery Order 8, Task B

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Environmental Policy and Technology Project
For the New Independent States of the former Soviet Union
A USAID Project Consortium Led by CH2M Hill

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ENVIRONMENTAL POLICY AND TECHNOLOGY PROJECT

A Project Financed by the U.S. Agency for International Development

Проект финансируемый Агентством по Международному Развитию США

Serving Countries of the Former Soviet Union

Служит странам бывшего Советского Союза

Managed by CH2M HILL

Под руководством CH2M HILL

USAID

ENVIRONMENTAL POLICY AND TECHNOLOGY PROJECT

Central Asian Republics Regional Office

ПРОЕКТ ПО ПРИРОДООХРАННОЙ ПОЛИТИКЕ И ТЕХНОЛОГИИ

Региональный офис республик Средней Азии

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List of Acronyms and Abbreviations

ADP - Applied Demonstration Project
BOD - Biochemical Oxygen Demand
EPT - Environmental Policy and Technology
RTI - Research Triangle Institute
RIMDESS - River Management Decision Support System
USAID - United States Agency for International Development

cum - cubic meters (m3)
g - gram
l - liter
mg - milligram

Summary Report

Purpose and Scope of Project

As part of the United States Agency for International Development's (USAID) Environmental Policy and Technology (EPT) project activities in Central Asia, the Research Triangle Institute (RTI) adapted a decision support system for the Syr Darya River basin (RIMDESS). Six subcontractors from the four countries in the basin, Kazakstan, Kyrgyzstan, Uzbekistan and Tajikistan, provided the necessary data to RTI. The collected data include the analysis of hydrological and hydrochemical data, information on existing water use control stations, sources of water pollution, population and current water regulations and management in the Syr Darya River basin, and will be used for the purpose of developing a system for water control and water quality management.

There were four applied demonstration projects (ADP) involved in this collection of data in the Syr Darya River basin. ADP 10 included one subcontractor each from Kyrgyzstan, Tajikistan and Uzbekistan who collected baseline data for analyzing the entire basin. ADP 8.1 provided information related to Uzbekistan's water use regulations and pollution sources, ADP 8.2 collected baseline data for the river basin in Kazakstan, and ADP 8.3 collected information on water regulations and laws in Kyrgyzstan.

Project Results and Findings

ADP 10: Regional

The quality of surface water in the Syr Darya River basin is influenced by natural and manmade factors. The geological and hydrological influences are the primary factors, along with collector drainage from irrigated lands.

Within the Kyrgyz portion of the basin, water in general is suitable for a wide spectrum of uses without considerable limits. In the Uzbek and Tajik portions, however, the water quality is close to the "bad" or dangerous category on the pollution index.

ADP 8.1: Uzbekistan

At present Uzbekistan does not have a unified methodology for recording water use and water quality characteristics. In the course of study various methodical approaches were used to collect, generalize and analyze the information about polluting agencies and enterprises. Materials were systematized and prepared for the development of RIMDESS.

Data on the polluters, such as their location, water withdrawals, use, catchment and the content of their discharages in the Syr Darya River basin have been prepared and entered in tables.

An environmental analysis of the Syr Darya River basin's aquatic ecosystems was carried out. It was found that:

- Water catchment for industrial, municipal, irrigation and cattle-breeding purposes affect the quality of the basin's surface waters.
- Changes in flow mineralization and aggrievement of the chemical composition occur from the upper to the lower Syr Darya
- The Fergana oasis is the main source of salt; the salt content in the upper Syr Darya is 330 mg/l, while in the lower reaches it comes to 1160 mg/l.
- The Tashkent oasis has less of an impact on the Syr Darya's water quality as the main amount of saline water is diverted from the irrigated lands to the Arnasay low area
- Increased amounts of heavy metals, nitrogen and other components is observed in the surface streamflows as a result of industrial effluents.

This project, in conjunction with ADP 10, provided the primary information on Uzbekistan being used in the development of RIMDESS.

The information was compiled and reports were made on an out dated computer, which required more time to complete the work than was assigned by the EPT project and the RTI.

ADP 8.2: Kazakstan

The area of the Syr Darya River basin and reservoirs is 462,000 square km, of which 240,000 square km are within the territory of Kazakstan. The river flow is used intensively (93%). Sixteen reservoirs with 34.6 billion cubic meters of total capacity were built in the upstream and downstream territories of the river. Within Kazakstan the river is characterized by a small stream gradient, low speed, and the existence of old and new deltas. The Arys and Keles rivers are the main inflows of the Syr Darya River.

Sixteen posts of hydrological and hydrochemical control were used to analyze the quantity and quality parameters of the river flow within Kazakstan. The analysis of water quality shows that Kazakstan "receives" water with mineralization over 1.3-1.5 g/l with pollutants and pesticides. In summer time water mineralization in the region of the new delta reaches 3 g/l.

The ecological situation in the Karmakchinsk, Kazalinsk and Aral districts of the Kzyl-Orda region remains critical and there is a tendency for further deterioration of the situation. Therefore the organization of an effective water monitoring system and development of a water control and management system (RIMDESS) in the Syr Darya basin would meet the requirements of the "Program of Concrete Actions...," which was approved by the heads of the Central Asian countries.

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ADP 8.3: Kyrgyzstan

Task 1 was the analysis of water use regulatory documents in the Republic. The government of Kyrgyzstan adopted the following laws to regulate water user relationships:

1) Law *"Nature Conservation,"* of April 17, 1991. This law is the main act of legislation regulating nature use in the Republic. Section 3 of the law reads: "The single regulatory, technical and metrological system has been introduced for the purpose of resource conservation and to meet environmental requirements regulating the marginal permissible impact of productive and other activities on the environment. The maximum permissible impact has to comply with international standards."

   The law "Nature Conservation" was adopted as the basis for elaborating and adopting resource laws that reflect resource conservation and management.

   In other times similar laws were adopted in other countries of the Aral Sea basin. As the allowable environmental impact for production might differ in these countries, discrepencies are seen today in the environmental management of territories whose ecosystems are contiguous.

2) Water Code of January 14, 1992. This law regulates water usage to promote conservation of water resources. Its objective is to prevent industries and other water users from harming water bodies and water facilities.

   This law covers water quality management, water user rights, duties and responsibilities. It also clarifies the respective roles of the national and local administration.

   National roles are governed by international agreements among the country governments. These agreements are formal documents, but they do not reflect all the aspects of an ecosystem approach to water management; they often contradict legislative acts and are presidential declarations.

   Copies of the Water Code, the "Regulations on Surface Waters Protection in the Kyrgyz Republic" and the list of water bodies assigned to different categories were provided to RTI.

3) Decree of the Government of the Kyrgyz Republic, of September 23, 1991. Pursuant to which, water bodies of the Kyrgyz Republic are assigned to different water use categories. The objective of the document, depending upon the category, is to establish water quality requirements, set maximum permissible concentration levels for waste water discharged into water bodies, and establish tools for controlling water quality.

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4) "Regulations on Surface Water Protection in the Kyrgyz Republic." Introduced by the State Committee for Nature Protection of the Kyrgyz Republic on January 1, 1994. The objective of this document is to regulate the water quality of all waste waters (including reclamative, drainages, mine and melt water) diverted to flowing water and water bodies.

The following mechanisms are laid out in the Regulations:

- standardization of water quality in water bodies and water streamflows
- water body protection when waste waters, as a result of any economic activities, are discharged
- planning water protection measures
- water quality monitoring and regulation of water users.

5) Water charges for water delivery services in the agricultural sector of the Republic have been introduced and are reviewed annually. In 1966 the following charges were set (with $1.00 = 1200 tyiyns):

- 0.5 tyiyns/sum for Quarters 1 and 4
- 1.5 tyiyns/sum for Quarters 2 and 3.

Local administrations set prices for potable water supply and municipal needs.

Task 2 was a case study research of the water supply and management in the city of Osh. The findings of the research are:

- Osh is a city in the south of Kyrgyzstan, with a population of 300,000. The city is divided by the Ak-Buura River which crosses the town. The water consumption rate ranges from 30 to 40 liters/day for every person, depending upon the dwelling's sanitary and hygienic methods. Osh has 310 industrial enterprises which include plants, factories and other small enterprises.
- Water withdrawal from the upper Ak-Buura are the largest in the Republic and amount to 100,000 cum/day.
- The Ak-Buura River is a transboundary river, with Kyrgyzstan being the formation zone and Uzbekistan the discharge zone. The river's waters flow into the Aral Sea basin and therefore special attention must be given to managing the river's water quality and quantity.
- The primary water characteristics of the Ak-Buura River before the water is taken from it are presented in Table 3, Appendix A.

- Water is taken out according to the "mountain river out-take" method; without a first-grade pumping station, water is delivered by gravity to the water-filtering station "Ozgor."

- The pumping and filtering station Ozgor, with a capacity of 100,000 cum/day includes the following facilities:

  --mixing chamber
  --flocculation chamber
  --settling tank
  --filtering station
  --clean-water reservoir
  --second-grade pumping station
  --town water-supply system

  The diagram is presented in Figure 1, Appendix F.

- The reagents used for water purification and disinfection are listed below, along with the quantity that is used annually:

  --Liquid chlorine: 108 tons. One dose is 3 mg/l
  --Aluminum sulfate, 10%: 576 tons. One dose is 80 mg/l;
  --Soda ash, 6 - 7%: 108 tons. One dose is 15 mg/l. It is used during 6 months.
  --Calcium hypochlorite, for disinfecting facilities and networks: 10 tons
  --Sodium (potassium) silicate: 22 tons. One dose: 3 mg/l

- Household and industrial waste water flows into the sewage treatment constructions which include:

  --lattice girder constructions
  --primary settling tank
  --aeration tank
  --secondary settling tank
  --contacting reservoir
  --bioponds, discharge in the Ak-Buura River

  The diagram is shown in Figure 2, Appendix F.

- Household and industrial waste water flows into the sewage treatment constructions in the amount of 80,000 cum/day. The outlet flow is 70,000 cum/day. The treatment effect according to BOD (Biochemical oxygen demand) is 85.5%, and for suspended solids, 83%. (See Appendix B).

Applications of Results

Recommendations for the application and use of the results of these projects are as follows:

- Recommendations for the RTI:

    1. To develop RIMDESS in the Syr Darya River basin.

    2. To elaborate unified requirements for recording water use and water quality at the source of pollution.

    3. To develop indicators for collection and summarizing water use information.

- RIMDESS should be approbated for Uzbekistan in the State Conservation for Nature Protection.

- As a result of the collection, analysis and systematization of hydrological and hydro-chemical indices of water flow, an integral picture was developed on water quality and the main pollutants in different branches of Kazakstan's economy. The results might be used by the Kzyl-Orda and South-Kazakstan regional ecology and bio-resources administration, Aral-Syr Darya basin water economy unit, and the sanitary-epidemiological services of these regions for the purpose of preventing flow of polluted water into the river, development of sewage disposal measures, and control over the special regime for water protected zones and regions.

- Results of the work might be used for the development of agreements between the countries of the basin for concerted actions on water quality improvement.

Policy Recommendations

Overall recommendations include:

- To promote water use and water quality information, and its delivery and exchange among water users and interested agencies.

- To develop unified normative and legal documents for Central Asian contiguous countries considering water management and water quality.

- To appoint a national agency with the power to carry out unified water quality and management policies.

- To immediately begin the "Water Protected Zones and Regions of Syr Darya River" project, developed by "Kazgiprovodkhoz" Institute in 1992.

- To create a regional center for water quality monitoring with a special hydrochemical laboratory. The center should develop general strategies for providing the required water quality, from its source to the Aral Sea.

- Create an agreement between the countries of the region to ensure the water quality of the Syr Darya River.

Recommendations regarding ADP 8.3, Task 1:

- For the Aral Sea Basin countries:

  1. To develop common limits for permissable environmental impacts, thereby providing ecological safety of water resources

  2. To agree upon those limits and to affect ratification

  3. Interstate environmental indices which identify limits of permissible impact will permit to eliminate harmful effects on one country on another which result from the transport of pollutants in the water.

- To work out an international "Clean Water Law," including transboundary waters. The law provides environmental and economic security for water used multiple times by different countries.

- If the international water quality law, including transboundary waters, is adopted, it is proposed to review the classification of water bodies, to adopt a convention on water body classification and categories and to pay special attention to river formation zones as a factor providing environmental security in the middle and lower Aral Sea basins.

- To develop environmental standards for the marginal indicators and maximum permissible concentrations of harmful substances. At present, the countries in the Aral Sea basin use sanitary and hygiene indices and on their basis water management strategy is constructed. But in reality it does not reflect an ecological approach to water quality and, therefore, does not reflect damage inflicted upon the hydrobiological aquatic environment and ecosystems tied with the environment.

In addition to the foregoing proposals the high priorities for the Aral Sea basin environmental security are:

- To unify legislation in the area of water management.

- To coordinate the laws among the countries and to ratify them

- To develop ecological standards for the Syr Darya and Amu Darya basins and to approve them through a convention.

- To take inventory of the valid legislative acts and available standards in the area of the Aral Sea Basin countries and to review and re-make them based on ecosystem approach. The renewed acts and standards will secure water flow formation and discharges, eliminate negative impact of the urbanized watershed on water flow quality and quantity and will foster the basin's ecological and economic sustainable development.

Potential Project Impact

- As soon as RIMDESS is introduced in the Syr Darya basin, it will be possible to evaluate water quality and the impact on water quality of different sources and urgent decisions on the elimination of pollutants.

- If RIMDESS runs successfully, wate quality can be monitored and managed in other river basins in Central Asia (Amu Darya and others).

- Work on this project enabled an analysis to be done of river water quality in the content of pollutants entering the river through sewage and collector drainage.

- RIMDESS's introduction will promote specific measures to prevent water pollution and improve water quality. It will promote the development of an international agreement and effective economic mechanisms between countries of the region for dealing with problems of maintaining water quality in the basin.

- The introduction of the project in the four Central Asian countries along the river basin will allow reliable data on water quality indices to be obtained and will improve the ability to manage water quality on the regional (system) level.

Regional Cooperation

- The implementation of the project will create a basis for mutual cooperation between state agencies, economic units, and scientists and specialists engaged in the Aral Sea problem.

- The implementation of this project promoted cooperation between specialists of the Central Asian Republics. These specialists exchanged ideas and information on problems, the application of a common system of management and control over the river basin's water quality and other technical and economic solutions.

APPENDIX A

MINISTRY OF MELIORATION AND WATER INDUSTRY OF KIRGIZ SSR

OSH WATER PROTECTION HYDROCHEMICAL LABORATORY

ANALYSIS No.12

Address _____ Administation Vodokanal

Date of sample taking _____ Analysis commenced on _____

Date of delivery to the laboratory _____ Analysis finished on _____

Name of object	Dry residue mg/l	Smell point	Colour index for 10cm	Trans-parency, for 10cm	Suspend subst. mg/l	PH	Total alka-linity	Oxidi zabili ty	Hard-ness	Oxidi-zabili-ty -- HPK mg/l	Solu-tion O2	BOD 5 mg/l	Nitro-gen ammon. mg/l	Nitro-gen nitrate	Nitrogen Nitrite mg/l	Chlo-rides (Cl) mg/l	Sul-phate mg/l	Sink-ing substa nces, mg/l	Fe
Before purifi-cation	869	5	without colour	5,1	181	7		32,6				93,8	11,8		weak	72,3	212	138	w e a k
Escape to Ak-Buura River	556	with-out smell	--	11,7	39,5	7		7,3				14,5	2,0	0,01	2,6	33,8	124		
Limit admis. con-centra-tion	1000	2 point				6, 5-8,5		15				3		0,39	9,1	300	100		

Percent of purification of suspended substances is 83%, BPK5-85,5%

Head of the laboratory _____ Opinion of sanitary doctor _____ Laboratory Assistant

Appendix A
Table 2

Parameters of water escape (output) into urban water-supply of Osh city

No.	Name of indices	Unit of measurement	Escape	Maximum permissible concentration
1	Smell	point	0	2
2	Smack	point	0	2
3	Colour	degree	0	20
4	PH	PH	8	6,5-8,5
5	Dry residue of	mg/l	300-400	1000
6	Chloride	mg/l	9-15	350
7	Sulphite	mg/l	180	500
8	Nitrate	mg/l	7-9	10
9	Hardness	mg.equ/l	7	7
10	Quantity-index number of intestinal bacillus	number/l	3	3
11	Iron	mg/l	0.02	3
12	Fluorine	mg/l	0.04	1,5

Total population of Osh city - 210 000
Length of the networks:
Water-supplying-380 km
Sewerage-180 km

Prices for water consumed
1) Water-supply services for agricultural purposes-1,5 tyin
2) Water supply services for houshold purposes and drinking-18 tyin for person per month
3) Water supply services for industrial purposes-1 som 85 tyin/m3
4) Water-supply services for utility purposes-68 tyin/m3

1 som-100 tyin-10 cents-0,1 USD

Table No. 3

Data of potable water quality provided to the population of Osh according to
GOST 2874-82
"Potable water", 1995

No.	Place of sample selection	Color index	Smack point	Smell 20^0 point	Turbidity mg/dm^3	Residue Cl_2mg/dm^3	Ammonia mg/dm^3	Nitrite mg/dm^3	Nitrate mg/dm^3	Chloride mg/dm^3	PH	Hardness mol/m^3	Alkalinity mol/m^3
17/	OZGOR* of AkkBuura	0	-	0	0.1	-	H/0	H/0	7.9	9.25	8.25	5	2.5
I	Before water comes to river	0	0	0	0	0.25	H/0	H/0	9.3	10.25	8.25	5.2	-
15/	OZGOR of AkkBuura	0	-	0	0.2	-	H/0	H/0	5.3	8.5	8.25	3.08	2.6
II	Before water comes to river	0	0	0	0.1	0.25	H/0	H/0	4.8	9	8.35	3	-
15/	OZGOR of AkkBuura	0	-	0	0.3	-	H/0	0.035	6.4	9	8.25	3.4	2.6
III	Before water comes to river	0	0	0	0.2	0.25	0.05	H/0	5.3	9.5	8.23	3.2	-
20/	OZGOR of AkkBuura	0	-	0	0.4	-	H/0	0.025	8.26	9	7.35	4.16	2.6
IV	Before water comes to river	0	0	0	0.2	0.25	H/0	0.015	7.53	9	7.35	4.39	-
24/	OZGOR of AkkBuura	0	-	0	5	-	H/0	0.002	6.6	10.5	7.05	4	2.65
V	Before water comes to river	0	0	0	3.6	0.27	H/0	0.001	7.5	11	7.15	4.04	-
27/	OZGOR of AkkBuura	0	-	0	6.2	-	H/0	0.046	5.3	8	7.2	2.42	2.52
VI	Before water comes to river	0	0	0	4	0.5	H/0	H/0	4.4	7.5	7.2	2.32	-
7/	OZGOR of AkkBuura	0	-	0	4	-	H/0	H/0	7.08	7.5	7.3	2	2.57
VII	Before water comes to river	0	0	0	2.7	0.4	H/0	0.001	7.97	8.3	7.3	2.1	-
15/	OZGOR of AkkBuura	0	-	0	3.4	-	H/0	0.025	8.86	9.25	8.65	4.16	2.6
VIII	Before water comes to river	0	0	0	2.1	0.3	H/0	0.015	7.53	9	8.7	4.33	-
5/	OZGOR of AkkBuura	0	-	0	4	-	H/0	H/0	6.64	10	7.5	3.2	2.8
IX	Before water comes to river	0	0	0	2.7	0.4	H/0	H/0	5.7	8.5	7.5	3.25	-
10/	OZGOR of AkkBuura	0	-	0	3.7	-	H/0	H/0	6.53	9	8.35	3.1	2.5
X	Before water comes to river	0	0	0	3	0.3	H/0	H/0	7.04	9	8.35	3.2	-
12/	OZGOR of AkkBuura	0	-	0	1.5	-	0.25	0.038	6.64	11	8	3.05	2.5
XI	Before water comes to river	0	0	0	1	0.3	H/0	0.0022	7.08	12	8.05	3.02	-
24/	OZGOR of AkkBuura	0	-	0	0.24	-	H/0	H/0	6.7	9.25	8.15	3.37	2.52
XII	Before water comes to river	0	0	0	0	0.25	H/0	H/0	7.9	10	8.2	3.48	-

*"OZGOR" - pumping and filter station

Table 3
Sheet 2

Oxidation mg O_2/dm^3	SolutionO_2 mg O_2/dm^3	COM* mg O_2/dm^3	BOD* mg O_2/dm^3	Iron mg/dm^3	Copper mg/dm^3	Zink mg/dm^3	Flourin mg/dm^3	Manganese mg/dm^3	Dry residue	Sulphate mg/dm^3	Phosphate mg/dm^3	Quantity index	t^0C grades
1.8	14.1	1.6	2.84	0.05	H/0	-	H/0	H/0	204	93	H/0	30	7
1.6	-	-	-	0.02	H/0	H/0	H/0	H/0	208	94	H/0	3	10
1.6	14.7	0.8	1.2	0.01	H/0	-	0.08	H/0	250	68	H/0	10	10
1.49	-	-	-	0.015	H/0	H/0	0.1	H/0	270	70	H/0	3	10
1.8	13.8	1.2	0.78	H/0	H/0	-	0.4	H/0	-	-	H/0	10	10
1.6	-	-	-	H/0	H/0	H/0	H/0	H/0	-	-	H/0	3	10
0.8	13.53	0.8	1.6	0.1	0.03	-	0.4	H/0	302	193	H/0	50	9
0.64	-	-	-	0.12	0.03	H/0	0.4	H/0	227	145	H/0	3	9
0.75	16.2	0.8	2.88	H/0	H/0	-	H/0	H/0	600	197	H/0	30	11
0.56	-	-	-	H/0	H/0	H/0	H/0	H/0	560	172	H/0	3	11
0.5	15.7	1.2	0.52	H/0	H/0	-	0.26	H/0	320	82	H/0	120	10
0.4	-	-	-	H/0	H/0	H/0	0.24	H/0	360	98	H/0	3	13
0.4	13.8	1.2	1.85	H/0	H/0	-	H/0	H/0	559	197	H/0	120	10
0.32	-	-	-	H/0	H/0	H/0	H/0	H/0	318	115	H/0	3	15
0.8	13.53	0.8	1.6	0.1	0.03	-	0.4	H/0	300	153	H/0	70	12
0.64	-	-	-	0.12	0.03	H/0	0.4	H/0	228	135	H/0	3	12
2.24	14.2	1.6	1.09	0.1	H/0	-	H/0	H/0	265	71	H/0	1335	9
1.44	-	-	-	H/0	H/0	H/0	H/0	H/0	288	72	H/0	3	9
0.95	14	1.2	0.98	0.4	H/0	-	H/0	H/0	280	96	H/0	180	8
0.79	-	-	-	0.5	H/0	H/0	H/0	H/0	320	98	H/0	3	8
0.72	12	1.2	1.3	H/0	H/0	-	H/0	H/0	480	138	H/0	180	8
0.88	-	-	-	H/0	H/0	H/	H/0	H/0	320	103	H/0	3	8
0.72	13.5	0.8	1.8	0.1	H/0	-	H/0	H/0			H/0	10	8
0.76	-	-	-	0.12	H/0	H/	H/0	H/0			H/0	3	8

*COM - Chemical Oxiden Minimum

*BOD - Biochemical Oxiden Demand

Head of Laboratory

Isaeva

Appendix B

EXTRACT
of maximum permissible concentrations of the fixed (normed) water substances of water objects for utility and drinking purposes

No.	Name of the substances	Maximum permissible concentrations
1	2	3
1.	Ammonia/on nitrogen	2,0
2.	Acetone	2,2
3.	Vanadium	0,1
4.	Bismuth	0,1
5.	Tungsten	0,05
6.	DD	0,4
7.	Iron	0,5
8.	Chloric iron	0,9
9.	IM-50/flotation agent	0,1
10.	Cadmium	0,001
11.	Cobalt	0,1
12.	Manganese	0,1
13.	Copper	1
14.	Molybdenum	0,25
15.	Oil polysulfide	0,1
16.	Oil other	0,3
17.	Nickel	0,1
18.	Nitrates /on NO3/	10
19.	Nitrates /on NO2/	1,0
20.	Mercury	0,0005*
21.	Sanonin	0,2
22.	Lead	0,03
23.	Carbon bisulphide	1
24.	SPAV	0,5
25.	Antimony	0,05
26.	Sulphates	500
27.	Titan	0,1
28.	Chlorides	350,0
29.	Zink	1,0
30.	Cyanides	0,1

* For inorganic compounds

Appendix C

EXTRACT

of limited admissible concentrations of fixed water substances of water objects of fish-farms

No. item	Name of the substances	Maximum permissible concentrations
1	2	3
1.	Ammonia	0,05/0,39 on N/
2.	Ammonia salted	0,5
3.	Vanadium	0,001
4.	Tungsten	0,0008
5.	Iron	0,05
6.	Iron sulphate oxide	0,1
7.	Cadmium	0,005
8.	Cobalt	0,01
9.	Manganese	0,01
10.	Copper	0,001
11.	Molybdenum	0,0004
12.	Oil products dissoled	0,05
13.	Nickel	0,01
14.	Nitrate ion /NO_2/	0,08/0,02 on N/
	/NO_3/	40,0/9 on N/
15.	Mercury	0,0001/0,001*/
16.	Lead	0,1
17.	Carbon bisulphide	1
18.	Sulphates	100
19.	Washing paste "Novost"	0,1
20.	Phenols	0,001
21.	Fluoride	0,05**
22.	Chlorides	300
23.	Zinc	0,01
24.	Cyanides	0,05
25.	Chromium/6+	0,001
26.	Phosphorus trichloride-, penta-chloride	0,1

* Maximum permissible concentrations for marine waters

** In addition to the basic content of ftuorides, but not exceeding the cumulative content.

Appendix D

Quality Standards for Irrigation Water

I. Indices, that describe the content of the substances and chemical elements, necessary for normal development of agricultural crops and operation of irrigation system (I group)

Index	Unit of measurement	Allowable quantity
1	2	3
PH		6,5-8,4
Temperature	degree	15-35
Mineralization	mg/l	1000
Hydrocarbonates	mg/l	300
Carbonates	___	6,0
Sulphates	___	500
Chlorides	___	250
Sodium	___	150
Calcium	___	300
Magnesium	___	150
Potassium	___	30
Phosphates	___	10
Nitrates	___	45
Nitrites	___	0,5
Ammonia	___	0,1
Iron general	___	2,0
Zinc	___	1,0
Copper	___	1,0
Boron	___	1,0
Fluorine	___	1,5
Manganese general	___	0,1
Cobalt	___	0,2
Molybdenum	___	0,5

Appendix E
Table 1

Polluting substance	Allowable concentration in utility sewage, sale mg/l
Aluminium	0,5
Nitrogen ammonium	18-20
Iron	1-2
Fat	30-50
Copper	0,01-0,03
CPAV (anionic)	5-8
Sulphates	80-100
Chlorides	40-60
Zinc	0,02-0,3

Based on the content of water from water-supply pipe

Appendix E
Table 2

Significance of the reducing coefficient k to the allowable concentrations of polluting substances in industrial sewage waters

Substance purified range	Calculated concentration of substance in the residue of dry substance mg/kg	K by multiplicity of the blending of sewage waters in calculating			
		n=1	n=5	n=10	n=20
Escape of purified sewage water into water object for utility usage					
Cadmium	15	0,4	0,08	0,04	0,02
Cobalt	100	0,04	0,008	0,004	0,002
Chromium	700	0,14	0,28	0,014	0,007
Copper	2000	0,2	0,04	0,02	0,01
Nickel	100	0,4	0,08	0,04	0,02
Lead	200	0,8	0,16	0,08	0,04
Zinc	2500	0,43	0,086	0,04	0,02
Escape of the purified sewage waters into water objects of fish-farms					
Cadmium	15	0,8	0,16	0,08	0,04/0,02
Cobalt	100	not introduced	0,8	0,04	0,02
Copper	2000		not introduced		
Nickel	100	not intr.	0,8	0,4	0,2
Lead	200	0,8	0,16	0,08	0,04
Zinc	2500		not intr.		

Appendix F

Diagram/plan of the pump-filter station "Ozgor"
(see next page)

Ak-Buura river

Municipal water-supply network

Figure 1

Sewerage network

Diagram/plan of the sewerage purification network

Figure 2

Схема насосно-фильтровальной станции “Озгор”

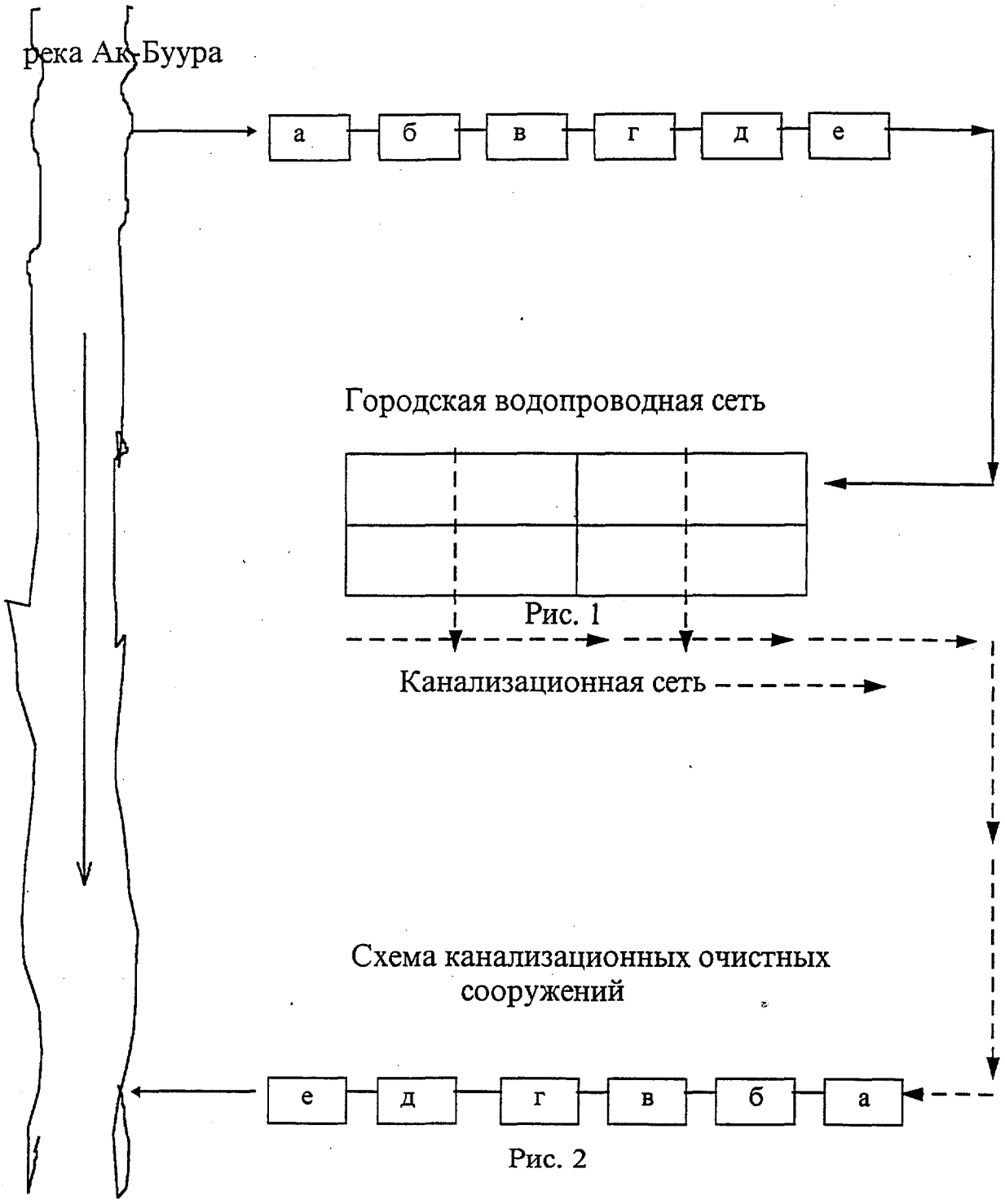

Рис. 2