

ECONOMIC COMMISSION FOR EUROPE
Geneva

Water Series № 5

**DAM SAFETY
IN CENTRAL ASIA:
CAPACITY-BUILDING
AND REGIONAL COOPERATION**



UNITED NATIONS
New York and Geneva 2007

NOTICE

The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations concerning the legal status of any country, territory, city or area, or of its authorities, or concerning the delimitation of its frontiers or boundaries.

ECE/MP.WAT/26

UNECE Information Unit Palais des Nations CH-1211 Geneva 10 Switzerland	Phone: +41 (0)22 917 44 44 Fax: +41 (0)22 917 05 05 E-mail: info.ece@unece.org Website: http://www.unece.org
--	--

UNITED NATIONS PUBLICATION
Sales No E.07.II.E.10 ISBN 92-1-116962-1
ISSN 1020-0886

Copyright © United Nations, 2007
All rights reserved

Printed at United Nations, Geneva (Switzerland)

FOREWORD

The United Nations Economic Commission for Europe (UNECE), in particular through its Convention on the Protection and Use of Transboundary Watercourses and International Lakes, is engaged in promoting cooperation on the management of shared water resources in Central Asia – a pre-condition for sustainable development in the subregion. One direction of activities is promoting the safe operation of more than 100 large dams, most of which are situated on transboundary rivers. Many of these dams were built 40 to 50 years ago, and due to limited resources for their maintenance and the inadequacy of a legal framework for their safe operation, the risk of accidents is increasing. The UNECE fully shares the concern of the Central Asian countries that an accident or emergency situation at any of these dams might have disastrous effects on the population and economy of the countries and communities downstream.

At the request of the countries in Central Asia to address this important issue, UNECE and the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP), in collaboration with the Executive Board of the International Fund for Saving the Aral Sea, started the project, “Capacity-Building for Cooperation on Dam Safety in Central Asia”, funded by the Government of Finland. The project is a contribution to the implementation of the Cooperation Strategy to Promote the Rational and Efficient Use of Water and Energy Resources in Central Asia. This Strategy has been developed and adopted under the United Nations Special Programme for the Economies of Central Asia (SPECA).

The first project phase was completed at the end of 2006, and the initial steps to improve safety have already been taken. All States have expressed their intention to improve the national legal and institutional frameworks for dam safety, and to start developing regional cooperation. UNECE and UNESCAP will support a new project phase starting in autumn 2007.

This publication includes material from the first phase of the project and is designated to experts and organizations dealing with dam safety in Central Asia. A draft model law and a draft regional agreement are key contributions for the further development of national laws and institutions, and subregional cooperation.

All the Central Asian States – Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan – are participating in the project. Thus, the UNECE-UNESCAP support for cooperation on dam safety represents an important contribution not only to safety and cooperation, but to further development of good neighbourly relations among the Central Asian countries.



Marek Belka
Executive Secretary
United Nations Economic Commission for Europe

PREFACE

This publication is the result of the first phase of the project “Capacity-Building for Cooperation on Dam Safety in Central Asia”, which was implemented, with the financial support of the Government of Finland, by UNECE, UNESCAP and the Executive Board of the International Fund for Saving the Aral Sea (EB IFAS).

The publication gives a review of the water management infrastructure in the region and a brief description of legal and organizational frameworks for safe operation of dams and other hydraulic structures in the Central Asian countries. Moreover, it describes the sources of financing for dam safety programmes as well as the procedures for notification in case of emergency and extraordinary situations at hydraulic structures, and gives an overview of main directions for further regional cooperation in the area of dam safety.

A list of large dams of Central Asia, a draft of a Model National Law on the Safety of Hydraulic Structures and a draft Agreement on Cooperation in the field of Safety of Hydraulic Structures in Central Asia are included in the publication.

This publication has been prepared by a group of experts assigned by the participating countries, including T. Sarsembekov and E. Badashev (Kazakhstan), A. Zyrianov (Kyrgyzstan), N. Abdulloyev (Tajikistan), K. Ballyev (Turkmenistan) and T. Kamalov and E. Makhmudov (Uzbekistan), with the participation of Yu. Steklov (UNESCAP), B. Libert (UNECE), A. Kholmatov (EB IFAS) and E. Orolbaev (Project Consultant). The draft Model National Law on the Safety of Hydraulic Structures and the draft Framework Agreement on Cooperation in the Field of Safety of Hydraulic Structures in Central Asia were prepared by D. Radkevich (Project Consultant).

During discussions in April and November 2006 in Almaty, constructive proposals were made by M. Aliyev, N. Atshabarov, Sh. Azizbekov, K. Beishekeev, U. Buranov, F. Gulomov, Kh. Ibodzoda, Kh. Ishanov, B. Jaksylyk, I. Joldoshaliev, L. Kasymjanova, A. Kenshimov, G. Khanmedov, N. Khanmedov, B. Khudaiberganov, D. Kustkov, Kh. Malaev, Kh. Mukhamedorazov, I. Najmidinov, A. Nurushev, M. Ospanov, B. Poluanov, Z. Tokhtokhodjaeva, V. Vinokhodov, S. Zaitseva and others.

On behalf of the United Nations, the implementation of the project has been supervised by Bo Libert (UNECE) and Yu. Steklov (UNESCAP). Coordination of inputs of the national experts and consultants has been provided by E. Orolbaev.

We hope that that distribution of this publication will draw more attention to dam safety issues in the region, and will help strengthen cooperation in this sphere in Central Asia.

CONTENTS

FOREWORD	iii
PREFACE	iv
ABBREVIATIONS	vii
INTRODUCTION	1
I. Dams and other hydraulic structures in Central Asia	5
II. Legal frameworks for safe operation of large hydraulic structures.....	11
III. Institutional arrangements for safe operation of large hydraulic structures.....	17
IV. Notification on emergency conditions at dams and other hydraulic structures.....	25
V. Financing of works for the safety of hydraulic structures.....	29
VI. Cooperation in the field of dam safety in Central Asia	33
CONCLUSIONS.....	37

LIST OF ANNEXES

1. List of large dams in Central Asia.....	46
2. Legislation and organizations involved in the regulation of dam safety in the Central Asian countries	56
3. Scheme on notification in case of emergency at the Toktogul hydroelectric power station	57
4. Organizations responsible for notification in case of emergencies at hydraulic structures in Central Asian countries	58
5. Multilateral and bilateral agreements related to cooperation in case of extraordinary situations at dams in the Central Asian countries	60
6. Model National Law on the Safety of Hydraulic Structures.....	61
7. Draft Regional Agreement on Cooperation in the Field of Safety of Hydraulic Structures	71

LIST OF FIGURES

Figure 1.	Summary diagram of main indicators for hydraulic projects with large dams in the countries of Central Asia.....	7
Figure 2.	Organizational chart of the regulatory framework for hydraulic structures safety in Uzbekistan.....	20
Figure 3.	Organizational structure of Gosvodkhoznadzor, Uzbekistan.....	21
Figure 4.	Medeo Dam on the Malaya Almatinka River, Kazakhstan.....	38
Figure 5.	Kapchagai Reservoir on the Ili River, Kazakhstan	38
Figure 6.	Bukhtarmin Dam on the Irtysh River, Kazakhstan	39
Figure 7.	Toktogul Dam on the Naryn River, Kyrgyzstan	39
Figure 8.	Uch-Kurgan Dam on the Naryn River, Kyrgyzstan.....	40
Figure 9.	Kurpsai Dam at the Naryn River, Kyrgyzstan	40
Figure 10.	Nurek Dam on the Vakhsh River, Tajikistan.....	41
Figure 11.	Sarez Lake on the Murgab River, Tajikistan.....	41
Figure 12.	Baipazin Reservoir on the Vakhsh River, Tajikistan.....	42
Figure 13.	Pulikhatun waterworks on the Tedjen River, Turkmenistan	42
Figure 14.	Oguzkhan Waterworks on the Karakum River, Turkmenistan.....	43
Figure 15.	Karakum River Waterworks, Turkmenistan.....	43
Figure 16.	Andijan Dam on the Karadarya River, Uzbekistan.....	44
Figure 17.	Pachkamar Dam on the Guzardarya River, Uzbekistan.....	44
Figure 18.	Karkidon Dam on the Kuvasai River, Uzbekistan.....	48
Figure 19.	Images of dams on national banknotes	48

MAP

Map of Central Asia.....	2
--------------------------	---

ABBREVIATIONS

BWO	Basin Water Management Organization
CECD.....	Committee for Emergencies and Civil Defense of the Government of the Republic of Tajikistan
CIS	Commonwealth of Independent States
CSCEIS MES.....	Committee for State Control over Emergencies and Industrial Safety of the Ministry of Emergency Situations of the Republic of Kazakhstan
CWR MA	Committee on Water Resources of the Ministry of Agriculture of the Republic of Kazakhstan
DWM MAWMPI	Department of Water Management of the Ministry of Agriculture, Water Management and Processing Industry of the Kyrgyz Republic
Gosvodkhoz nadzor	State Inspectorate for Control and Supervision over Technical Condition and Operational Safety of Large and Especially Important Water Facilities under the Cabinet of Ministers of the Republic of Uzbekistan
Gosgortekhnadzor	Committee for State Supervision over the Safety of Works in Industry and Mining in Kyrgyzstan and Tajikistan
ha.....	hectare
HPS	hydroelectric power station(s)
HS	hydraulic structure(s)
ICOLD	International Commission on Large Dams
ICWC	Interstate Commission for Water Coordination
IFAS	International Fund for Saving the Aral Sea
Kazselezashchita	State Agency for Mudflow Protection of the Ministry of Emergency Situations of the Republic of Kazakhstan
kW	kilowatt
kWh.....	kilowatt hour
km ³	cubic kilometre
Minselvodkhoz.....	Ministry of Agriculture and Water Management of the Republic of Uzbekistan
Minvodkhoz	Ministry of Land Reclamation and Water Management of the Republic of Tajikistan and the Ministry of Water Management of Turkmenistan
MES	Ministry of Emergency Situations in Kazakhstan and Kyrgyzstan
MW	megawatt
m ³	cubic metre
m ³ /sec.....	cubic metre per second
OJSC	Open joint stock company
SPECA.....	United Nations Special Programme for the Economies of Central Asia

INTRODUCTION

The water management infrastructure of Central Asia comprises a multitude of reservoirs, dams, irrigation systems and pumping stations, a great number of canals and tens of multipurpose hydraulic projects. The highest dam in the world, the Nurek Dam, a rockfill dam of 300 metres in height, is located on the Vakhsh River in Tajikistan, and one of the longest canals in the world – the Karakum Canal, with a length of more than 1,100 km, which contributes about half of the water used in Turkmenistan – originates from the transboundary Amu Darya River.

Large dams occupy a special place in the water management infrastructure of Central Asia. According to the classification of the International Commission on Large Dams (ICOLD), dams of 15 metres and higher, as well as dams of 5 to 15 metres with water storage of no less than 3 million m³, are defined as large dams. Out of the more than 1,200 dams in the region, 110 are large dams; a list of these can be found in Annex 1. Many of these dams are located in the basins of such transboundary rivers as the Amu Darya, the Syr Darya, the Ili and the Irtysh, and have inter-State significance.

Large dams and their reservoirs are of great importance to the economy of the countries in the region. They contribute to seasonal and long-term regulation of river flow in the interests of irrigation, hydropower generation and water supply. They also serve as efficient means against floods, mudslides and droughts. On the other hand, these large dams pose a significant potential threat, because their breach or destruction could have caused disastrous effects, including loss of life.

The natural ageing of dams, many of which were built 30 to 40 years ago, requires close supervision of their technical condition and the execution of proper repair and rehabilitation work. However, insufficient financing of these activities increases the risk of accidents at hydraulic structures (HS), and correspondingly, risks to life, human health, property and the environment. For downstream countries, the breach of any dam may have devastating consequences. The establishment of effective national legislation and specialized organizational structures and the development and strengthening of cooperation in the area of dam safety are, therefore, of great importance for the Central Asian region.

Currently, a specialized legal and institutional system in the area of dam safety exists only in Uzbekistan. In the other Central Asian countries, regulations and functions in this area are spread among various normative and legal acts and organizations.

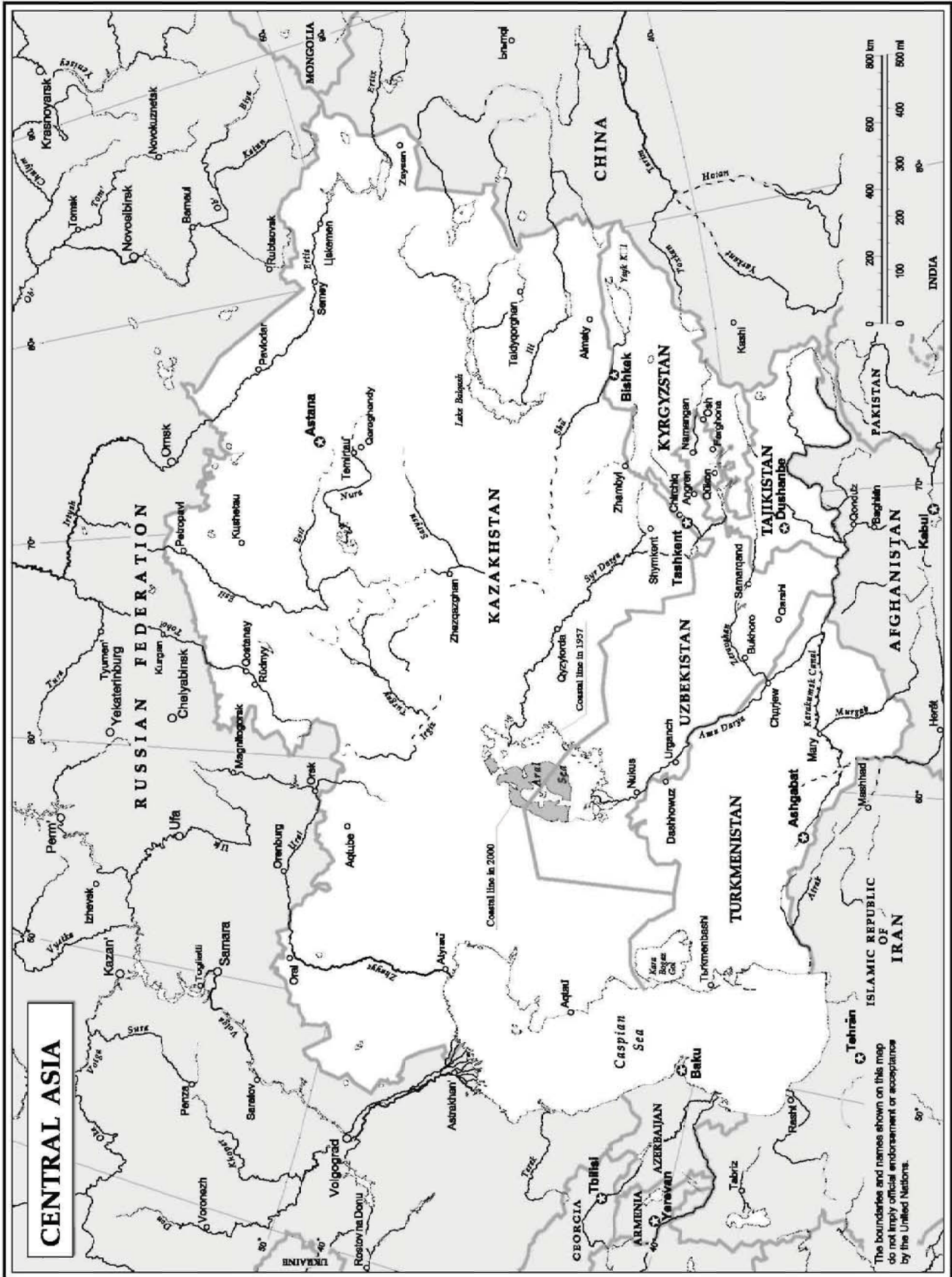
In addition, there are no special intergovernmental agreements covering all the countries of the region that define procedures for informing each other of dam conditions of inter-State importance and of emergencies occurring with dams and other large HS. Only two transboundary river basins of the region have departmental warning systems that can notify downstream countries of serious dam failures or emergencies. However, these do not apply to all dams and HS located in these basins.

Safe operation of dams at transboundary rivers of Central Asia requires constructive interaction between the region's countries. The establishment of certain mechanisms for regulating relations in the area of dam and HS safety began in March 2004 when a regional meeting of experts was organized in Almaty under the project, "Capacity-building for Cooperation on Dam Safety in Central Asia". This project, implemented by UNECE and UNESCAP in close cooperation with IFAS, was initiated with the support of the Government of Finland as one of the elements of implementing the provisions contained in the Cooperation Strategy to Promote the Rational and Efficient Use of Water and Energy Resources in Central Asia. This Strategy was formulated in 2003 in the framework of the United Nations Special Programme for the Economies of Central Asia (SPECA).

The first phase of the project initiated a process of optimizing and harmonizing national legislation as well as of developing regional cooperation on dam safety with the participation of all five Central Asian countries.

A Model National Law on the Safety of HS and a draft Regional Agreement on Cooperation in the Field of HS Safety have been developed in the framework of the project. A panel of experts considered these documents at the regional meetings held in Almaty in April and November 2006.

This publication on legal and regulatory frameworks for dam safety in the Central Asian countries was prepared as a culminating document of the project, which also proposes the main directions for developing further cooperation in this area.



I. DAMS AND OTHER HYDRAULIC STRUCTURES IN CENTRAL ASIA

DAMS AND OTHER HYDRAULIC STRUCTURES IN CENTRAL ASIA

Kazakhstan

In Kazakhstan, the water management infrastructure serves multiple purposes, being used for such different economic functions as power generation, water supply, irrigation, water transport, fishery and recreation. In total, there are about 650 major HS of various institutional affiliations and types of ownership. There are 214 reservoirs with a total water storage capacity of more than 95.5 km³. The largest are the Bukhtarmin reservoir (on the Irtysh), with a water storage capacity of 49.8 km³, and the Kapchagai reservoir (on the Ili), with a water storage capacity of 28.1 km³.

Some tens of dams for different purposes have been constructed in Kazakhstan, of which 12 are large dams according to the ICOLD definition. Five large dams are for energy generation purposes; one serves for mudflow protection for the city of Almaty, and the rest are mainly for irrigation purposes.

The hydraulic power potential of the country's rivers is around 170 billion kWh of energy per year. The potential technically available for utilization is estimated at 62 billion kWh per year, with economically appropriate potential at 27 billion kWh a year. The average yearly production of electrical energy at HPS is more than 8 billion kWh, or about 12 per cent of the total electricity produced in the country.

The potential area of irrigated lands is estimated at 2.3 million ha, accounting for 6 to 7 per cent of the total area of cultivated land. However, only the area of 1.5 to 1.6 million ha is actually irrigated.

According to the Ministry of Emergency Situations (MES), about 40 per cent of major HS are in urgent need of repair. At the same time, the average rate of depreciation of water management structures is estimated at more than 60 per cent, that has resulted in decreasing the operation reliability and safety of many strategically important HS. One serious problem relates to small-scale HS, some of which are abandoned and neither have an owner nor serve any function. Their technical condition is extremely inadequate. Annual damage caused by adverse water impacts, e.g. floods, waterlogging, due to unsatisfactory performance of water regulating and protecting structures, is estimated in the tens of millions of United States dollars. The inadequate technical condition of many HS requires urgent measures aimed at improving their safety.

Kyrgyzstan

The hydropower infrastructure in Kyrgyzstan is relatively well developed. On the Naryn River in the Syr Darya

basin, there is a cascade of six large hydraulic structures used mainly for energy generation. These structures include large dams and HPS with a total installed capacity of 2,870 MW and an average annual production of energy of 10.4 billion kWh.

In the total energy balance of the country, the share of hydropower constitutes 82 per cent of installed capacity and 71 per cent of potential electric energy production. However, the actual share of hydropower production amounts to more than 90 per cent. About 97 per cent of the installed capacity of HPS is situated in the lower Naryn cascade of reservoirs. At this cascade, a multi-year runoff control is performed by the Toktogul reservoir (full storage capacity of 19.5 km³; live storage capacity of 14 km³), created by a 215-metre-high concrete dam.

Under the water management administration, there are 103 dams, of which 14 are large dams according to the ICOLD definition. A review of these large dams' safety, undertaken in July-August 2005 during the preparation of the World Bank's Water Management Improvement Project, has identified that the technical condition of some dams does not meet safety requirements, and that urgent repair and rehabilitation work is needed. This is because during the last 15 years, due to the lack of funds, repairs and rehabilitation work on a range of irrigation dams have not been performed to the extent needed, and the monitoring of their technical condition has been almost lacking. As a result, the operation of these dams have started to pose a serious threat, especially during the period of flood flow.

More than 50 dams with a total mudflow retaining storage capacity of 4.8 million m³ are under the management of MES.

The main problems of water control structures are related to the occurrence of significant filtration at dams downstream, the depreciation of hydro- and electromechanical equipment, the disintegration of concrete structures, and the lack of reliable communication means, which impede the safe operation of reservoirs. At many dams, instruments for monitoring condition of their structural elements, such as spillways and tunnels, embankments and supporting structures, are out of order.

Tajikistan

In Tajikistan, much focus is given to maintenance and development of water infrastructure related to hydropower and irrigation. This is due to the lack of significant sources of hydrocarbon resources in the country, where agriculture is based on irrigated farming.

Nine large multipurpose hydraulic projects are operational in the country. The hydropower potential of the country is estimated at 527 billion kWh of electric energy annually.

Currently, the technically available and economically appropriate hydropower potential is 317 billion kWh a year, 5 per cent of which is utilized. The total installed generation capacity at HPS is around 4,060 MW. About 15 billion kWh a year of electric energy is produced by Tajikistan's HPS, or 98 per cent of its overall national production. The harnessing of the still unused hydropower potential is a priority for the economic development of Tajikistan.

The Nurek Dam at the Vakhsh River is the largest in Tajikistan and Central Asia. The height of its gravel rockfill dam is 300 metres. Installed capacity of the Nurek HPS is 3,000 MW. The water reservoir with a storage capacity of 10.5 km³ performs seasonal runoff control in the Amu Darya basin.

The other large HS is the Kayrakkum Reservoir with a storage capacity of 4.1 km³ that provides seasonal runoff control in the middle part of the Syr Darya basin.

With the attraction of investment to Tajikistan, the construction of the Rogun hydraulic project on the Vakhsh has been renewed with the following design specifications: rockfill dam 335-metre-high; reservoir with a storage capacity of 13.8 km³; and HPS of 3,600 MW capacity. The construction of large dams and other structures for Sangtuda HPS 1 and 2 projects on the Vakhsh, with a capacity of 670 and 220 MW, respectively, is ongoing.

In 1911, a natural 567-metre-high landslide dam and with a body volume of more than 2.2 km³ was formed at the Murgab River as the result of a severe earthquake, creating the high-mountain Lake Sarez with a storage capacity of more than 17 km³. Through this dam, named Usoi in memory of the village that was buried under it, more than 1.5 km³ a year is filtrated to the Murgab. In the event of a breach of the Usoi Dam, the valleys of the Murgab, Bartang, Pyanj and the Amu Darya Rivers in Afghanistan, Tajikistan Turkmenistan and Uzbekistan would be flooded. The total possible flood area is estimated at 52,000 km², inhabited by approximately 6 million people.

In Tajikistan, out of 1.6 million ha that are potentially suitable for irrigation, the area of 720,000 ha is irrigated. The irrigation infrastructure includes 3,206 headwater intakes on main canals, 219 large structures of off-farm collectors, major and off-farm irrigation canals of the total length of 4,232 km, and on-farm canals totaling about 28,000 km. The length of irrigation tunnels – 26.6 km with a total water intake of 170 m³/sec, and riverbank protection dikes and mudflow discharge routes – of more than 2,000 km.

In Tajikistan, on the whole, the depreciation rate for irrigation and drainage systems exceeds 50 per cent, and for pumping stations - 65 per cent. Thus, the Kayrakkum Reservoir needs urgent repairs on and rehabilitation of

its embankments and waterlogging control on an area of about 12,000 ha, to prevent a water deficit of up to 1 km³ for downstream countries.

According to estimates, the technical condition of irrigation and drainage systems may not be improved to the level of 1990 before 2015. It is therefore necessary to increase investment opportunities and to increase the number of pilot projects for the rehabilitation of irrigation and drainage systems.

Turkmenistan

For Turkmenistan, the water management infrastructure has a strategic significance, as water supply for the population, industry and agriculture, and especially irrigated farming, depends on trouble-free operation of a complicated and large system of canals, dams and reservoirs that delivers water from the Amu Darya to the central part of the country. A main element of this system is the Karakum Canal, which takes water from the Amu Darya and stretches for the length of 1,100 km through the Karakum Desert towards the Caspian Sea. Four dam reservoirs with a total storage capacity of 2.5 km³ have been constructed on the Karakum, and a second phase of the Zeyid Reservoir for multi-year water flow regulation, with a design storage capacity of 3.2 km³, is under construction.

To date, 16 major reservoirs created by large dams, according to the ICOLD definition, are operational. Design works for construction of another six dam reservoirs are under way. Existing water management infrastructure allows for water supply to 6.5 million people and the irrigation of 2.4 million ha of land.

At present, the infrastructure is working without accident, but a number of structures, especially those which were erected 30 or more years ago, are in need of significant reconstruction. These are mainly large HS (dams, connecting structures, drop structures, inverted siphons, aqueducts and bridges) on the Karakum and its reservoirs.

Uzbekistan

Of the region's countries, Uzbekistan has the most developed water management infrastructure, making it possible to irrigate 4.26 million ha of land and to produce about 7 billion kWh of electrical energy annually.

In Uzbekistan, there are 273 major and especially important HS of classes I, II, III, including 54 large dams according to the ICOLD definition with a total water storage capacity of about 20 km³, 35 pumping stations with total productivity of about 3,000 m³/sec, 29 HPS with a total installed capacity of about 400 MW, 60 main canals with total length of 24,300 km and a carrying capacity of 9,000 m³/sec, 64 hydraulic projects, 24 main

collectors for collection of drainage waters at irrigation systems, and bank-protecting and regulating structures for seven rivers, with total length of 2,312 km.

A special focus is given to further development of water management infrastructure. Thus, in 2005–2006, the structures of the Andijan and Tashkent Reservoirs were equipped with automation facilities, instrumentation, and communication and early warning systems.

Activities to ensure reliable and safe operations have been performed as a priority at structures with a high risk of possible accident which could lead to the loss of life and considerable material loss.

Regional Summary

The greater part of existing infrastructure in Central Asia was built in USSR times. Design, construction and operation of dams, reservoirs, canals and other HS followed the unified technical regulations of the former Soviet Union. These regulations provided for routine monitoring, maintenance of structures, their capital repairs, and if necessary, their reconstruction.

Deductions based on levels of annual depreciation were used to finance capital repairs. Before 1991, once every five years a comprehensive inspection of large water control structures was carried out by sectoral commissions, often with participation of specialized design, assembly, construction and scientific research organizations. The commission made an appraisal of a structure's condition and issued recommendations and a description of the activities needed to improve safety levels.

After the collapse of the Soviet Union, responsibility for operation and maintenance of dams and other HS

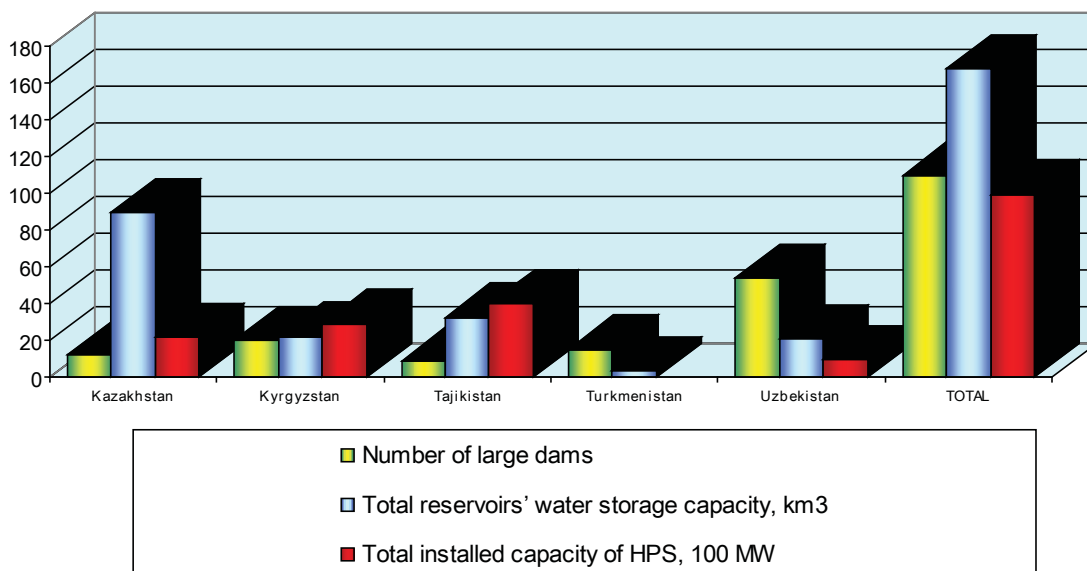
was transferred to each of the Central Asian countries, although so far design, construction and operation of irrigation and hydropower facilities are mainly performed according to the requirements which were applicable in the former Soviet Union.

After 1991, contacts with organizations and institutions of other former Soviet republics responsible for field observations and safety assessments of large HS were discontinued. Not all the Central Asian countries managed to quickly establish their own adequate services for these purposes. Sufficient funds were not allocated for observations and replacement of instrumentation that had become disabled during operation. Thus, the overall monitoring of the condition of dams and other HS decreased. Due to the lack of funds, preventive as well as repair and rehabilitation work on a range of dams, mostly for irrigation, has not been carried out to the extent needed.

As a result of these and other factors, the technical condition of many dams has deteriorated and started to pose a danger for operation, especially in the period of flood discharge. Although the situation with respect to maintaining large dams and other large HS in safe condition has been somewhat improved during recent years, significant efforts and increased financing are needed to improve the safety of the existing water management structures in the countries of the region.

A summary diagram of main indicators for large dams in the countries of Central Asia is shown on Figure 1. A more detailed list of the region's large dams is found in Annex 1.

Figure 1.
Summary diagram of main indicators for hydraulic projects with large dams in the countries of Central Asia



II. LEGAL FRAMEWORKS FOR SAFE OPERATION OF LARGE HYDRAULIC STRUCTURES

LEGAL FRAMEWORKS FOR SAFE OPERATION OF LARGE HYDRAULIC STRUCTURES

Kazakhstan

Specialized legislation on the regulation of HS safety, including dam safety, is lacking in Kazakhstan. Operating Rules of Reservoirs, a departmental instruction approved by an authorized body in the area of use and protection of water resources, which is currently the Committee on Water Resources of the Ministry of Agriculture (CWR MA), constitutes the legal basis for State regulation in the field of dam safety. These Operating Rules have been developed by a specialized planning organization.

According to Article 24 of the country's Water Code of 2003, water facilities, including dams, may be in State or private ownership. State ownership is subdivided into two types: (a) ownership under the responsibility of central authorities (republican); and (b) ownership under the responsibility of local executive authorities (communal). Water facilities of special strategic importance are State-owned and cannot be leased or transferred to asset management or privatized. In accordance with Article 25 of the Water Code, the President of the Republic of Kazakhstan establishes the list of such structures.

Water facilities under republican ownership, in accordance with Article 26 of the Water Code, are managed by State water management organizations. The Government establishes the list of water facilities that are in republican ownership. In correspondence with the Resolution № 1344 of the Government of Kazakhstan On Approval of the List of Water Facilities under Republican Ownership of 21 December 2004, proposals on the inclusion of structures into the list shall be submitted by CWR MA, as well as by the Committee for Geology and Subsoil Use of the Ministry of Energy and Mineral Resources.

According to Article 32 of the Water Code, owners of water facilities are fully responsible for their safe technical condition. An owner of a dam or other structure is responsible for ensuring that they are properly maintained and do not pose a risk for accidents of a technical nature. Authorized bodies in the area of use and protection of water resources, emergencies and industrial safety supervise the safety of water facilities.

To improve normative and legal safety regulation for dams and other HS, a special draft law on the introduction of changes and amendments into the Water Code on issues related to dam safety is under preparation in Kazakhstan. It is expected that the Water Code, supplemented by the amendments related to dam safety, will strengthen owner responsibility for the dams' safe technical condition, and will better regulate legal relations in this area.

Kyrgyzstan

The main law in the area of dam safety in Kyrgyzstan is the Water Code adopted in 2005. For the first time in legislative practice of Kyrgyzstan, the Water Code includes regulations on emergencies and dam safety.

Issues related to dam safety are found in Chapter 12 of the Water Code. Article 75 assigns responsibility for safety of dams, their safe operation and maintenance, as well as for damage caused as the result of improper operation, to dam owners and users. Article 76 stipulates the classification of all dams, including hydropower dams, into three categories: (a) dams of national importance; (b) dams of basin importance, and (c) dams of local importance. Proposals on dam classification by such categories as dam height, water storage capacity, risk for population and property, as well as the extent of possible damage and change in water quality in case of dam failure, have been prepared. The inter-State importance of dams, i.e. their impact on the river flow regime in the downstream countries if the dam is situated at transboundary watercourses, has also been taken into account. All dams of inter-State importance are in the highest category of importance – dams of national importance.

In Kyrgyzstan, the State Property Committee is the owner of hydropower dams, as it is the main shareholder of energy facilities transferred to the management of Electric Stations Open Joint Stock Company (OJSC). Dams for irrigation purposes are also owned by the State, and have been transferred to the Department of Water Management of the Ministry of Agriculture, Water Management and Processing Industry (DWM MAWMPI) for operation and maintenance.

With the approval of the Water Code, owners' responsibility for the technical condition and adequate operation of dams has been increased. However, implementation of all Water Code regulations will take several years. Time is needed to establish a normative base that regulates dam safety, as well as for dam observation and the identification of funds for capital repairs and improvement of their technical condition.

Tajikistan

In Tajikistan, there is no special law on dam and other HS safety. Legal provisions related to this area are found in different normative and legal acts make regulation of dam safety difficult.

The most important legal act is the Water Code adopted in 2000. This document regulates the conditions for site identification, design, construction and commissioning HS (Articles 14, 17 and 18). An incentive for providing dam and other HS safety is the issuance of permits for special water use (Articles 32, 39 and 44). Articles 45 and 129 set

up obligations for the proper maintenance of structures, and for prevention and mitigation of consequences of accidents and natural disasters. Article 84 stipulates rights and obligations of hydropower companies with respect to maintenance and accident-free operation. The operation of reservoirs is regulated by rules approved for each reservoir, cascade or system of reservoirs (Article 105). The organization and coordination of activities for achieving appropriate technical condition and status of water reservoirs, as well as the procedures pertaining to the application of rules of operation, have been established by the Government of Tajikistan (Article 106). For the time being, these competences have been transferred to the Ministry of Land Reclamation and Water Management (Minvodkhoz), the Ministry of Energy and Industry, the Barki Tojik Energy Company, and oblast and territorial administrations of water management, depending on the ownership of the dam, as well as to the Committee for State Supervision for Safety of Works in Industry and Mining under the Government of Tajikistan (Gosgortekhnadzor).

Activities with respect to the prevention and mitigation of accidents and emergencies impacts are specified in the State forecasts on the country's economic development (Article 131). To provide for the security in the region and the prevention of terrorist and destructive activities, large water facilities of strategic importance in Tajikistan are to be protected by the State (Article 132). Articles 142 and 144 specify responsibility for violations, and assign obligations on legal entities and individuals for compensation for losses caused.

Article 136 of the Water Code provides for the institution of a State Register of water facilities. Information about function and legal status of facilities and the physical-geographical and technical parameters that characterize safe operation and economic as well as other indicators will be reflected in the State Register. The introduction in the State Register will be made simultaneously with issuance of licenses for special water use. At present, licenses for water use are issued by Minvodkhoz (for irrigation), and by the Ministry of Agriculture and Environment Protection (for other types of water use).

The Law of the Republic of Tajikistan On Energy (2000) has significant importance for the provision of dam and other HS safety (Article 1), as well as for the protection of the population and the environment from hazardous impacts of water (Articles 4 and 6). To observe established standards and operating rules for energy facilities by legal entities and individuals, a State energy supervisory agency of the Ministry of Energy and Industry, Gosenergonadzor (Article 19), is in place. Article 20 of the Law On Energy stipulates responsibility for violating legislation in the energy sector.

Rules on the Use of Water Facilities for Hydropower Purposes were approved by a Resolution of the

Government of Tajikistan (№ 95, of 4 March 2003). According to these Rules, supervision of the safety of hydropower facilities is to be performed by a body authorized by the Government (p. 7). Technical operation of energy facilities shall be performed in accordance with the Rules on Technical Operation of Energy Stations and Networks (Clause 10). Water flow through water release structures should neither damage these structures nor cause riverbed erosion downstream that might affect the structure's stability (Clause 16). For now, together with these Rules, similar ones that had been in force at the USSR are also applicable, as the two complement each other.

The condition of irrigation dams is supervised by the State Departments of Water Management at the oblast and territorial levels in accordance with the Operational Rules for Silted Reservoirs of Small and Medium Storage Capacity approved by Minvodkhoz. Measures such as inspections and current and capital repairs are included in annual autumn-winter activities for preparing the systems for the following irrigation season, approved by joint boards of Minvodkhoz and the Ministry of Agriculture and Environmental Protection.

In accordance with Articles 6 and 13 of the Water Code, and Article 11 of the Law On Energy, dams and other HS may be in State, private, joint stock, mixed or joint ownership. Under Article 10 of the Water Code, the Government may, on the basis of a tender and on the condition of retaining the facility's original functions, hand over the right to manage State-owned water facilities within a limited territory to specialized local and foreign legal entities on a contractual basis.

Turkmenistan

HS safety in Turkmenistan is regulated by technical and normative documentation adopted during the Soviet period. New rules of operation and provisions for dam and HS safety have been developed and approved only for the Kopetdag and Khauz Khan hydraulic projects.

In Turkmenistan, a Law on HS Safety has been drafted and agreed upon within the Minvodkhoz.

Uzbekistan

Uzbekistan is the only country of Central Asia where a special Law On the Safety of Hydraulic Structures, passed in 1999, regulates issues of dam safety. This law applies to all large dams and other HS under State ownership, independent of the institutional affiliation to which they have been transferred for operation.

The system for regulating HS safety in the Republic of Uzbekistan includes:

- Definition of the functions of the Government, executive bodies and local State bodies and operating

organizations involved in the regulation of HS safety;

- Establishment of basic obligations of operating organizations;
- Execution of State supervision of HS safety during their designing, construction and operation;
- Declaration of safety for HS;
- Establishment of an HS cadastre;
- Definition of responsibilities for violating HS safety legislation.

The main goal of the State regulation of HS safety is the prevention of accidents through:

- Improvement of HS design, construction and safe operation rules and norms;
- State supervision of the application of rules and norms of HS operation by operating organizations, as well as supervision of activities of other entities, which may reduce HS safety levels;
- Observation and analysis of facilities' conditions, rectification of those defects which may lead to full or partial loss of their functional capacity and increased possibility of emergency situations;
- Personnel training on accident prevention measures and actions to localize and eliminate emergency situations, as well as establish needed material and financial reserves.

Full implementation of all requirements of the Law has identified a need for drafting a range of legislative and normative-legal acts. The main objectives of these documents are:

- Specification of the role of executive bodies responsible for State supervision of HS safety;
- Establishment of an HS cadastre;
- Definition of procedures for development and conduct of declared State technical expertise regarding HS safety;
- Compliance with the Law for legal, sectoral and technical normative documents regulating HS operation.

To date, almost all documents that have been included in the plan described above have been drawn up and entered into force. The prepared and issued normative acts, together with the Law On the Safety of Hydraulic Structures, forms a set of legislative acts that provides the framework for State supervision of HS safety.

Regional summary

In the Central Asian countries, the legal frameworks in the area of dam and other HS safety exhibit significant differences, and demonstrate different approaches.

In Uzbekistan, a special Law On the Safety of Hydraulic Structures adopted in 1999 constitutes the legal basis.

In remaining four countries of the region, separate regulations related to dam safety are included in general legislation on water management, energy and emergency situations. In recent years, however, a tendency to consolidate issues on the safety of major HS, including large dams, into specialized legislation can be clearly observed.

In Turkmenistan, Minvodkhoz has prepared a draft Law on HS safety, in which principally new approaches to State regulation in the sphere of dam safety, similar to the existing order in Uzbekistan, are proposed.

In Kyrgyzstan, the recently adopted Water Code, for the first time in legislative practice of the country, includes regulations on emergencies and dam safety.

In Kazakhstan, a draft Law on Introduction of Changes and Amendments, mainly related to issues of dam safety to the Water Code of the country, is under preparation.

In Tajikistan, the Government has instructed several institutions to prepare a draft Law on HS Safety. The responsible authorities have considered a draft Resolution on a State Register of Water Facilities, which will contain also technical data specifying their safety.

A tendency to consolidate issues on dam safety into special legislation has emerged through joint work of experts from all the Central Asian countries on a Model National Law On the Safety of Hydraulic Structures prepared within the framework of the project "Capacity-Building for Cooperation on Dam Safety in Central Asia". The adaptation of the prepared Model Law to the legal conditions of each of the interested countries will allow them to achieve certain harmonization of national legislation on dam safety, which will positively impact further cooperation in this area in Central Asia. In a broader perspective, this will also allow for more successful cooperation between neighbouring States with respect to the use of the water resources of transboundary rivers.

III. INSTITUTIONAL ARRANGEMENTS FOR SAFE OPERATIONS OF LARGE HYDRAULIC STRUCTURES

INSTITUTIONAL ARRANGEMENTS FOR SAFE OPERATION OF LARGE HYDRAULIC STRUCTURES

Kazakhstan

In accordance with Article 32 of the country's Water Code, the Committee on Water Resources of the Ministry of Agriculture (CWR MA), the Committee for State Control over Emergencies and Industrial Safety of the Ministry of Emergency Situations (CSCEIS MES) and their territorial bodies oversee the provision of the safety of dams and other water facilities by their owners.

The CWR MA and its basin water management authorities approve the regime of utilization of State-owned water bodies as well as of the operating rules of water facilities located in the territory of those water bodies.

Supervision of safety requirements for industrial enterprises, including large dams and hydropower infrastructure, is within the competence of CSCEIS MES. In accordance with Resolution № 1346 of the Government of Kazakhstan of 21 December 2004, On Approval of Registration Rules for the State Register for Units, the Activity of which May Cause Loss to Third Parties, CSCEIS MES is responsible for keeping a register of hydraulic structures.

Kyrgyzstan

In Kyrgyzstan supervision of safe dam is performed by the dam owners: Electric Stations OJSC or DWM MAWMPI.

Supervision of the technical condition of dams and other HS owned by Electric Stations OJSC is performed by the technical services of this organization. A Comprehensive Commission of the Electric Stations OJSC inspects dams' condition with representatives from the Committee for State Supervision over the Safety of Works in Industry and Mining (Gosgortekhnadzor). After the inspection, a report, including a list of activities for improvement of operations' reliability, is drawn up.

The technical condition of irrigation dams is overseen by the technical services of DWM MAWMPI; annual statements are made on dams' technical condition before and after the growing season.

Currently, there is no specialized organization for supervising the safety of dams and other HS. However, according to Article 11 of the Water Code, a State Water Administration, will be established to deal with, inter alia, the regulation of dam safety. In addition, according to Article 77 of the Water Code, a Commission on Dam Safety is to be established to deal directly with the regulation in the area of dam safety. As an independent technical body, the Commission will submit recommendations,

based on the results of inspections undertaken to the State Water Administration, for undertaking measures for the rectification of identified defects. The Commission will also prepare reports on the safety of dams of national importance not less than once every 10 years, and for dams of local importance, not less than once every 15 years.

To date, a draft of the terms of reference for the Commission on Dam Safety has already been prepared along with proposals for classifying dams by such criteria as dam height, water storage capacity, risk to life and property, and the levels of possible damage and change of water quality in the event of dam demolition.

In Kyrgyzstan, the registration of dams is performed in an established order, and includes data on a given dam's owner or user, dam location and size, the components of its construction, and other technical information. Article 78 of the Water Code envisages a registry of dams by the State Water Administration, which will keep a database on the country's dams. Dam owners will need to submit an annual report to the State Water Administration, with a detailed description of any structural changes and identified defects in the functioning of a dam's structural elements, and indicating shortcomings and problems.

Tajikistan

In Tajikistan, there is no single specially authorized body supervising the safety of dams and other HS. This responsibility has been delegated to the following organizations: Gosgortekhnadzor, Barki Tojik Energy Company, sectoral ecology inspections and operational services in the water resources management sector. Local administrations also carry out supervision of HS safety within their territorial borders.

Barki Tojik Energy Company and the administration of corresponding HS are responsible for the safe operation of multi-purpose hydropower projects. State departments of water resources management under Minvodkhoz operate irrigation dams in Khatlon and Sogd oblasts.

A special agency – "Sarez", under the Committee for Emergency Situations and Civil Defense of the Republic of Tajikistan (CoES) – deals exclusively with issues concerning the natural landslide dam on the high-altitude Lake Sarez, including warning and evacuation of local residents in case of a breach of the Usoi dam.

Turkmenistan

In Turkmenistan, Minvodkhoz and its subordinate territorial subdivisions managing and operating HS, including dams, are responsible for their safe operation. In addition, there is a special Karakumvodkhoz Industrial Association affiliated with Mindvodkhoz that oversees the Karakum River, one of the longest canals in the world,

through which about half of the total water available in the country flows from the Amu Darya.

Uzbekistan

The Law of the Republic of Uzbekistan On the Safety of Hydraulic Structures establishes an order for organization and implementation of State regulation of HS safety. These are carried out by the Cabinet of Ministers of Uzbekistan (Article 4 of this Law). The duties of State supervision of HS safety have been assigned to the State Inspectorate for Control and Supervision over Technical Condition and Operational Safety of Large and Especially Important Water Facilities under the Cabinet of Ministers of the Republic of Uzbekistan (Gosvodkhoznadzor) by Resolution № 143 of 30 March 1999.

Resolution № 499 of the Cabinet of Ministers of Uzbekistan of 16 November 1999 states that control and supervision of the technical condition and safe operation of HS of classes I, II and III are to be undertaken by Gosvodkhoznadzor, as are structures of lower classes by the operating organizations.

In Uzbekistan, there are 273 HS of classes I, II and III. These are operated by the Ministry of Agriculture and Water Management, Uzbekenergo State JSC and the Amu Darya and Syr Darya Basin Water Management Organizations (BWO). Gosvodkhoznadzor also oversees the safe condition of the bank-protecting and riverbed-regulating structures under the jurisdiction of local authorities. An organizational chart of the State supervision of HS safety in Uzbekistan is shown in Figure 2.

The main functions of Gosvodkhoznadzor are:

- Organizing the drafting and approval of institutional normative, legal and technical documentation;
- Participating in the development of legislation and normative-legal documents on HS safety;
- Coordinating the development and implementation of programmes for HS safety;
- Supervision of the application of norm and rules for the safe operation of HS by operators, as well as their compliance with license terms for the design, construction and operation of HS defined as high-risk.

Gosvodkhoznadzor also performs the following duties:

- Formation of and responsibility for keeping the HS cadastre;
- Organization and preparation of declarations on HS safety and State expertise in this area;
- Organization of inspections of HS, execution of field observations and diagnosis of technical conditions.

Gosvodkhoznadzor also submits proposals to the

Government for limiting and prohibiting activities that could negatively impact the safety of high-risk HS safety. It also organizes training and certification of State inspectors, as well as of the operating organizations' personnel responsible for the safe operation of HS.

In 2002, a Panel of Experts was established under Gosvodkhoznadzor with the main tasks of considering and making decisions on the most important issues affecting the reliability and safe operation of HS of classes I, II and III. Representatives of operational, financial, ecological, design and scientific organizations as well as agencies on emergency situations participate in the Panel of Experts. The Head of Gosvodkhoznadzor is the Chairman of the Panel. Decisions adopted by the Panel of Experts on improving, the technical condition and the reliability of safe operation of HS are to be obligatorily implemented by organs for State and economic management, as well as by local authorities, enterprises, institutions and organizations.

To carry out field observations and diagnosis of the technical conditions of dams and other HS, a Diagnostic Center has been established under the Panel of Experts. In addition, Gosvodkhoznadzor has created a monitoring system and a database, and is assessing HS safety. An organizational chart of Gosvodkhoznadzor is shown in Figure 3.

Regional summary

In Uzbekistan, Gosvodkhoznadzor is the specialized body supervising and regulating relations in the area of dam and other HS safety. Gosvodkhoznadzor oversees the technical condition and safe operation of dams and other HS operated by various ministries and organizations. It also supervises the safety of bank protection and riverbed control structures under the jurisdiction of local State authorities.

In three countries in the region, the supervision of dam safety is only one of the roles of State supervisory bodies. To such multifunctional bodies belong CSPSFE MES in Kazakhstan and Gosgortekhnadzor in Kyrgyzstan and Tajikistan. In these countries, the regulatory functions in the area of dam safety are fragmented among several institutions. In Kazakhstan, CWR MA, through its basin water management authorities, participates in this activity. In Kyrgyzstan, DWM MAWMPi and Electric Stations OJSC are the responsible bodies, as are and Barki Tojik Energy Company and Minvodkhoz in Tajikistan. Actual monitoring of technical conditions of HS is done by the departmental inspectors of the organizations operating these structures.

In Turkmenistan, Mindvodkhoz is responsible for the safe operation of all water management projects, including dams with reservoirs.

At the same time, a tendency towards establishing special organizations for supervising dam and HS safety can be seen in the region. For example, in Kyrgyzstan, in accordance with Article 77 of the Water Code, a Commission on Dam Safety is being established. This Commission will deal directly with regulation in the area of dam safety. It will be established as an independent technical body, that will prepare reports on dam safety, and will submit recommendations to the State Water Administration to take remedial action on identified defects, based on results of inspections.

A summary table with information on existing legal and organizational frameworks related to the regulation of dam safety in the Central Asian countries can be found in Annex 2.

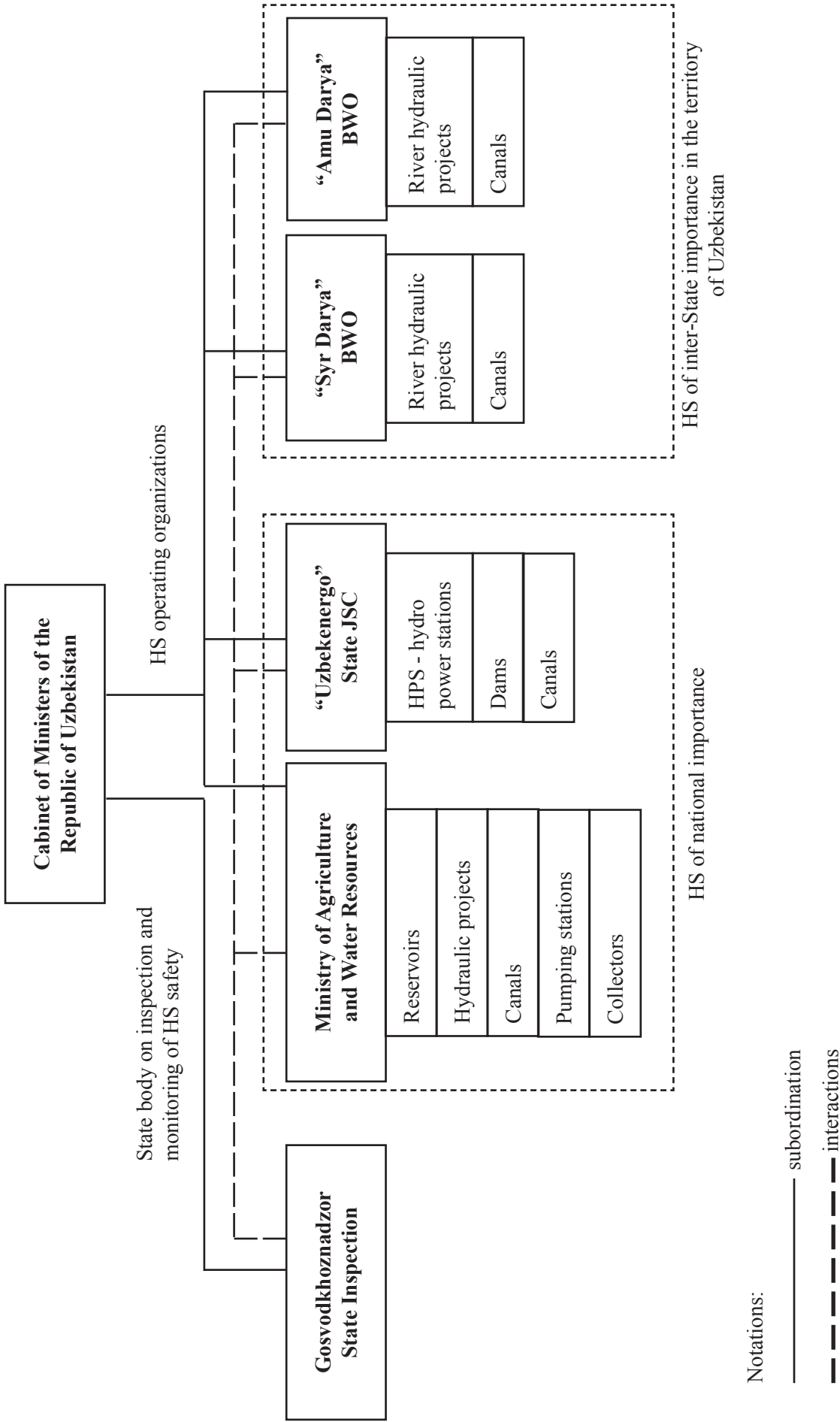


Figure 2
 Organizational chart of the regulatory framework for hydraulic structures in Uzbekistan

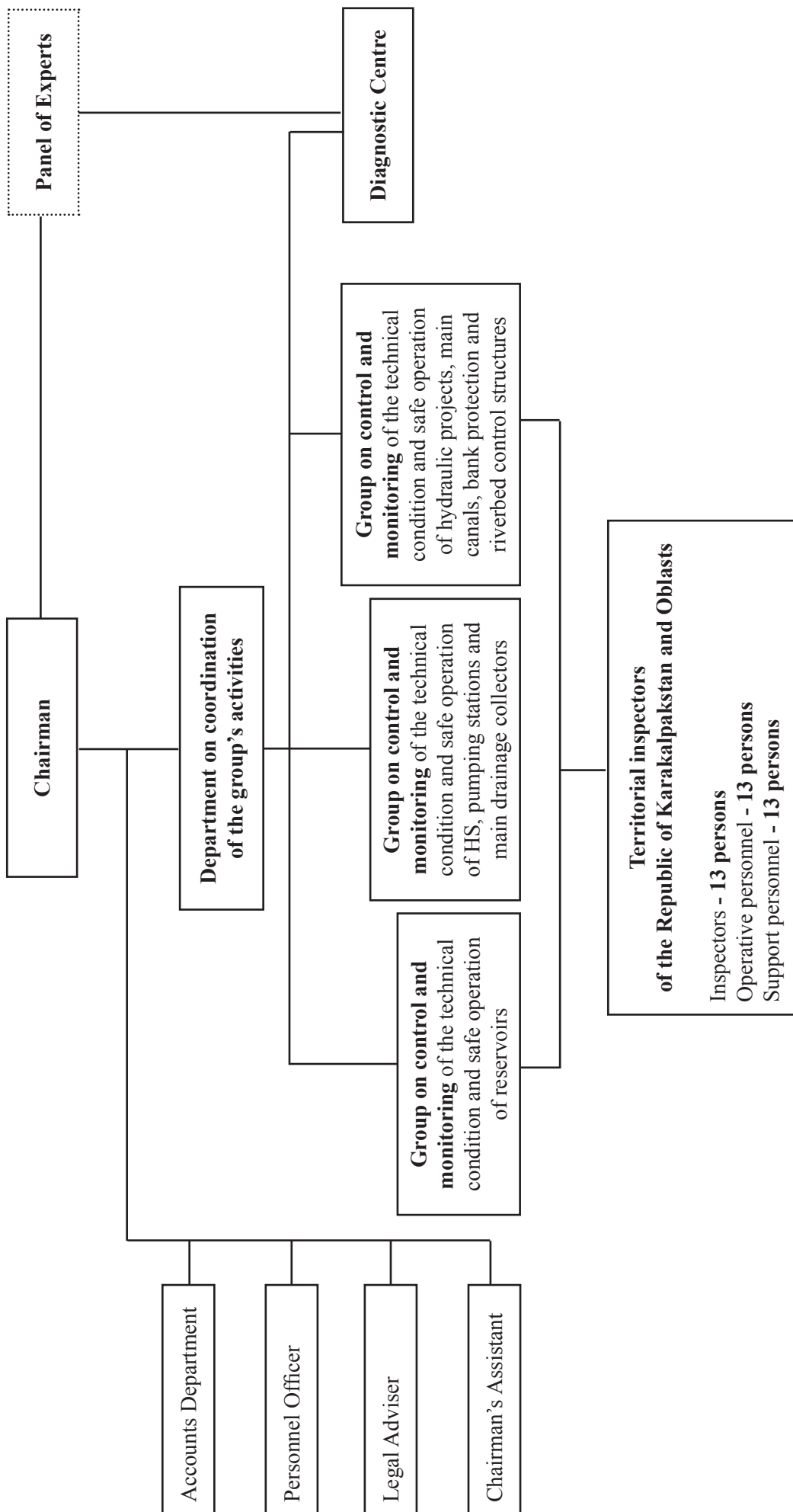


Figure 3
Organizational Structure of Gosvodkhoznadzor Uzbekistan

IV. NOTIFICATION ON EMERGENCY SITUATIONS AT DAMS AND OTHER HYDRAULIC STRUCTURES

NOTIFICATION ON EMERGENCY SITUATIONS AT DAMS AND OTHER HYDRAULIC STRUCTURES

Kazakhstan

In case of emergency situations at HS, operating organizations should undertake the requisite actions for notifying the population and authorities in accordance with these structures' rules of operation. In Kazakhstan, a State System of Prevention and Mitigation of Emergency Situations has been established which unites the activities of the State administrative bodies responsible for the development and realization of State policy in this area. Its activities are coordinated by MES.

In neighboring countries, issues regarding notification of emergencies at transboundary rivers are regulated by separate agreements or by articles of broader agreements. For instance, in 2005 the Ministry of Agriculture of Kazakhstan signed an Agreement with the Ministry of Water Resources of China On Extraordinary Notification of Parties on Natural Disasters at Transboundary Rivers. According to this Agreement, both Parties committed to conduct monitoring of floods and ice formation and to mutually and timely notify each other of the occurrence of such events, their progress, and measures taken to mitigate natural disasters in transboundary river basins. The Agreement also envisages the institution of a specific notification procedure, which after its approval by the Kazakh-Chinese joint commission on the use and protection of transboundary rivers, will be executed by the competent authorities. This procedure will include criteria for the initiation of notification and means for transfer of information.

In the event of an emergency that may lead to the worsening of water use conditions due to the pollution of transboundary waters, notification of Parties is also foreseen by the Agreement between the Russian Federation and the Republic of Kazakhstan on Joint Use and Protection of Transboundary Water Bodies of 27 August 1992.

Kazakhstan is the only Central Asia State to have become a Party (2001) to the UNECE Convention on the Transboundary Effects of Industrial Accidents. MES and the Ministry of Environmental Protection were assigned as the competent bodies to implement the goals of this Convention in the country.

Kyrgyzstan

In Kyrgyzstan, in the event of any emergency situation at the Toktogul hydraulic project located at the Naryn River, a tributary of the Syr Darya, notification will be carried out in line with an established scheme, shown in Annex 3. This notification scheme is based on the administrative

structure of Electric Stations OJSC. In addition, the notification of the Regional Dispatch Control Centre "ODC Energy" (Tashkent) is envisaged, through which the energy companies of Uzbekistan, Tajikistan and Kazakhstan will be informed.

In the case of emergency at HS, the structural subdivisions of MES of Kyrgyzstan will also be notified, and through them, the local administrations in the areas at risk as well as other countries' ministries and emergency services.

Article 71 of the Water Code of Kyrgyzstan envisages the establishment of a unified information system on floods, droughts, mudslides and landslides for notifying State bodies and the public about the possible threat of a natural catastrophe.

Tajikistan

In accordance with the Water Code (Articles 130 and 131), in the event of accidents and catastrophes endangering safety and health of population, it is envisaged to proclaim areas at risk of emergency situations, of extraordinary ecological danger or disaster, and to notify neighboring countries. The order to notify other countries in the event of accidents or emergency situations, as well as to invite representatives of appropriate countries to participate in the commissions' work to prevent accidents and natural disasters and to eliminate their consequences, is decided on by the Government.

Barki Tojik Energy Company's dispatch service notifies the network of energy organizations. Minvodkhoz, the Hydrometeorological Service and local administrations should be notified in advance of plans for drastic changes in water discharge from HPS reservoirs.

The Minvodkhoz dispatch service notifies its subordinate bodies as well as similar services of the energy sector, the Hydrometeorological Service, and emergency and civil defense bodies.

In 1991, a warning system at the natural landslide dam of the high-risk Lake Sarez on the Murgab River was put into operation. In 2005, additional systems of early warning and monitoring of the Usoi Dam's condition and of right-bank landslide hazard area were put into operation. These systems have been created with the assistance of Switzerland within the framework of the international Lake Sarez Risk Mitigation Project and are now operated by CoES. In case of an emergency at the Usoi Dam, CoES is obliged to notify the population situated in the area at risk, as well as the emergency services of downstream countries.

On 30 May 2000 an agreement between the Governments of Uzbekistan and Tajikistan on joint actions relating to issues of timely notification in case of a breach of Lake Sarez dam was signed in Tashkent.

In 2005, an instruction was approved to arrange for information exchange between the emergency situation services of Tajikistan and Uzbekistan in day-to-day activities, as well as in the event of a threat of a breach of the Lake Sarez dam.

Turkmenistan

Minvodkhos ensures the provision of dam safety, and its oblast subdivisions coordinate the activities of all institutions in emergency situations. The Rules on Reservoirs Operation, available at each major reservoir, define the main activities and actions in case of emergency, including notification of the population.

In the bilateral inter-State agreements between Turkmenistan and the Islamic Republic of Iran and Uzbekistan, procedures are defined for the notification of countries located downstream on transboundary rivers in the event of accidents and emergency situations at HS. Interdepartmental documents stipulate the mechanisms for cooperation on mitigating the possible consequences of accidents, as well as the officials personally responsible for the implementing these agreements.

Uzbekistan

In accordance with the Law On the Safety of Hydraulic Structures, organizations operating dams and other HS are required to maintain in constant readiness local warning systems for emergencies at HS. They are obliged to immediately inform the responsible central and local bodies and local self-governments of a structure's possibility of failure, and in case of direct threat of a breach, the populations, enterprises, institutions and organizations situated in the zone of a possible flood must be informed.

In Uzbekistan, a State System of Prevention and Actions in Emergency Situations that also covers certain HS has been established within the framework of MES.

Regional summary

In the Central Asian countries, notification of accidents at HS is initiated by their operating organizations in accordance with rules of operations for these structures. These organizations interact with the national emergency services, which take the requisite measures. A summary table with information on organizations responsible for notification of emergencies at dams or other HS in the countries of Central Asia can be found in Annex 4.

All the Central Asian States are members of the Commonwealth of Independent States (CIS) Agreement On Interaction in the Field of Prevention of and Response to Natural and Technological Emergency Situations of 22 August 1993. Cooperation takes place through an Inter-State Council on Natural and Technological Emergency Situations established in accordance with this Agreement. As a rule, Heads or Deputy Heads of the State bodies authorized in the fields of emergency situations and civil defense are included in this Council.

A framework agreement On Mutual Aid in Case of Accidents or Other Emergency Situations at Energy Units of the CIS Member Countries of 30 May 2002 also defines the general terms of the countries' cooperation in the event of emergency situations related to dam safety. Issues concerning cooperation in the field of information provision have been specified by the Agreement Between Governments of the CIS Member Countries on Information Exchange on Natural and Technological Emergency Situations, and on Informational Interaction in the Response to their Consequences and Rendering Assistance to the Affected Population of 18 September 2003.

In Moscow in 2005, the Central Asian countries, with the exception of Turkmenistan, also signed the Agreement between the Governments of the Shanghai Cooperation Organization member countries On Cooperation When Rendering Assistance in Response to Emergency Situations. China and the Russian Federation are also Parties to this Agreement.

Separate regulations related to cooperation in emergency situations are found in other international documents, in particular the Agreement between the Governments of Kazakhstan, Kyrgyzstan, Tajikistan and Uzbekistan On the Use of Water and Energy Resources in the

Syr Darya Basin of 17 March 1998, and in a Protocol to the Agreement of 19 May 1999. In general, the existing warning system for emergencies in the Syr Darya basin follows the above-mentioned documents. However, this system is used for notification of emergencies at hydropower facilities only, but not at irrigation HS.

A list of multilateral and bilateral agreements related to cooperation in the event of dam emergencies in the Central Asian countries can be found in Annex 5.

**V. FINANCING OF WORKS FOR THE SAFETY OF
HYDRAULIC STRUCTURES**

FINANCING OF WORKS FOR THE SAFETY OF HYDRAULIC STRUCTURES

Kazakhstan

In Kazakhstan, the State finances activities for the improvement of the technical condition of the State-owned HS. In the 2004–2005 budget, the amount of funds allocated for this purpose increased several times compared to the previous period, which made it possible to perform urgent rehabilitation work at a number of especially high-risk facilities. While taking into account the technical condition of these structures, however, it is obvious that the allocated funds are not enough – they make up only 10-15 per cent of the funds required to ensure HS reliable safety.

Kyrgyzstan

In Kyrgyzstan, annual financing of maintenance and repair activities for the safe operation of HS in the energy sector is specified in the operating organizations' business plans. These expenses are included in the production costs of electricity. Regarding repair work at irrigation HS, it is funded by the State budget, and partially by the operating organizations.

In addition to funds from the owners, resources and funds from MES are made available if necessary to clear up an accident. Financial liability for the damage caused is determined in each specific case by the Government and the owner.

In Kyrgyzstan, there is no system of compulsory civil liability insurance for infliction of damage, nor a system of financial provision of civil liability in cases related to HS.

To finance the improvement of structures' safety, loan funds are also sought. In 1998, the World Bank gave a loan to Kyrgyzstan for implementation of the Irrigation Rehabilitation Project. This project envisaged the rehabilitation of 12 irrigation dams. However, the funds available (about US\$10 million) were sufficient only for the partial rehabilitation of four dams, of which three (the Orto-Tokoi Dam on the Chu River, the Kirov Dam on the Talas and the Papan Dam on the Akbura) are of inter-State importance. A detailed inspection of the remaining dams' condition and the rehabilitation activities under the Irrigation Rehabilitation Project has not yet been carried out due to the shortage of allocated funds.

Tajikistan

In Tajikistan, dam safety activities are funded by the State, partially from funds collected from water users. These expenses are incorporated into the production costs of electricity and services for water supply to the users of irrigation systems. Currently, the tariff collection rate for

electricity is 87 per cent and for that of water supply - 65 per cent. In addition, investments and grants are sought from donors and international organizations. Within the framework of the Asian Development Bank's Project on Integrated Management of Water Resources of Fergana Valley, rehabilitation of the Kayrakkum hydropower facility on the Syr Darya is being implemented. From 2005, aided by Electricité de France, observations on the technical condition of the Nurek HPS structures have been carried out. Under the Component C of the World Bank's Water Resources and Environment Management Project, the safety of the Kayrakum and Nurek Dams located respectively on the Syr Darya and Vakhsh Rivers has been assessed. Warning system devices and instrumentation have been installed at these dams.

Turkmenistan

Financing of dam safety activities in Turkmenistan comes from the State budget.

Uzbekistan

In Uzbekistan, all HS are State-owned and safety improvement measures are financed mostly by the State. Financing of the following expense items is covered by the State: operating costs, financial resources for current repairs and minor reparations, in situ observation of facilities' technical condition, and capital investment for dam design and construction as well as for repairs and reconstruction.

Nevertheless, funds allocated from the State budget for the safe operation of all HS are not sufficient. Consequently, financing the improvement of the technical condition of structures with high risk of accident and loss of life and loss of property is a priority.

For financing work to improve safety of HS, Uzbekistan's contributions to IFAS are also used. For instance, the structures of the Andijan and Tashkent Reservoirs have been equipped with automation and instrumentation at the expense of these contributions.. In addition, donor support is being sought for this purpose. Thus, within the framework of the World Bank's Water Resources and Salt Management Project, early warning systems have been installed at two dams, as have state-of-the-art devices and equipment, from a Global Environmental Fund grant of US\$ 683,000.

Regional summary

In the majority of the Central Asian countries, financing of activities concerning dam and other large HS safety is mostly allocated from the State budgets of the respective countries.

In Kyrgyzstan, financing of these activities for HS of the hydropower projects is included in the business plans of

the operating organizations and is based on an estimate of expenditures, which are referred to as a production cost of electricity. For repair works at irrigation installations, the State budget as well as some funds from the operating organizations are used. Funds from dam and HS owners are also used in Tajikistan.

Overall, State financing for the provision of dam and other HS safety is not sufficient. Therefore, to supplement budgetary funds, loans and grants from donors and international organizations are utilized.

**VI. COOPERATION IN THE FIELD OF DAM SAFETY
IN CENTRAL ASIA**

COOPERATION IN THE FIELD OF DAM SAFETY IN CENTRAL ASIA

Dam safety cooperation between the Central Asian countries is carried out mostly in two areas: (a) improvement of structures' technical condition and notification of emergency situations; and (b) harmonization of the national legislation.

(a) Improvement of structures' technical condition and notification of emergency situations

Under the Aral Sea Basin Programme 1, executed by the World Bank and IFAS in the period 2000–2003, under the Component C of the Water Resources and Salt Management Project, an assessment of the safety of 10 dams was made (two in each of the Central Asian countries) and corresponding technical reports were prepared. Based on these assessments, pilot projects to improve the observations on the technical condition of these dams, with the installation of adequate operating as well as instrumentation, were implemented.

Under Component C, two sets of bathymetric equipment (one for Kyrgyzstan and one for Uzbekistan) have been supplied to undertake hydrometric investigations at water bodies, and 10 specialists to operate this equipment have been trained.

Total cost of the activities implemented under Component C was \$2.6 million, including expenditures on the preparation of a hydrologic study of the Naryn-Syr Darya cascade of reservoirs, and mathematical modeling of possible maximal flooded areas and excess of critical water level at each of the reservoirs.

In the Aral Sea Basin Programme 2, approved by the IFAS Board on 28 August 2003, dam safety was highlighted as one of the highest priority goals. As a step in this direction, in cooperation with Switzerland, France and the Asian Development Bank activities are being carried out in Tajikistan at the Usoi natural landslide dam of the lake Sarez, as well as at the Nurek and Kayrakkum Dams.

In Uzbekistan, some facilities of the Andijan and Tashkent Waterworks have been equipped with automation devices, instrumentation, communication and early warning systems using the country's contributions to IFAS. Similar activities are planned for structures of the Karkidon, Yuzhnosurkhan and Pachkamar Reservoirs.

In some cases, neighboring countries cooperate on a bilateral basis on issues related to the safety of structures that are used in the interests of these countries. For instance, Kazakhstan assists Kyrgyzstan in executing maintenance and rehabilitation works and improving operational safety of five hydraulic structures in the Chu and Talas river basins. These and other joint works are performed under the aegis of the bilateral Commission on Use of

Water Management Facilities of Inter-State Significance on the Chu and Talas Rivers that was recently established in accordance with an agreement between Kazakhstan and Kyrgyzstan signed in January 2000.

Turkmenistan cooperates with Uzbekistan in operating the jointly used Tuyamuyun Dam located on the Amu Darya, as well as with the Islamic Republic of Iran in operating the Dostluk Dam on the transboundary Tejen River. The responsibility of each of the Parties has been defined in the corresponding inter-State agreements.

At present, there is an interdepartmental warning system for emergencies on the Naryn-Syr Darya cascade of reservoirs (Annex 3). This system makes it possible for Kyrgyzstan to notify the downstream countries – Kazakhstan, Uzbekistan and Tajikistan – in the event of emergency situations at HS in the Syr Darya basin.

In the basin of the Amu Darya, there is a monitoring system over the Usoi Dam at its upper tributary, the Murgab River, in Tajikistan, and there is also an early warning system in the event of a possible breach of the Usoi Dam.. The CECD of Tajikistan also has a facility that can notify the emergency services of downstream countries about the threat of breach of Lake Sarez. At the same time, a well-arranged inter-State emergency warning system at other HS of the Amu Darya basin is lacking. Overall, the institutions responsible for HS safety, including dams, in the Central Asian countries do not keep regular contact with each other.

(b) Regulatory frameworks for dam safety

Active work on the State regulation in the field of dam and other HS safety was initiated in March 2004 at a regional meeting of a group of experts held in Almaty. At the meeting, recommendations to Central Asian countries on possible avenues for cooperation were approved. These ranged from consultations during the drafting and revising of national normative and legal documents on dam safety, with a view to achieving their harmonization, to joint actions to prevent emergency situations at large HS on transboundary rivers.

A regional project to develop cooperation on dam safety, funded by the Government of Finland, has been initiated to implement the Almaty meeting's recommendations. The first phase of the project, focusing on supporting the interested countries with regard to improving or establishing national legislation and regulatory frameworks in the field of dam safety, was implemented in 2006. As mentioned above, except for in Uzbekistan, specialized legislation and regulatory bodies for HS safety are lacking in the Central Asian States. This is a constraint to the development of cooperation in this area.

One result of the first phase has been a Model National Law the Safety of Hydraulic Structures, drawn up on the

basis of a similar law adopted by the Russian Federation in 1997. The Model Law, presented at Annex 6, has been recommended as a basis for improving national legislations of the interested countries.

Within the framework of the project, a draft regional agreement on cooperation in the field of HS safety has been developed (see Annex 7).

CONCLUSIONS

CONCLUSIONS

The results of the first phase of the “Capacity-Building for Cooperation on Dam Safety in Central Asia” project have created a solid foundation for developing further cooperation in the field of dam safety in the region.

The participating countries have started to give significant attention to the normative and legal issues related to dam and other large HS safety. Activities have been initiated by countries of the region to harmonize national legislation by the adaptation of the Model National Law On the Safety of Hydraulic Structures drawn up under the Project. Tajikistan, after considering the Model Law at various levels of government, has decided to prepare a national law on HS safety. In Turkmenistan, work on formulating a national law on HS safety has already started. In Kyrgyzstan, a Statute has been drafted for the proposed Dam Safety Commission, which will act as the State regulatory body supervising the provision of safety of dams by their operators. In Kazakhstan, it was proposed to amend the Water Code with legal norms that will regulate relations in the field of dam safety. In Uzbekistan, work to implement provisions of the Law on HS safety adopted in 1999 is continuing.

A special focus has been given to the normative and legal acts of the Central Asian countries in the effort to improve the technical conditions and to increase the safety levels of those dams located on transboundary rivers and having inter-State importance. For instance in Kyrgyzstan, in accordance with the Water Code, all dams of international importance, regardless of their technical specifications, are categorized as dams of national importance.

To strengthen cooperation in the field of dam safety, a draft framework agreement for cooperation on HS safety in Central Asia has

been prepared. This framework agreement could become a basis for regional as well as river basin agreements in this

field. The draft includes the main directions, forms and mechanisms of possible cooperation. It is expected that the conclusion of this agreement will help attract investment to the region for improving the technical condition of large HS, and especially those on transboundary watercourses and of inter-State importance.

At the same time, for the successful continuation of the initiated legal and institutional reforms in area of dam safety and for the elaboration of regional and basin agreements on dam safety, more efforts by each country, as well as more coordination at the regional level, are needed.

At the last meeting under the project's first phase in Almaty in November 2006, representatives of participating countries confirmed their full support for the continued rapid development of cooperation in the field of dam safety in Central Asia. The following main directions for cooperation were defined:

- Continuation of harmonization activities with respect to legislative frameworks for dam safety in the Central Asian countries;
- Harmonization of technical and normative documentation for the safe operation of dams and other HS;
- Development of a regional agreement on cooperation in the field of dam safety;
- Harmonization of monitoring methods regarding condition of dams and other HS, and of work to improve their technical condition.

The participants at the final meeting requested the Government of Finland and other potential donors to continue financial support for the successfully initiated project, “Capacity-Building for Cooperation on Dam Safety in Central Asia”. This project will undoubtedly accelerate development and strengthen cooperation in this important field.



Figure 4.

Medeo Dam on the Malaya Almatinka River, Kazakhstan
(dam's height – 144m; water storage volume – 12,6 mln. m³)



Figure 5.

Kapchagai Reservoir on the Ili River, Kazakhstan
(dam's height – 52m; water storage volume – 28100 mln. m³)

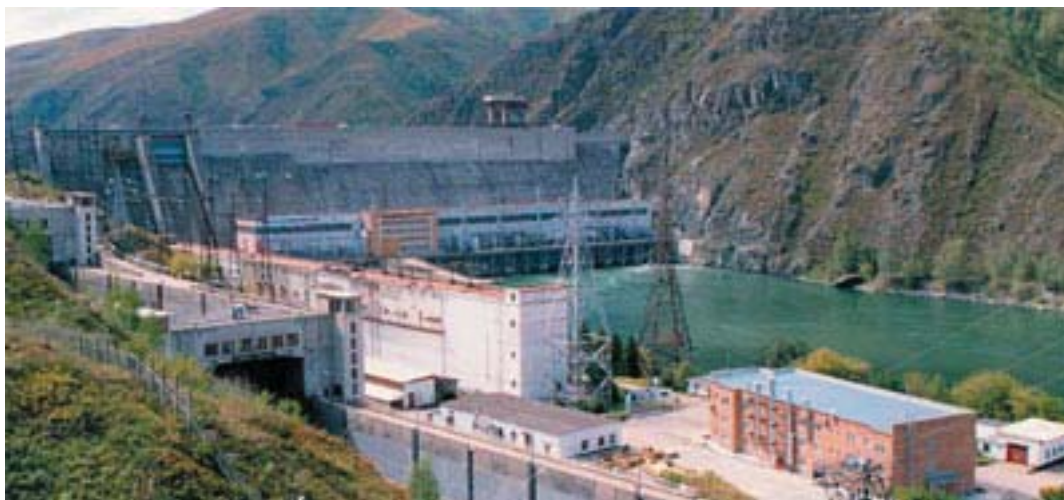


Figure 6.
Bukhtarmin Dam on the Irtysh River, Kazakhstan
(dam's height – 90m; water storage volume – 49800 mln. m³)



Figure 7.
Toktogul Dam on the Naryn River, Kyrgyzstan
(dam's height – 215m; water storage volume – 19500 mln. m³)



Figure 8.
Uch-Kurgan Dam on the Naryn River, Kyrgyzstan
(dam's height – 36m; water storage volume – 56,4 mln. m³)



Figure 9.
Kurpsai Dam at the Naryn River, Kyrgyzstan
(dam's height – 113m; water storage volume – 370 mln.m³)



Figure 10.
Nurek Dam on the Vakhsh River, Tajikistan
(dam's height – 300m; water storage volume – 10500 mln. m³)



Figure 11.
Sarez Lake on the Murgab River, Tajikistan
(“Usa” dam's height – 567m; lake's volume – 17500 mln. m³)



Figure 12.
Baipazin Reservoir on the Vakhsh River, Tajikistan
(dam's height – 75m; water storage volume – 125 mln. m³)



Figure 13.
Pulikhatun waterworks on the Tedjen River, Turkmenistan
(“Dostluk” dam's height – 78m; water storage volume – 1250 mln. m³)



Figure 14.
Oguzkhan Waterworks on the Karakum River, Turkmenistan
(dam's height – 15m; water storage volume – 700 mln. m³)



Figure 15.
Karakum River Waterworks, Turkmenistan
(Karakum River – canal from Amudarya River, length 1100km through Karakum Desert)



Figure 16.
Andijan Dam on the Karadarya River, Uzbekistan
(dam's height – 121m; water storage volume – 1900 mln. m³)



Figure 17.
Pachkamar Dam on the Guzardarya River, Uzbekistan
(dam's height – 71m; water storage volume – 260 mln. m³)



Figure 18.

Karkidon Dam on the Kuvasai River, Uzbekistan
(dam's height – 70m; water storage volume – 218,4 mln. m³)



Kyrgyzstan,
Dam of Toktogul



Russia,
Dam of Kranoyarskaya
hydro-electric power-station



Afganistan,
Dam of Nauglu
hydro-electric power-station

Figure 19.

Images of dams on national banknotes

List of large dams in Central Asia¹

KAZAKHSTAN

Name of hydraulic project	Year of completion	River/basin	Type of dam	Purpose of the project	Dam height (m)	Dam crest length (m)	Dam volume (m ³ x 10 ³)	Reservoir water storage (m ³ x 10 ⁶)	Power station, installed capacity (kWt x 10 ³)	Operating organization
1	2	3	4	5	6	7	8	9	10	11
Badam	1974	Badam	Earth	Irrigation	43	1152	2 930	61	-	RGP Yugvodhoz
Bukhtarma	1960	Irtysh	Concrete gravity	Energy Transport	90	380	1 170	49 800	675	JSC Kaztsink
Kapchagai	1970	Ili	Hydraulic fill embankment	Multipurpose	52	840	6 220	28 100	364	JSC Kapchagaiskaya HPS
Kargalinsky	1969	Kargali	Earth	Irrigation	35	325	947	280	-	RGP Aktubinsk-vodhoz
Medeo	1966	Malaya Almatinka	Rockfill	Mudflow protection	144	530	8 500	12,6	-	RGP Kaz-selezashchita MES
Seletinsky	1965	Seleti	Earth	Water-supply Irrigation	35	2 508	15 100	230	-	RGP Astana su, KVR
Shardarinsky	1965	Syr Darya	Earth	Energy Transport	27	5 400	9 528	6 700	100	JSC Shardarinskaya HPS
Shulbinsky	1987	Irtysh	Earthfill	Multipurpose	36	570	2 700	2 390	702	LC «AES Ust-Kamenogorskaya HPS
Tashutkul	1974	Chu	Earthfill	Irrigation	28	5 895	5 000	620	-	RGP Tarazvodkhoz, KVR
Ters-Ashbulak	1963	Ters	Earth	Irrigation	29	1 890	2 100	158	-	RGP Tarazvodkhoz, KVR
Ust-Kamenogorsky	1952	Irtysh	Concrete	Energy Transport Water-supply	65	390	330	630	332	LC AES Ust-Kamenogorskaya HPS»
Verkhne-Tobolsky	1977	Tobol	Earth	Water-supply	42	4 360	26 300	861	-	RGP Kustanai-vodkhoz

¹ Dams under construction and projected dams are in italics.

KYRGYZSTAN

Name of hydraulic project	Year of completion	River/basin	Type of dam	Purpose of the project	Dam height (m)	Dam crest length (m)	Dam volume (m ³ x 10 ³)	Reservoir water storage (m ³ x 10 ⁶)	Power station, installed capacity (kWt x 10 ³)	Operating organization
1	2	3	4	5	6	7	8	9	10	11
Ala-Archinsky river bed	1986	Ala-Archa/Chu	Homogeneous loam	Irrigation	35	2 100	3 020	90	-	DWM MAWMPI
Ala-Archinsky flooded area	1966	Ala-Archa/Chu	Homogeneous loam	Irrigation	24.5	6 000	5 880	51	-	DWM MAWMPI
Atbashinsky	1970	Atbashi/Naryn/Syr Darya	Gravelly -pebbles with screen	Energy	79	55	370	9	40	Electric Stations OJSC
Bazar-Kurgansky	1962	Kara-Unkur/Syr Darya	Homogeneous loam	Irrigation	25	2 400	2 670	22.5	-	DWM MAWMPI
Issikatinsky	1979	Issik-Ata/Chu	Gravel with earth core	Irrigation	31	492	740	3	-	DWM MAWMPI
Kara-Burinsky	2005	Kara-Bura/Talas	Earth with puddle core	Irrigation	49	250	650	17	-	DWM MAWMPI
Kassansaisky ²	1968	Kassansai/Syr Darya		Irrigation	64	210	900	165	-	
Kirovsky	1975	Talas	Concrete gravity	Irrigation Water-supply	86	258.5	311	570	-	DWM MAWMPI
Kurpsaisky	1983	Naryn/Syr Darya	Concrete gravity	Energy	113	364	999	370	800	Electric Stations OJSC
Naimansky	1966	Kyrgyz-Ata	Homogeneous loam	Irrigation	40.5	265	911	39.5	-	DWM MAWMPI
Orto-Tokoisky	1962	Chu/Chu	Gravel with core	Irrigation	52	365	2 037	470	-	DWM MAWMPI
Papansky	1985	Akbura/Syr Darya	Gravel with core	Irrigation Water-supply	100	90	2 640	260	-	DWM MAWMPI
Shamaldaisky	2002	Naryn/Syr Darya	Earthfill	Energy	37	238.5	91.7	39	240	Electric Stations OJSC
Sokululsky	1968	Sokuluk/ Chu	Homogeneous loam	Irrigation	22.5	3 000	8 020	11.5	-	DWM MAWMPI
Spartak	1978	Ak-Suu/Chu	Homogeneous loam	Irrigation	15	2 600	547	22.8	-	DWM MAWMPI

² The Kassansai Hydraulic Unit is located in Kyrgyzstan, but is operated by the Ministry of Agriculture and Water Resources of Uzbekistan.

Name of hydraulic project	Year of completion	River/basin	Type of dam	Purpose of the project	Dam height (m)	Dam crest length (m)	Dam volume (m ³ x 10 ³)	Reservoir water storage (m ³ x 10 ⁶)	Power station, installed capacity (kWt x 10 ³)	Operating organization
1	2	3	4	5	6	7	8	9	10	11
Tashkumirsky	2001	Naryn/Syr Darya	Concrete gravity	Energy	75	336	317	140	450	Electric Stations OJSC
Toktogulsky	1978	Naryn/Syr Darya	Concrete gravity	Energy Irrigation	215	292.5	3 345	19 500	1 200	Electric Stations OJSC
Tort-Gulsky	1971	Isfara	Homogeneous loam	Irrigation	west 34 east 20	west 1090 east 540	1 850 400	90	-	DWM MAWMIPI
Tort-Gulsky Reservoir	1963	Ton	Gravel with earth core	Irrigation	19	380	457	1.4	-	DWM MAWMIPI
Uch-Kurgansky	1962	Naryn/Syr Darya	Concrete Earth	Irrigation Energy	36 27	223.9 2 882	1252.3	56.4	180	Electric Stations OJSC
Kambaratinsky-1	Project	Naryn/Syr Darya	Earth-rockfill	Energy	275	280	80 000	4 650	1 900	Electric Stations OJSC
Kambaratinsky -2	Under construction	Naryn/Syr Darya	Earth-rockfill	Energy	60	190	1 700	70	360	Electric Stations OJSC

TAJIKISTAN

Name of hydraulic project	Year of completion	River/basin	Type of dam	Purpose of the project	Dam height (m)	Dam crest length (m)	Dam volume (m ³ x 10 ³)	Reservoir water storage (m ³ x 10 ⁶)	Power station, installed capacity (kWt x 10 ³)	Operating organization
1	2	3	4	5	6	7	8	9	10	11
Baipazinsky	1989	Vahsh/Amu Darya	Rockfill	Irrigation Energy	75	422	5 222	125	600	Barki Tojik Energy Company
Daganasaisky	1983	Daganasai/Syr Darya	Earth	Irrigation	50	180	3 100	28	-	Minvodkhoz
Golovnoi	1962	Vahsh/Amu Darya	Earth	Energy Irrigation	44.5	1 033	1 977	94.5	240	Barki Tojik Energy Company
Kairakumsky	1956	Syr Darya	Earth	Irrigation	32	1 200	2 400	4 160	126	Minvodkhoz
Kattasaisky	1966	Kattasai/Syr Darya	Earth	Irrigation	55	800	3 450	55	-	Minvodkhoz
Nureksky	1983	Vahsh/Amu Darya	Rockfill	Irrigation Energy	300	704	58 000	10 500	3 000	Barki Tojik Energy Company

Name of hydraulic project	Year of completion	River/basin	Type of dam	Purpose of the project	Dam height (m)	Dam crest length (m)	Dam volume (m ³ x 10 ³)	Reservoir water storage (m ³ x 10 ⁶)	Power station, installed capacity (kWt x 10 ³)	Operating organization
1	2	3	4	5	6	7	8	9	10	11
Selsbursky	1964	Kyzylsuu/Amu Darya	Earth	Irrigation	18.2	1 040	878.3	26	-	Minvodkhoz
Usoi, Landslide Dam	1911	Murgab/Amu Darya	Rockfill	-	567	5 000	2 200 000	17 500	-	CoES
Sangtudinsky-1	Under construction since 1989	Vahsh/Amu Darya	Rockfill	Energy	75	517	4.3	258	670	Barki Tojik Energy Company / JSC EES
Sangtudinsky -2	Project	Vahsh/Amu Darya	Rockfill	Energy	30	385	1.5	75	220	Barki Tojik Energy Company / Islamic Republic of Iran
Rogunsky	Under construction since 1976	Vahsh/Amu Darya	Rockfill	Energy Irrigation	335	660	75 500	13 800	3 600	Barki Tojik Energy Company

TURKMENISTAN

Name of hydraulic project	Year of completion	River/basin	Type of dam	Purpose of the project	Dam height (m)	Dam crest length (m)	Dam volume (m ³ x 10 ³)	Reservoir water storage (m ³ x 10 ⁶)	Power station, installed capacity (kWt x 10 ³)	Operating organization
1	2	3	4	5	6	7	8	9	10	11
Delili	1970	Etrek	Earthfill	Irrigation	3,5	5 000	540	16	-	Minvodkhoz
Elotensky	1910	Murgab Mariisky Oasis	Earthfill	Irrigation	12.7	1300	690	24	-	Minvodkhoz
Gindikushkie Middle and Lower	1895, Reconstruction 1953	Murgab Mariisky oasis	Earthfill	Irrigation	7	175	115	31	-	Minvodkhoz
Hor-Horsky	1960	Tedjen	Earthfill	Irrigation	8	1 552	470	10.9	-	Minvodkhoz
Kyzyl-Ai	1966	Etrek	Earthfill	Irrigation	4.4	2 000	340	5.3	-	Minvodkhoz
Kolhozbenitskoe	1941	Murgab Mariisky Oasis	Earthfill	Streamflow control	4.5	13 000		30	-	Minvodkhoz
Kopetdagsky (Geokte-pinsky)	1975	Karakum, 850 km	Hydraulic-fill	Irrigation	24	14 500	158	550	-	Minvodkhoz

Name of hydraulic project	Year of completion	River/basin	Type of dam	Purpose of the project	Dam height (m)	Dam crest length (m)	Dam volume (m ³ x 10 ³)	Reservoir water storage (m ³ x 10 ⁶)	Power station, installed capacity (kWt x 10 ³)	Operating organization
1	2	3	4	5	6	7	8	9	10	11
Mamed-Kul	1964	Etrek	Earthfill	Irrigation	7.05	175	115	31	-	Minvodkhoz
Oguzhansky (Hauzhansky)	1964 Reconstruction 1967, 1975	Karakum, 456 km	Hydraulic-fill	Irrigation	15	35 000	32 000	700	-	Minvodkhoz
Pulihatunsky («Dostluk»)	2005	Tedjen	Gravel-sand with loam core	Irrigation	78	660	5 060	1 250	-	Minvodkhoz
Saryyazinsky	1986 Reconstruction	Murgab Maryisky Oasis	Hydraulic-fill	Irrigation Flood control	39	5 400	8 400	390	-	Minvodkhoz
Tedjensky (ancillary capacity)	1950 Reconstruction 1978	Tedjen	Earth combined: dry-placed and hydraulic-fill	Irrigation	20.5	7 400	40.4	111	-	Minvodkhoz
Tedjensky II	1960	Tedjen	Earth combined: dry-placed and hydraulic-fill	Irrigation	8.5	10 200	10 500	16.9	-	Minvodkhoz
Shorkelsky	Project	Tedjen	Hydraulic-fill	Flood-control Irrigation	26	20 000	53	1 500	-	Minvodkhoz
Western (Kurtinsky)	1962	Karakum	Hydraulic-fill	Water-supply	10	9 400	24.5	48,1	-	Minvodkhoz
Chatsky	Project	Etrek	Earthfill	Irrigation	56.3	5 000	760	760	-	Minvodkhoz
Madausky	Project	Karakum	Hydraulic-fill	Irrigation	14	21 500	81	650	-	Minvodkhoz
Murgabsky (Kulanbaisky)	Project	Murgab Maryisky Oasis	Earth	Flood-control Irrigation	34.5	23 300	34,5	1 000	-	Minvodkhoz
Sarahssky	Project	Tedjen	Hydraulic-fill	Irrigation	16.5	14 000	87	700	-	Minvodkhoz
Soltandeshskoe	Project	Artyk	Earth	Irrigation	14	22 000	80	220	-	Minvodkhoz
Tagtynsky	Project	Turkmen- Darya	Earth	Irrigation	17.6	10 400	32	800	-	Minvodkhoz
Zeidsky	Under construction	Karakum	Hydraulic-fill	Irrigation	17	18 000	41250	1 150	-	Minvodkhoz

UZBEKISTAN

Name of hydraulic project	Year of completion	River/basin	Type of dam	Purpose of the project	Dam height (m)	Dam crest length (m)	Dam volume (m ³ x 10 ³)	Reservoir water storage (m ³ x 10 ⁶)	Power station, installed capacity (kWt x 10 ³)	Operating organization
1	2	3	4	5	6	7	8	9	10	11
Akdarynsky	1989	Akdarya	Earth with loam core	Irrigation	20	930	878	112.5	-	Minselvodkhoz
Aktepinsky (not exploited)	1981	Amu Darya/ Canal Amuzang	Earth protruding	Irrigation	14	42	90.1	120	-	Minselvodkhoz
Akhangaransky	1987	Akhangaran	Earth with loam screen	Irrigation Water-supply	100	1 933	5 100	198	21 Under construction	Minselvodkhoz
Andijansky	1983	Karadarya	Concrete counterforce	Irrigation, Energy	121	850	3 600	1 900	140	Minselvodkhoz
Arnasaisky	2001 Under construction	Syr Darya. (Source: 1.Vostochnaya Verkhne-amasai Lake; 2.Zapadnaya – Arnasai Lake; 3.Yujnaya –Tuzkan Lake)	Earthfill	Irrigation	Dam 1 n/a Dam 2 -17,3 Dam 3 12,35	2 356 1 392	n/a n/a n/a	650		Minselvodkhoz
Asaka-adyrsky	1980	Asaka-adyr	Earthfill	Irrigation	24.6	485	139.2	3.5	-	Minselvodkhoz
Atchapsarsky (not exploited)	1974	Canal Katartal	Earth	Irrigation	24	1 200	633	7.5	-	Minselvodkhoz
Charvaksy	1975	Chirchik	Earth Rockfill with loam core	Energy Irrigation	168	764	19 754	2 006	600	Minselvodkhoz Uzbekenergo SJSC
Chartaksy	1989 Under construction 6 stage	Chartaksai	Earthfill with loam core	Irrigation	project 45 actual 41.5	project 1 594 actual 1 500	project 8 004 actual 4 001	project 45 actual 30	-	Minselvodkhoz
Chimkurgansky	1960 Reconstruction 1969	Kashkadarya	Earth with loam core	Irrigation	33	7 400	7 280	500	-	Minselvodkhoz
Degrezsky	1962	Tupalang/ Canal Hazarbag	Earth Homogeneous with cut-off	Irrigation	12.7	3 000	800	12.7	-	Minselvodkhoz

Name of hydraulic project	Year of completion	River/basin	Type of dam	Purpose of the project	Dam height (m)	Dam crest length (m)	Dam volume (m ³ x 10 ³)	Reservoir water storage (m ³ x 10 ⁶)	Power station, installed capacity (kWt x 10 ³)	Operating organization
1	2	3	4	5	6	7	8	9	10	11
Dehkanababsky	1991	Kichik/Uriadarya	Earth Homogeneous	Irrigation	41.8	850	928.4	18.4	-	Minselvodkhoz
Dzhizhazsky	1973	Sanzarsai	Earthfill	Irrigation	20	5 500	1 900	100	-	Minselvodkhoz
Eskiersky	1975	Namangansai	Earth	Irrigation	34	1 250	506.3	18.5	-	Minselvodkhoz
Gissaraksy	1988	Aksu	Rock earth with loam core	Irrigation	138.5	660	2750	170	45 Under construction	Minselvodkhoz
Kalkaminsky	1987	Kumdarya	Earthfill	Irrigation	21	546	434	9.45	-	Minselvodkhoz
Kamashinsky	1957 Reconstruction 1987	Karabag-darya	Earthfill	Irrigation	14.9	3 100	1 040	25	-	Minselvodkhoz
Karabagsky	1977	Karabag-darya	Earthfill	Irrigation	28.5	400	1 706	7.5	-	Minselvodkhoz
Karamurdsy	1968	Discharge/drainage water	Earthfill	Irrigation Erosion-prevention	18.2	216	91	0.8	-	Minselvodkhoz
Karasuisky	1987	Karasu	Earth Homogeneous	Irrigation	15.2	1500	1 098	27.6	-	Minselvodkhoz
Karasuvsy	1977 1 stage	Ispan-Shavand	Earthfill	Irrigation	Project 33.5 actual 26	Project 650	Project 1 024	Project 6.5	-	Minselvodkhoz
Karatepinsky	1981	Karatepasai	Earthfill with loam core	Irrigation	36	681	1 593	19	-	Minselvodkhoz
Karaultepinsky	1987	Zeravshan/Eski-Tuyatartar Canal	Earth (3) Dam 1 Dam 2 Dam 3	Irrigation	40 51 19	1 545 265 102	5 584	53	-	Minselvodkhoz
Karkidonsky	1967	Kuvasai/Yujino-Fergansky Canal	Earth (2) High-head Low-head	Irrigation	70 30	420 210	5 600	218.4	-	Minselvodkhoz
Kasansaisky	1967	Kasansai	Rockfill with reinforced concrete screen	Irrigation	64	290	1 121	165	-	Minselvodkhoz

Name of hydraulic project	Year of completion	River/basin	Type of dam	Purpose of the project	Dam height (m)	Dam crest length (m)	Dam volume (m ³ x 10 ³)	Reservoir water storage (m ³ x 10 ⁶)	Power station, installed capacity (kWt x 10 ³)	Operating organization
1	2	3	4	5	6	7	8	9	10	11
Kattakurgansky	1952	Zeravshan	Earthfill	Irrigation	31.2	4 040	6 947	900	-	Minselvodkhoz
Khodzhimush-kentsky	1989	Hodjimush-kentsai	Earthfill	Irrigation	51.5	583	745.2	8	-	Minselvodkhoz
Kuksereksaisky	1980	Kuruksai/Koksereksai	Earth (3) Main Eastern Western	Irrigation	41 15 20	354 214 168	1 197	6.4	-	Minselvodkhoz
Kurgantepinsky	1977	Arabelasai/Kemkulsai	Earth (2) Arabelasai Kemkulsai	Irrigation	45 34	620 450	1 812 779	19.9 8.8	-	Minselvodkhoz
Kuyumazarsky	1958	Zeravshan	Earthfill	Irrigation	23.5	100	64	310	-	Minselvodkhoz
Lyangarsky	1973	Lyangar	Earth	Irrigation	34	1050	1612	7.35	-	Minselvodkhoz
Naukinsky	1980	Naukasai	Earth	Irrigation	23.7	870	970.9	6	-	Minselvodkhoz
Nugailiisky	1972	Yakkabag-darya/Pahtakor Canal	Earth	Irrigation	13.5	850	273	2.5	-	Minselvodkhoz
Pachkamarsky	1967	Guzardarya	Earthfill with loam core	Irrigation	71	573	3 040	260	-	Minselvodkhoz
Sabirsaisky	1984	Sabirsai/ - Eski-Angar Canal	Earthfill	Irrigation	Project 25 Actual 15	project 1350 actual 800	project 1469.2 actual 529.8	project 42.5 actual 8	-	Minselvodkhoz
Sarmichsaisky	1984	Sarmichsai	Earth with loam core	Irrigation	34	550	1 025	4.3	-	Minselvodkhoz
Shorsuisky	1991	Achchisu	Earthfill with loam core	Irrigation	32	489	825.1	10	-	Minselvodkhoz
Shurapsaisky	1977	Shurabsai/Aksuv/Anhor-2 Canal	Earthfill	Irrigation	12	1 140	291.8	2	-	Minselvodkhoz
Shurkulsy	1985 Not completed	Zaravshan	Earth with loam core	Irrigation	14.5	project 6 870 actual 560	project 6 039 actual 31	project 394 actual 170	-	Minselvodkhoz

Name of hydraulic project	Year of completion	River/basin	Type of dam	Purpose of the project	Dam height (m)	Dam crest length (m)	Dam volume (m ³ x 10 ³)	Reservoir water storage (m ³ x 10 ⁶)	Power station, installed capacity (kWt x 10 ³)	Operating organization
1	2	3	4	5	6	7	8	9	10	11
Talimardjansky	1983	Amu Darya/ Karshinsky Canal	Earth (2) Dam 1 Dam 2	Irrigation Water-supply	35 36	9 745 1 000	40 300	1 525	-	Minselvodkhoz
Tashkentky	1963	Akhangaran/ Chirchik/ Tashkanal	Earthfill with loam core	Irrigation	36.5	2 815	5 485	250	-	Minselvodkhoz
Tashlaksaisky No operation	1981	Tashlaksai	Earth	Irrigation	32	940		7	-	Minselvodkhoz
Tudakulsky	1977	Amu Darya/ Amubuharsky Canal	Earth	Irrigation	12	4 000	856.8	1200	-	Minselvodkhoz
Tupalangsky	2006 1 stage	Tupalang	Rockfill with loam core	Irrigation	100	180	10 046	800	30	Minselvodkhoz
Tusunsaisky	1986	Tusunsa	Earth with loam core	Irrigation	40.6	405	1 385	42.1	-	Minselvodkhoz
Tuyamuyunsky	1980	Amu Darya	Earth (3) Ruslovaya Sultansadjar- skaya Kaparasskaya	Irrigation Water-supply	34 24 22	900 21 600 134.5	26 121	7 800	150	Minselvodkhoz
Uchkyzylsky	1957	Surhadarya/ Canal Zang	Earth (2) Southern Western	Irrigation	11.5 5.2	1 750 2 260	project 1408 actual 506.3	160	-	Minselvodkhoz
Varzyksky	1989	Gavasai/ Galaba Canal	Earth (3) Main Western Eastern	Irrigation	40 20 28	550 1 410 400	3 247.1	18.2		Minselvodkhoz
Yangikurgansky	1962 Reconstruc- tion 1974	Yakkabag- darya/Kara/su/ Habar-II Canal	Earth	Irrigation	16	1 900	285.1	3.3	-	Minselvodkhoz
Yuzhno- Surhansky	1967	Surkhan-darya	Earth with core	Irrigation	30	4 930	45	800	-	Minselvodkhoz
Zaaminsky	1987	Zaaminsu	Earthfill with loam core	Irrigation	73.5	408	423	51	-	Minselvodkhoz

Name of hydraulic project	Year of completion	River/basin	Type of dam	Purpose of the project	Dam height (m)	Dam crest length (m)	Dam volume (m ³ x 10 ³)	Reservoir water storage (m ³ x 10 ⁶)	Power station, installed capacity (kWt x 10 ³)	Operating organization
1	2	3	4	5	6	7	8	9	10	11
Dzhidalisaisky	Under construction since 1980	Chadaksai	Earth with loam core	Irrigation	Project 65 actual 45	project 1 395 actual 897	project 5 931.6 actual 5 001.4	project 7.7	-	Minselvodkhoz
Zarkentsky	1983 Under construction 1 stage	Karakorum-sai/Padshata	Earth with loam core	Irrigation	51	1 150	1 036.3	25	-	Minselvodkhoz

Summary of main indicators of large hydraulic projects in Central Asia

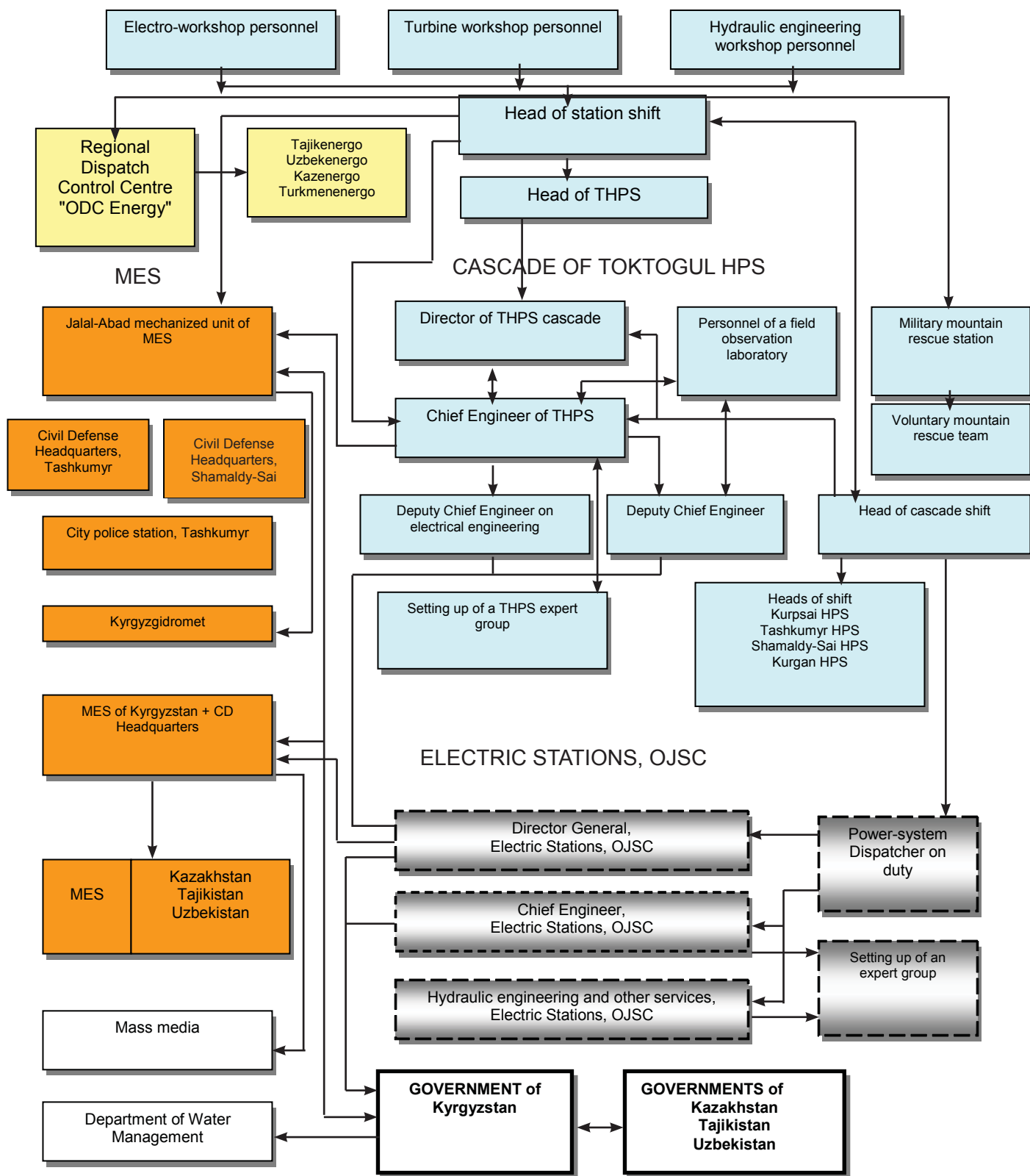
	Number of large dams	Total reservoirs' water storage capacity, km ³	Total installed capacity of HPS, 100 MW
Kazakhstan	12	89 842,60	2 173
Kyrgyzstan	20	21 928,10	2 910
Tajikistan	9	32 519,50	3 966
Turkmenistan	15	3 214,20	-
Uzbekistan	54	20 840,95	920
TOTAL	110	168 345,35	9 969

Legislation and organizations involved in the regulation of dam safety in the Central Asian countries

COUNTRY	National legislation on dam safety	Legal documents on dam safety	Institution responsible for State regulation in the field of dam safety	Operating organizations responsible for dam safety
Kazakhstan	None	It has been proposed to supplement the Water Code with separate articles, clauses and provisions on dam safety	No single authority. The roles are distributed between the Committee on Water Resources of the Ministry of Agriculture and the Committee for State Control over Emergencies and Industrial Safety of the MES.	Organizations/owners of hydraulic structures, including: The Committee on Water Resources of the Ministry of Agriculture, Kazselezashchita of the MES, power and industrial companies, agricultural organizations, river transport enterprises.
Kyrgyzstan	None	The Water Code (2005): Articles 71, 75, 76, 77 and 78.	None. A draft regulation on a Committee on Dam Safety has been prepared in accordance with Article 77 of the Water Code.	Department of Water Management of the Ministry of Agriculture, Water Management and Processing Industry, Electric Stations OJSC
Tajikistan	None	Separate clauses and provisions in the following documents: The Water Code: Articles 14, 16, 17, 18, 32, 44, 45, 84, and 105, 106, 107, 121, 129, 130, 131, 132, 136, 142 and 144. The Law on Energy: Articles 1, 4, 19 and 20 Rules on the use of water bodies for the needs of hydro-power engineering approved by Resolution № 95 of the Government of Tajikistan in March 2003.	No single authority. The roles are distributed between the Ministry of Land Reclamation and Water Management, Barki Tojik Energy Company, the Committee for Emergency Situations and Civil Defense and Gosgortekhnadzor.	Barki Tojik Energy Company Oblast and territorial departments of the Ministry of Land Reclamation and Water Management
Turkmenistan	None	Separate clauses and provisions in the following documents: The Code "On Land": Articles 4, 76,96,97 and 98; The Code "On Water": Articles 18,19,31, 69, 70 and 102 Rules of operation for reservoirs and HS.	None	Operation Department and oblast departments of the Ministry of Water Management
Uzbekistan	The Law on Safety of Hydraulic Structures (1999)		State Inspectorate for Control and Supervision over Technical Condition and Operational Safety of Large and Especially Important Water Facilities under the Cabinet of Ministers (Gosvodkhozadzor)	Ministry of Agriculture and Water Management «Uzbekenergo» «Amudaryya» BWO «Syrdarya» BWO

Scheme on notification in case of emergency at the Toktogul hydroelectric power station

TOKTOGUL HPS (THPS)



Organizations responsible for notification in case of emergencies at hydraulic structures in Central Asian countries

COUNTRY	Institution responsible for State regulation in the field of dam safety	Responsible person Position and address	Contact information	Operating organizations responsible for dam safety	Responsible person Position and address	Contact information
Kazakhstan	None	-	-	Committee on Water Resources of the Ministry of Agriculture	Erlan Badashev, Head, Operation Department for Water Management Projects and Land Development	Tel. (73172) 321882 Mobile 87771356929
		-		Kazselezashchita of MES	Jumabek Mukhatov, Head, Operation Division for Water Management Projects	
		-			Vadim Vinokhodov, Deputy Head	Tel. (73272) 916 431 Fax. (73272) 914 398 selezashita@nursat.kz
Kyrgyzstan	None	-	-	Department of Water Management of the Ministry of Agriculture, Water Management and Processing Industry	Baratali Koshmatov, Director-General; Iskander Djoldoshaliyev, Chief, Technical Department	Tel. (996 312) 549 095 Tel. (996 312) 549 098 E-mail: dvh@elcat.kg; pkti@elcat.kg
	A draft regulation on a Committee on Dam Safety has been prepared in accordance with Article 77 of the Water Code	-	-	Electric stations OJSC	Bishkek, 720055, Toktonaliev St., 4-a	
Tajikistan	None	-	-	Barkhi Tojik Energy Company	Saparbek Balkibekov, Director-General; Alexey Zyrianov, Deputy Director, Center of Operation and Repair.	Tel. (996-312) 661 101 Tel. (996 312) 272 411 E-mail: expo-es@infotel.kg
		-		Ministry of Land Reclamation and Water Management	Sharifkhon Samiev, Chairman	Tel. (992 372) 358 766
		-		Gosgortekhnadzor	Kodur Aliev, Head, Department of Irrigation System Operation	Tel. (992 372) 353 566 Tel. (992 372) 355 594
					Ajub Aliev, Chairman	Tel. (992 372) 213 317

COUNTRY	Institution responsible for State regulation in the field of dam safety	Responsible person Position and address	Contact information	Operating organizations responsible for dam safety	Responsible person Position and address	Contact information
Turkmenistan	None	-	-	Minvodkhoz: Operation Department Oblast departments	Begench Mommadov, Deputy Minister of Water Management	Tel. (99312) 224 221 E-mail: minwater@online.tm
Uzbekistan	Gosvodkhoz nadzor	Timur Kamalov Chairman Tashkent, 700011 Navoi st., 7	Tel. (998 71) 144 3131 Fax. (998 71) 144 3041 E-mail: v-nadzor@dostlink.net	Ministry of Agriculture and Water Management	Shavkat Khamraev, Deputy Minister of Agriculture and Water Management	Tel. (99871) 139 1657 Fax. (99871)142 2642
				Uzbekenergo SJSC	Batir Teshabaev, Chairman	Tel. (99871) 133 9825 Fax. 99871)136 2700
				Amudarya BWO	Juldash Hudaitbergenov, Head	Tel. 362226-4755 Fax. 36222 72346
				Syrdarya BWO	Makhmud Hamidov, Head	Tel. (998 712)658 226 Fax. (998 712) 57 345

Multilateral and Bilateral Agreements Related to Cooperation in Case of Emergency Situations at Dams in the Central Asian Countries

A. Multilateral and Regional Agreements

1. Agreement between the Governments of the CIS Member Countries on Cooperation in the Field of Prevention of and Response to Natural and Technological Emergency Situations, 22 January 1993 (in force from the date of signing).
2. Inter-State Agreement between Kazakhstan, Kyrgyzstan and Uzbekistan on the Use of Water and Energy Resources in the Syr Darya River Basin, Bishkek, 17 March 1998 (Article 10) (in force from the date of signing; Tajikistan joined the Agreement on 17 June 1999).
3. Agreement between Kazakhstan, Kyrgyzstan, Tajikistan and Uzbekistan on Cooperation in the Field of Prevention of and Response to Emergency Situations, 17 July 1998 (in force from 25 January 2000).
4. Agreement between the Governments of Kazakhstan, Kyrgyzstan, Tajikistan and Uzbekistan on the Parallel Operation of the Energy Systems of Central Asia, 17 June 1999 (Article 8) (in force from the date of signing).
5. Agreement on Mutual Assistance in the Event of Accidents and Other Emergency Situations at Energy Facilities of the CIS Member Countries, 30 May 2002 (in force from 22 July 2004).
6. Agreement between the Governments of the CIS Member Countries on Information Exchange on Natural and Technological Emergency Situations, and on Informational Interaction in the Response to Their Consequences and Rendering Assistance to the Affected Population, 18 September 2003 (in force from 26 November 2004).
7. Agreement between the Governments of Member States of the Shanghai Organization on Cooperation on Interaction in the Course of Rendering Assistance in Response to Emergency Situations, 26 October 2005 (not in force).

B. Bilateral Agreements

1. Agreement between the Governments of the Russian Federation and Kazakhstan on the Joint Use and Protection of Transboundary Water Bodies, 27 August, 1992 (Article 10).
2. Agreement between the Ministry of Agriculture of Kazakhstan and the Ministry of Water Resources of China on Extraordinary Notification of Parties in the Case of Natural Disasters on Transboundary Rivers, 4 July 2005.
3. Agreement between the Governments of Kazakhstan and Kyrgyzstan on the Use of Water Facilities of Inter-State Use on the Chu and Talas Rivers, 21 January 2000 (Article 8).
4. Agreement between the Governments of Uzbekistan and Tajikistan on Joint Activities and Cooperation Related to Timely Notification in the Case of a Breach of Lake Sarez, concluded 30 May 2000 in Tashkent.
5. Agreement between Turkmenistan and Uzbekistan on Cooperation in the Field of Water Management Issues, 15 January 1996 (preamble).

MODEL LAW
on the
SAFETY OF HYDRAULIC STRUCTURES*

Chapter I. GENERAL PROVISIONS

This Law shall regulate the relations, arising out of the implementation of the activities in the field of design, construction, putting into operation, operation, reconstruction, restoration, conservation and decommissioning of hydraulic structures.

Article 1. Scope of the Law

This Law shall apply to the hydraulic structures, whose breakdown may result in the development of an emergency situation, endangering the life of people, causing damage to their health, disrupting the conditions of vital activity, as well as doing harm to the environment and to the property of natural and legal persons.

Article 2. Legislation in the field of safety of hydraulic structures

The legislation in the field of safety of hydraulic structures shall include this Law and the other laws and State regulatory legal instruments, adopted on the basis thereof.

If an international treaty of a State establishes other rules, than those, provided for by this Law, the rules of the international treaty shall apply.

Article 3. Basic notions

For the purpose of this Law the following basic notions are used:

The term “**hydraulic structures**” refers to dams, buildings of the hydroelectric power plants, outfall regulators, discharge structures and outlet works, tunnels, canals, pumping stations, shipping locks, canal lifts, structures, designed for the protection against floods and destruction of the banks of the storage lakes, banks and beds of the rivers; dikes embanking the ash dumps and drilling waste disposal sites of fossil-fueled power stations and boiler plants, as well as dikes embanking the deposits of liquid wastes of industrial and agricultural enterprises;

The term “**owner of a hydraulic structure**” refers to the State, administrative area, region or any other managed territory, as defined by the administrative division of the State, legal person, irrespective of its organizational and legal form, natural person, having the rights of ownership, usage and disposal of a hydraulic structure;

The term “**operating organization**” refers to an enterprise or organization of any organizational and legal form, carrying out technical operation of a hydraulic structure, based on the right of ownership, economic control, operational management, tenancy, work or service contract or on other legal grounds;

The term “**safety of hydraulic structures**” refers to a quality of hydraulic structures to maintain their operating capacity and ensure the protection of the life, health and legitimate interests of people, legal persons, as well the preservation of the environment;

The term “**criteria of safety of a hydraulic structure**” refers to the threshold values of the quantitative indices and qualitative characteristics of the State of a hydraulic structure and its operating conditions, which are in compliance with the permissible level of risk of a breakdown of a hydraulic structure and which are adopted in accordance with the established procedure by the bodies of the executive authority, exercising the supervision over safety of hydraulic structures;

The term “**assessment of safety of a hydraulic structure**” refers to the evaluation of compliance of the state of a hydraulic structure and of the professional skills of employees of a operating organization with the standards and rules, approved in accordance with the procedure, established by this Law;

* In the course of elaborating the Model Law, the Federal Law of the Russian Federation of 21 July 1997, No. 117-FL, On the safety of hydraulic structures, was used as a reference.

The term “**survey of hydraulic structures**” refers to the set of measures to assess a technical state and operating capacity of hydraulic structures and to make up a list of necessary works to ensure operational reliability and safe operation of these structures;

The term “**breakdown of a hydraulic structure**” refers to a partial or complete destruction of a hydraulic structure and failure of hydromechanical equipment, as a result of which the structure becomes inoperative, and an emergency situation may arise;

The term “**emergency situation**” refers to the danger of a breakdown of a hydraulic structure, as a result of external impact, not provided for by a project, degradation of an operational capacity of an structure or its foundation, as a result of changing of the properties of the materials of the structure or its soils, or reduced operational reliability of hydromechanical equipment, as well as a result of reduced water-carrying capacity of the structures by technical reasons or in connection with the constraints of a permissible hydrological regime, being lower than a site of the structures;

The term “**risk of a breakdown of a hydraulic structure**” refers to a measure of danger, which characterizes the probability of occurrence of a breakdown at a hydraulic structure and the gravity of its aftereffects for the health and life of people, property and environment;

The term “**risk assessment of a breakdown**” refers to the evaluation of frequency (probability) of a breakdown and the gravity of a resulting emergency situation for the life and health of people, property and environment;

The term “**permissible level of risk of a breakdown of a hydraulic structure**” refers to a risk value of a breakdown of a hydraulic structure, established by the legislation or by regulatory legal instruments;

The term “**declaration of safety of a hydraulic structure**” refers to a basic document which gives the grounds for safety of a hydraulic structure, sets forth the compliance of a hydraulic structure with the safety criteria and makes up a list of necessary works to ensure safety of a hydraulic structure;

The term “**complex of hydraulic structures**” refers to the hydraulic structures, forming part of one project (i.e. waterworks facility, electric power plant, enterprise or its subsidiary), which are situated in one water body and belong to one owner;

The term “**territory of a hydraulic structure**” refers to a territory within the limits of the boundaries of a land allotment, established according to existing land legislation;

The term “**ensuring of safety of a hydraulic structure**” refers to the development and implementation of a set of engineering, organizational and other measures to prevent the breakdowns of a hydraulic structure;

The term “**class of a hydraulic structure**” refers to an indicator, established by the standards and rules for design of hydraulic structures, on the basis of which the requirements to the indicators of operational reliability of hydraulic structures are established;

The term “**category of responsibility of a hydraulic structure**” refers to a composite index which takes into account a grade of a hydraulic structure and qualitative and quantitative characteristics of a damage, which may be caused in case of a breakdown of a hydraulic structure;

The term “**reconstruction of a hydraulic structure**” refers to a complex of design and construction works, carried out with a view of changing the basic technical and economic indicators of a hydraulic structure (estimated external impacts, total structural volume, water carrying capacity, engineering instrumentation) and operational conditions, as well as replenishing physical and moral depreciation occurred, achieving new objectives of the operation of a hydraulic structure;

The term “**restoration of a hydraulic structure**” refers to a complex of design and construction works, carried out with a view of elimination of the damage and destruction occurred or the increased risk of breakdowns, while maintaining the basic technical data and economic indicators of a hydraulic structure;

The term “**conservation of a hydraulic structure**” refers to a complex of design and construction works, carried out with a view of temporary preservation of a hydraulic structure and ensuring its safety under the conditions of a passage of transit discharges, without the regulation of a hydrological regime with a relevant lowering of the water level in a water storage facility;

The term “**decommissioning**” refers to a complex of design and construction works, carried out with a view of

complete disassembly of a hydraulic structure and restoration of a natural hydrological regime, with possible preservation of elements of a hydraulic structure, not creating obstacles at the time of flood routing, for using it for other purposes;

The term “**basin water administration**” refers to a territorial body of the State Water Administration, authorized to manage the water resources of a basin;

The term “**basin council**” refers to an advisory body, headed by a manager of a basin water administration which may include the representatives of the bodies concerned of the executive authority of a country, organizations-water users concerned, representatives of research institutions and voluntary associations and foreign observers from the countries concerned, who are appointed by the State Water Administration in accordance with the procedure, established by the Government of a Country;

The term “**water body**” refers to a natural or artificial water body, watercourse or other body, where a permanent or temporary concentration of waters has typical forms and features of a hydrological regime;

The term “**hydrological regime**” refers to a change over time of the level, consumption and volume of water in a water body;

The term “**water resources**” refers to surface waters and groundwaters which are found in water bodies and used or may be used;

The term “**water facility**” refers to a hydraulic structure, which is designed to manage a hydrological regime of a water body or to protect shore fronts and beds from the negative impact of waters;

The term “**State Water Administration**” refers to a body of the State executive authority, which is authorized by the Government (President) to exercise the functions of management of water resources;

The term “**State Body on Emergency Situations**” refers to a body of the State executive authority, which is authorized by the Government (President) to exercise the functions of management in the field of prevention, localization and elimination of natural and technogenic emergency situations, and to implement the measures to protect the population and the territories;

The term “**National Water Council**” refers to an advisory body, headed by a chief of the State Water Administration which may include the representatives of the bodies concerned of the executive authority of a country, organizations-water users concerned, representatives of research institutions and voluntary associations and foreign observers from the countries concerned, who are appointed by the State Water Administration in accordance with the procedure, established by the Government of a Country;

The term “**body of a local State administration**” refers to a body of the State executive authority, which is authorized by the Government (President) to exercise, in accordance with the established procedure, the management of the territory forming part of the State, whose boundaries are set by the Constitution of a Country.

Article 4. Powers of the Government of a Country in the field of ensuring safety of hydraulic structures

The Government of a Country shall exercise the following powers in the field of ensuring safety of hydraulic structures:

- elaborate and implement the State policy in the field of safety of hydraulic structures;
- arrange the State supervision over the safety of hydraulic structures;
- develop and arrange the execution of the State programmes in the field of safety of hydraulic structures;
- arrange the interaction with other countries of the Central Asia in the field of safety of hydraulic structures;
- arrange and ensure the safety of hydraulic structures which are in State ownership.

Article 5. Powers of the bodies of a local State administration

The bodies of a local State administration within the limits of the administrative areas’ boundaries shall exercise the following powers:

- ensure the safety of hydraulic structures, which are in ownership of these bodies of a local State administration, on the basis of the general requirements to the safety of hydraulic structures, as defined in the Article 8 of this Law;
- take part in the implementation of the State policy in the field of ensuring of safety of hydraulic structures;

- develop and implement the regional programmes in the field of ensuring of safety of hydraulic structures;
- ensure the safety of hydraulic structures in the process of the utilization of water resources and implementation of environmental measures;
- take part, in cooperation with the executive State bodies, in work on the prevention of the breakdown of hydraulic structures and the breakdown management and control;
- inform the population about the danger of the breakdown of hydraulic structures.

Article 6. State body of the executive authority in charge of the supervision over safety of hydraulic structures

The executive authority, authorized by the Government of a Country to perform the functions of the State supervision over safety of hydraulic structures (hereinafter referred to as “State supervision body”) shall exercise State control and supervision over the safety of hydraulic structures.

Article 7. State register of hydraulic structures

The hydraulic structures, covered by this Law, shall be entered in the State Register of the Hydraulic Structures (hereinafter referred to as “Register”).

The Register shall be developed and maintained in accordance with the procedure, established by the Government of a Country.

Chapter II. ENSURING THE SAFETY OF HYDRAULIC STRUCTURES

Article 8. General requirements for the safety of hydraulic structures

The safety of hydraulic structures shall be ensured on the basis of the compliance with the following general requirements:

- ensuring of a permissible level of risk of breakdown of hydraulic structures;
- periodic survey and declaration of safety of hydraulic structures;
- state supervision over the safety of hydraulic structures;
- continuity of the operation of hydraulic structures;
- implementation of measures to ensure the safety of hydraulic structures, including the development of the criteria of their safety, equipping of hydraulic structures with technical devices with a view of exercising regular control (monitoring) of their technical condition, ensuring of a required level of professional skills of the employees, attending to a hydraulic structure;
- need for timely implementation of a set of measures to minimize risks for emergency situations at the hydraulic structures;
- priority financing of works, included in the plans of measures to ensure the safety of hydraulic structures, and
- responsibility for the actions (inaction), which resulted in an increase of risk of a breakdown of a hydraulic structure above permissible levels and arising of emergency situations and breakdowns.

Article 9. Responsibilities of the owner of a hydraulic structure and of an operating organization

The owner of a hydraulic structure and an operating organization should:

- ensure compliance with the standards and regulations of safety of hydraulic structures in the process of their construction, putting into operation, operation, repair and maintenance, reconstruction, restoration, conservation, putting out of operation and decommissioning;
- ensure control of the parameters of the technical condition of a hydraulic structure and the characteristics of natural and technogenic impacts and make assessment of the technical condition of a hydraulic structure on the basis of the data received;
- analyse the reasons for the deterioration of the technical condition and for the reduced level of safety of hydraulic structures, taking into account their operation in cascade, harmful natural and technogenic impacts, outcomes of economic and other activities in the adjacent territories, situated below and above a hydraulic structure;

- ensure the development and timely updating of the criteria of safety of a hydraulic structure;
- develop the systems of control (monitoring) of the technical condition of a hydraulic structure;
- carry out in good time the elaboration and implementation of the measures to ensure the serviceability of a hydraulic structure and its safety, as well as the measures to prevent a breakdown of a hydraulic structure;
- ensure the conducting of regular surveys of a hydraulic structure;
- build up financial and material resources for the elimination of the aftereffects of a breakdown of a hydraulic structure;
- organize the operation of a hydraulic structure and ensure the compliance of the professional skills of the employees of an operating organization with the relevant standards and regulations;
- maintain in constant operational readiness the local systems of warning of emergency situations at hydraulic structures;
- interact on the issues of the prevention of the breakdowns of hydraulic structures with the State management body on civil defense matters and emergency situations;
- inform without delay about the danger of a breakdown of a hydraulic structure the State Supervision Authority, other State bodies concerned, and in case of an imminent threat of a failure of a damming structure – the population and organizations, situated in a territory concerned;
- assist the State Supervision Authority in the implementation of its functions;
- inform, in conjunction with the local bodies of the executive authority, the population on the issues of safety of hydraulic structures; and
- provide priority financing of the measures to ensure a safe operation of a hydraulic structure, as well as the works in the field of prevention of emergency situations and localization and elimination of the aftereffects of the breakdown of hydraulic structures, and

An owner should ensure a continuous operation of its hydraulic structure (a complex of hydraulic structures), until the transfer of the rights of ownership to another person, or until the completion of the works on the liquidation of a hydraulic structure.

Article 10. Declaration of safety of a hydraulic structure

An owner of a hydraulic structure or an operating organization shall make up a declaration of safety of a hydraulic structure or a complex of hydraulic structures (hereinafter referred to as “Declaration”) at the stages of the design, putting into operation and operation, as well as after its reconstruction, restoration and conservation.

The hydraulic structures of the categories I, II and III shall be subject to declaration of safety.

The Government of a Country shall define the basic requirements with regard to the structure and contents of a Declaration, taking into account a category of responsibility of a hydraulic structure. On behalf of the Government of a Country, the State Supervision Authority may establish additional requirements with regard to the contents of a Declaration, depending on the significance of a hydraulic structure and the category of its responsibility.

In the process of the declaration of safety of a complex of hydraulic structures, the requirements should be met with regard to the structure and contents of a Declaration, which are imposed upon the Declarations of the hydraulic structures of the highest category of responsibility, established for the hydraulic structures of a given complex.

An owner of a hydraulic structure or an operating organization, authorized by the owner, shall submit a Declaration to the State Supervision Authority for approval. Concurrently with the Declaration, an owner of a hydraulic structure (an operating organization) shall submit to the State Supervision Authority a conclusion of the State commission of experts on the Declaration, criteria of safety of a hydraulic structure (a complex of hydraulic structures) and estimated presumable damage which may be caused, as a result of a breakdown of a hydraulic structure. The approval of the Declaration by the State Supervision Authority shall be the grounds for the inclusion of a hydraulic structure (a complex of hydraulic structures) to the Register and for the issuance by the State Supervision Authority of a permit for putting into operation, operation and putting out of operation of a hydraulic structure, or for its reconstruction, restoration or conservation.

The approval of a Declaration at the stage of the completion of a project shall be the grounds for the approval of the project in accordance with the established procedure in case of a positive conclusion of the examination of the project as a whole and the issuance of a permit for construction hydraulic structures.

The validity of a Declaration during the period of operation of a hydraulic structure (a complex of hydraulic structures), established by the State Supervision Authority, shall be subject to the technical condition and safety of declared hydraulic structures, and may not exceed the period of five years.

Article 11. State expert examination of the declarations of safety of hydraulic structures

The Government of a Country shall establish the procedure of the execution of the State expert examination of the declarations.

The State or other research and design organizations, working in the field of hydraulic engineering, hydropower development and water management, which are included in the list of centres of expertise, approved by the State Supervision Authority, with the indication of their sectoral specialization and category of responsibility - authorized for the examination - of hydraulic structures, shall be engaged in the execution of the State expert examination of the declarations.

The choice of a centre of expertise shall be made on the initiative of the owners of hydraulic structures or operating organizations, taking into account the specialization, established by the approved list of the centres of expertise.

The State Supervision Authority shall adopt a decision on the approval of a Declaration for a certain period of time and the issuance of a permit for putting a hydraulic structure into operation, or on the refusal to approve the Declaration and to issue such permit, on the basis of the conclusion of the State commission of experts.

In case of disagreement of an owner of a hydraulic structure or an operating organization with the decision of the State Supervision Authority, this decision may be appealed against judicially.

The State expert examination of the Declarations shall be carried out on the basis of a contract for works (services), or as per tariff, approved in accordance with the established procedure and differentiated by the categories of responsibility of hydraulic structures.

Article 12. Categories of responsibility of hydraulic structures

The following four categories of responsibility of hydraulic structures, covered by this Law, shall be established.

The category I of responsibility shall include:

- hydraulic structures, the hazardous consequences of a breakdown of which go beyond the limits of the territory of a State;
- all hydraulic structures of the grade 1;
- the hydraulic structures of the grades 2, 3 and 4, the breakdowns of which may result in causing harm to the life and health of people, with the total number of victims, exceeding 50 persons, or in arising of a need of temporary resettlement in connection with the violation of the conditions of vital activity of more than 300 persons, and
- the hydraulic structures of the grades 2, 3 and 4, the breakdown of which may cause damage to the environment, State property, property of natural and legal persons (apart from the property, belonging to an owner of hydraulic structures, where the above-mentioned breakdown took place), assessed by the methods of calculation on the basis of aggregative indices in the amount, exceeding 10 million US dollars.

The category II of responsibility shall include:

- all hydraulic structures of the grade 2, with the exception of those, which are put into the category I of responsibility;
- the hydraulic structures of the grades 3 and 4, the breakdowns of which may result in causing harm to the life and health of people, with the total number of victims, ranging from 10 to 50 persons, or in arising of a need of temporary resettlement in connection with the violation of the conditions of vital activity for 100 to 300 persons, and
- the hydraulic structures of the grades 3 and 4, the breakdown of which may cause damage to the environment, State property, property of natural and legal persons (apart from the property, belonging to an owner of hydraulic structures, where the above-mentioned breakdown took place), assessed by the methods of calculation on the basis of aggregative indices in the amount, ranging from 1 to 10 million US dollars.

The category III of responsibility shall include:

- the hydraulic structures of the grade 3, with the exception of those, which are put into the category I and II of responsibility;
- the hydraulic structures of the grades 4, the breakdowns of which may result in causing harm to the life and health of people, with the total number of victims up to 10 to 50 persons, or in arising of a need of temporary resettlement in connection with the violation of the conditions of vital activity for 20 to 100 persons;
- the hydraulic structures of the grade 4, the breakdown of which may cause damage to the environment, State property, property of natural and legal persons (apart from the property, belonging to an owner of hydraulic structures, where the above-mentioned breakdown took place), assessed by the methods of calculation on the basis of aggregative indices in the amount, ranging from 0.05 to 1 million US dollars.

The category IV of responsibility shall include:

- the hydraulic structures of the grade 4, which are not put into the higher categories.

Before the primary declaration of safety at the stages of putting into operation and operation of a hydraulic structure, constructed earlier, an owner or an operating organization shall submit to the State Supervision Authority the substantiation materials for the determination of the category of responsibility of each hydraulic structure.

The substantiation materials should include the description of the possible scenarios of the breakdowns of a hydraulic structure, as well as the estimate of damage which may be caused, as a result of a breakdown under the most probable and hardest in its consequences scenarios of the breakdowns. The substantiation materials shall be forwarded to the State Supervision Authority which shall decide on attributing a category of responsibility to a hydraulic structure. The category of responsibility should be determined for each hydraulic structure, indicated in the Article 3 of this Law, including those, being part of a declared complex of the hydraulic structures.

In the time of subsequent declaration of safety of a hydraulic structure, the category of responsibility of this structure may be updated by the State Supervision Authority on the basis of the estimate of probable damage which may be caused, as a result of a breakdown of a hydraulic structure, submitted together with a Declaration.

Article 13. Criteria of safety

The criteria of safety shall be developed for each hydraulic structure of the category I, II and III of responsibility.

The methods of the definition and assignment of the criteria of safety shall be approved by the State Supervision Authority.

The criteria of safety should contain the list of the testing parameters of a hydraulic structure, the methods of their definition by means of instrumental and visual monitoring, as well as warning and rated values or characteristics of the testing parameters, characterizing an elevated risk of a breakdown.

The criteria of safety may be updated according to the results of the monitoring of the technical condition of a hydraulic structure. The updated criteria of safety shall be submitted for approval to the State Supervision Authority in the time of a subsequent declaration of safety.

Chapter III. SUPERVISION OVER SAFETY OF HYDRAULIC STRUCTURES

Article 14. Bodies of the State supervision over safety of hydraulic structures

The bodies of the State supervision of safety of hydraulic structures shall exercise the supervision and control over the observance by the owners of hydraulic structures and operating organizations of the requirements of this Law, as well as the standards of technical regulation of safety of hydraulic structures.

The powers of the bodies of the supervision of safety of hydraulic structures shall be as follows:

- organization of the development and approval of the standards of technical regulation of safety of hydraulic structures in the course of operation of hydraulic structures;
- harmonization of the standards and regulations of the design, construction and reconstruction of hydraulic structures, as well as the introduction of changes and amendments into the above-mentioned standards and

regulations;

- approval of a Declaration and of the criteria of safety;
- establishment of a category of responsibility of a hydraulic structure on the basis of the substantiation materials, provided by a owner of a hydraulic structure or an operating organization;
- harmonization of technical design assignments of hydraulic structures and projects of their construction and reconstruction;
- participation in the commissioning of hydraulic structures;
- unobstructed survey of hydraulic structures, familiarization with the documents and materials on the issues of safety of hydraulic structures;
- organization of the inspection of hydraulic structures;
- triennial personnel evaluation of managers and specialists of operating organizations with a view of certifying the right to carry outwork in the field of operation of hydraulic structures of the categories I, II and III of responsibility; organization of pre-evaluation training of managers and specialists;
- issuance of orders for ensuring of safety of hydraulic structures;
- harmonization of the use of the territories of hydraulic structures, river beds and adjacent territories, situated below and above the sites of water retaining hydraulic structures, and
- participation in the development of the draft of the laws and regulatory legal instruments in the field of safety of hydraulic structures.

The bodies of the supervision over safety of hydraulic structures may prohibit or restrict the activities of natural and legal persons, operating water management facilities or carrying out economic or other activity in the river beds and adjacent territories, situated below and above the sites of water retaining hydraulic structures, provided that these activities may have a negative impact upon the safety of hydraulic structures.

The orders for the ensuring of safety of hydraulic structures, issued by the bodies of the State supervision over the safety of hydraulic structures, as well as the orders for suspension or termination of the construction, reconstruction, restoration, conservation and decommissioning of hydraulic structures shall be compulsory for the owners of hydraulic structures and operating organizations and shall be executed the time fixed. The orders may be appealed against judicially.

The operation of a hydraulic structure and ensuring of safety of a hydraulic structure, whose permit for construction and operation was withdrawn (including a hydraulic structure which is in emergency condition), as well as a hydraulic structure which is subject to conservation and liquidation, and a hydraulic structure which does not have an owner, shall be carried out in accordance with the regulations, approved by the Government of a Country.

Article 15. Inspection of hydraulic structures

The inspection of hydraulic structures shall be organized and carried out by the State Supervision Authority.

The inspection of hydraulic structures shall be carried out with a view of exercising overall or partial control over the observance by the owners of hydraulic structures, operating organizations, as well as by the contractors of the requirements of this Law, standards and regulations of safe operation of hydraulic structures in the time of operation, reconstruction, restoration conservation and decommissioning of hydraulic structures.

A knowledge assessment of selected operating personnel may also be one of the objectives of making inspection

Chapter IV. FINANCING SECURITY FOR SAFETY OF HYDRAULIC STRUCTURES

Article 16. Compensation for damage, caused as a result of a breakdown of hydraulic structures

The damage, caused to the life and health of natural persons, property of natural and legal persons and State property, as a result of a breakdown of a hydraulic structure, in case of the violation by the owner of this structure or the operating organization of the legislation on the safety of hydraulic structures, shall be subject to compensation in full by the owner or operating organization which caused such damage, in accordance with the civil legislation of a Country.

An operating organization shall bear responsibility for ensuring safety of a hydraulic structure, including the compensation for damage, caused as a result of a breakdown of a hydraulic structure, up to the moment of the transfer of

the right to operate this structure to another person, or until the full completion of works on the liquidation of a hydraulic structure. If an agreement or other document, on the basis of which an operating organization carries out its activities in the field of operation of this structure, provides for other terms and conditions of responsibility for ensuring safety of a hydraulic structure, the provisions of the said agreement (document) shall apply.

An owner of a hydraulic structure shall bear subsidiary responsibility in respect of the obligations of an operating organization within the period of validity of an agreement or other document, on the basis of which an operating organization carries out its activities in the field of operation of this structure.

If a hydraulic structure is operated by an owner, or if responsibility for ensuring safety of a hydraulic structure is not placed by an agreement or other document upon an operating organization, the owner shall bear full responsibility for ensuring safety of this hydraulic structure, up to the moment of the transfer of the right to operate this structure to another person, or until the full completion of works on the liquidation of a hydraulic structure.

The provision of this Article shall apply to the owners of hydraulic structures, irrespective of the category of responsibility of a hydraulic structure.

Article 17. Compulsory insurance of civil liability for causing of harm

The risk of civil liability in respect of the obligations, arising as a result of causing of harm to the life and health of natural persons, as well as to the property of natural persons as a result of a breakdown of a hydraulic structure, shall be subject to compulsory insurance during the periods of temporary and permanent operation of a given hydraulic structure (complex of hydraulic structures).

The owner of a hydraulic structure or an operating organization shall be insured with respect to civil liability for causing of harm.

An insurance sum under a contract of compulsory insurance shall be established by the law in the form of fixed sums of differential payments to one person for harm, caused to the human life or health, and for damage, caused to property. The total insurance sum under a contract of compulsory insurance shall be proportional to the probable number of victims.

The amount of the insurance sums, terms and conditions and the procedure of compulsory insurance against risk of civil liability for damage, caused as a result of a breakdown of a hydraulic structure, shall be regulated by a special law.

Article 18. Financing of civil liability for harm, caused as a result of a breakdown of a hydraulic structure

The owner of a hydraulic structure should have financial security for civil liability for harm which may be caused as a result of a breakdown of its hydraulic structure (complex of hydraulic structures). In this case financial security for civil liability (with the exception of force majeure events) shall be provided at the expense of the funds of an owner of a hydraulic structure, as well as at the expense of a insurance sum, determined by the contracts of insurance against risk of civil liability, including a contract of compulsory insurance.

In the time of the conclusion of a contract of voluntary insurance of civil liability, an insurance sum, fixed by a joint decision of an insurer and insurant, shall not depend on the amount of financial security for civil liability. If an insurance sum turns out to be less than the difference between the amount of financial security and the insurance sum under a contract of compulsory insurance, an owner should evaluate its assets, which were taken on discount as its own funds as part of financial security for civil liability.

The procedure of payment of insurance benefits under a contract of voluntary insurance of civil liability should provide for the payments to be made in order of priority for harm, caused to the property of natural persons, including persons, whose property was damaged in the territory of other State (States).

The amount financial security for civil liability for harm which may be caused as a result of a breakdown of its hydraulic structure, shall be determined on the basis of the data of calculations of a probable extent of this damage, which are made by the owner and agreed upon with the bodies of the executive authority, in accordance with the procedure, established by the Government of a Country.

The procedure of determination of the amount and generation of financial security for civil liability in respect of the provisions, which are not regulated by this Law, shall be established by the Government of a Country.

The responsibilities of an owner of a hydraulic structure, established by this Article, may be placed by the owner, fully or partially, upon an operating organization, while maintaining subsidiary responsibility.

Article 19. Participation of the State in the compensation for damage, caused as a result of a breakdown of a hydraulic structure

If the actual costs of the compensation for damage, caused as a result of a breakdown of a hydraulic structure, exceed the volume of assets of an owner, the procedure of the compensation for damage, caused in the territory of other State (States), and damage, caused in the territory of a Country to the property of foreign investors, shall be established by the Government of a Country.

Article 20. Responsibility for the violation of the legislation on the safety of hydraulic structures

The officials and other persons shall bear responsibility for the violation of the legislation on the safety of hydraulic structures, committal of actions (inaction), resulting in a breakdown of a hydraulic structure and infliction of harm to people, property and environment, in accordance with the legislation of a Country.

Chapter VI. FINAL PROVISIONS

Article 21. Procedure of coming of this Law into force

This Law shall come into force from the date of its official promulgation.

The regulatory legal instruments, which were adopted before coming of this Law into force, shall be effective in respect of the provisions thereof, not contradicting this Law.

A legislative body of a Country should elaborate before the proposals on the introduction of necessary changes into the existing legislative instruments with a view of bringing them into conformity with this Law.

Draft Regional Agreement on Cooperation in the Field of Safety of Hydraulic Structures

DRAFT AGREEMENT

**Between the Government of the Republic of Kazakhstan, the Government of the Kyrgyz Republic, the Government of the Republic of Tajikistan, the Cabinet of Ministers of Turkmenistan and the Government of the Republic of Uzbekistan
on Cooperation in the Field of Hydraulic Structures Safety**

The Government of the Republic of Kazakhstan, the Government of the Kyrgyz Republic, the Government of the Republic of Tajikistan, the Cabinet of Ministers of Turkmenistan and the Government of the Republic of Uzbekistan, hereinafter called “the Parties”,

Driven by a sincere spirit for good neighboring relations and cooperation,

Realizing the necessity for organization of cooperation in Central Asia in the field of hydraulic structures safety,

Noting that the operation of dams and other hydraulic structures constructed at transboundary rivers of Central Asia, requires coordinated actions for the prevention of possible emergencies and accidents prevention, in the result of which human lives, health, property of individuals and legal entities, and environment will be posed to danger,

Expressing a wish to find mutually equitable solution for problems emerging in case of hydraulic structures breakdown,

Have agreed as follows,

Article 1 Terms and Definitions

The following terms and definitions are used in this Agreement:

The term “*hydraulic structures*” refers to dams, hydro power plants’ buildings, outfall regulators, discharge structures and outlet works, tunnels, canals, pumping stations, shipping locks, canal lifts, structures, designed for protection against floods and destruction of the banks of the reservoirs; banks and beds of river channels; check dams, whose breakdown may cause damage to life, human health, to individual and legal entities’ property, and to environment;

The term “*safety of a hydraulic structure*” refers to a quality of hydraulic structures to maintain their operating capacity, and ensure protection of life, health and legal interests of people, legal entities, as well as preservation of the environment;

The term “*Model Law*” refers to the draft law on the safety of hydraulic structures, with the application of which the Parties to this Agreement shall draw up the drafts of corresponding national laws to achieve their over-all compatibility;

The term “*State body on supervision of hydraulic structures safety*” refers to the State executive authority authorized by the Government of the Party to exercise a State supervision over the safety of hydraulic structures;

The term “*regulation of hydrological regime*” refers to regulation of water discharge running through a hydraulic structure (a hydraulic power plant) in order to perform an established by the authorized executive body regime on water discharge change at river sections between regulating hydraulic structures, and the change in the regime of the reservoirs’ water levels;

The term “*hydraulic structure technical state monitoring*” refers to regular instrumental measuring and visual observation of changes in diagnostic parameters of the hydraulic structures with maintaining a database on the results of measuring and observations, their [computer] processing, analysis and forecasting of the hydraulic structures technical state [with application of mathematical models];

The term “*survey of a hydraulic structure*” refers to the set of measures to assess a technical state and operating capacity of hydraulic structures and to make up a list of necessary works to ensure operational reliability and safe operation of these structures;

The term “*conservation of a hydraulic structure*” refers to a complex of design and construction works, carried out with a view of temporary preservation of a hydraulic structure and ensuring its safety under the conditions of a passage of transit discharges, without the regulation of a hydrological regime with a relevant lowering of the water level in a water storage reservoir;

The term “*hydraulic structure decommissioning*” refers to a complex of design and construction works, carried out with a view of complete disassembly of a hydraulic structure and restoration of a natural hydrological regime, with possible preservation of elements of a hydraulic structure, not creating obstacles at the time of flood routing, for using it with other purposes.

Article 2

Harmonization of the Parties’ Legislation on Hydraulic Structures Safety

The Parties shall agree on advisability for national legislation of hydraulic structures *safety development, which comprises the Law On Hydraulic Structures Safety*, based on agreed between the Parties’ Model Law, and normative legal acts adopted by the Governments of the Parties.

The Parties agreed to coordinate their actions on development of corresponding normative legal acts, entering them into force and introduction of further amendments and additions to provide compatibility of main requirements of the national legislations in the area of hydraulic structures safety.

The Parties acknowledge a necessity in defining the hydraulic structures’ status, which are located at transboundary watercourses and have inter-State significance, for cooperation and provision of their safety.

Article 3

Norms and Rules for Hydraulic Structures Technical Regulation

The Parties attach special importance to the technical regulation of hydraulic structures safety, and find it purposeful to carry out joint consultations and activities on improvement of the norms and rules on hydraulic structures’ safety provision upon their design, construction, operation, reconstruction, conservation, conservation and decommissioning.

Article 4

Establishment and Interaction of National Bodies of State Supervision over Hydraulic Structures Safety

The Parties believe that establishment of the national bodies on State supervision over hydraulic structures safety acting in accordance with the legislation of each Party to be an efficient measure.

The Parties agreed to perform a required interaction of the national bodies on State supervision over hydraulic structures safety in accordance with the principles of this Agreement, and mutually agreed programmes.

Article 5

Agreement Implementation Terms

Joint activity of the Parties on implementation of this Agreement shall be fulfilled under the terms of bilateral or multilateral agreements, in accordance with the Parties’ national legislations.

Article 6

Incorporation of Requirements on Hydraulic Structures Safety in the Rules on Water Resources Use and in the Rules on Operation for Reservoirs on Transboundary Water Bodies

The Parties consider necessary to take into account the issues on hydraulic structures safety upon design and practical implementation of the *Rules on Use of Water Resources* and the *Rules on Operation of Reservoirs on Transboundary Rivers*; to perform discharges of floods and water regime regulation with consideration of the hydraulic structures’ condition located both in their territory, and in the territories of the Parties downstream along the transboundary river, on the base of bilateral or multilateral long-term inter-State agreements *On Joint Use of Water and Hydropower Resources*.

The Parties shall introduce into the national normative documents setting up an order of drafting the Rules on Use of Water Resources and the Rules on Reservoirs Operation, the regulations that ensure the requirements on hydraulic structures safety are included in these Rules.

Article 7

Scientific and Technical Cooperation in the Field of Hydraulic Structures Safety

The Parties consider to be mutually beneficial an organization of coordination and joint execution of the scientific and research activities and information exchange on:

- (a) Development and improvement of norms and rules on technical regulation of hydraulic structures safety;
- (b) Organization of field investigations and hydraulic structures technical condition monitoring;
- (c) Improvement of methods on a hydraulic structure technical condition assessment and of methods on a failure risk analysis;
- (d) Improvement of hydraulic structures repair and reconstruction technology, as well as execution of failure-proof works technology;
- (e) Mutual information on findings of scientific works and exchange of data on technical state of hydraulic structures, and in the field of hydraulic structures safety.

Article 8

Hydraulic Structures Survey

The Parties consider appropriate to conduct a joint survey of the hydraulic structures of inter-State significance, where necessary, upon agreement of the Parties and with participation of the interested Party's specialists.

Article 9

Cooperation in the Field of Prevention, Localization and Emergencies' Liquidation that may emerge in the Result of a Hydraulic Structure Failure

The Parties consider necessary a reciprocal warning on a hydraulic structure failure danger, and shall take measures on organization of a timely warning of the interested parties in each particular case of the emergency occurrence, consequences of which may pose danger to other Party.

The Parties express their readiness to coordinate the activity of the national forces on localization and elimination of emergencies, protection of population and territories, as well as to provide practical aid and assistance to correspondent bodies of other Party in case of the hydraulic structure breakdown.

Article 10

Joint Consideration of Procedures of the Indemnification for Damage Caused to the Population, Property of Individuals and Legal Entities, or the Environment by One of the Parties in the Result of the Hydraulic Structure Breakdown in the Territory of other Party

The Parties express their preparedness to establish a mutually applicable and equitable procedure of indemnification for damage caused to the population, individual and legal entities' property, or the environment of one Party in case of the hydraulic structure breakdown in the territory of other Party, based on the international law principles, and in accordance with the national legislation, guided by an intention to consider the stated issues in the spirit of good neighborliness and cooperation.

Under mentioned case, the Parties consider appropriate to conduct a joint investigation and analysis of the causes of accident with participation of the interested parties and involvement of independent experts.

The Parties agree that disputes which may emerge during consideration of issues on indemnification for damage caused in the result of the hydraulic structure breakdown, at the initial stage, shall be considered in pre-trial order, in accordance with Article 12 of this Agreement.

Article 11

International Commission on Hydraulic Structures Safety in Central Asia

To organize interaction in the field of dam and other hydraulic structures safety, the Parties agreed on establishment of an International Commission on Hydraulic Structures Safety in Central Asia (ICHIS CA), and on assignment of roles, defined by the Provisions on Commission agreed by the Parties, including:

- (a) Interaction with the Governments and executive agencies of the Parties on issues regulated by this Agreement;

(b) Analysis and summary of the investigation findings, and hydraulic structures' monitoring, which have been constructed or under construction in the territories of the Parties, and publication of annual information on these issues;

(c) Joint activity organization with the Parties' participation (conferences, workshops, meetings, exhibitions, etc.) for goals, provided by this Agreement;

(d) Execution of a technical arbitrator's roles upon consideration of disputable issues emerged in the result of a hydraulic structure breakdown at a transboundary river;

(e) Interaction with the International Commission on Large Dams (ICOLD), the interested organizations and the State supervisory bodies over dam and other hydraulic structures safety of other States.

Article 12 Dispute-Solving

Disputes and disagreements between the Parties shall be solved through negotiations and mutual consultations. If the parties will not come to agreement, an issue shall be directed for a third arbitration consideration to be established by the Parties for a certain issue.

Article 13 Amendments and Additions

This agreement, by approbation of the Parties, can be changed and amended by certain inter-State protocols, and shall be considered as an integral part of this Agreement.

Article 14 On Withdrawal of Party from This Agreement and on Other Parties Joining This Agreement

This Agreement is open for other States that invest into hydraulic structures construction in the territory of the Central Asian countries.

The Party has a right to withdraw from this Agreement unilaterally on the base of the decision of the Government of this Party.

Article 15 Final Provisions

This Agreement shall come into effect from the moment the Depository receives the latest notification on execution of the required inter-State procedures for a term of 5 years by signatory Parties, and shall be automatically extended for the next five-year period, if none of the Parties no later than 6 months have not sent a written notification on withdrawal from this Agreement.

Concluded in the city of _____ «__» _____ year in one original copy in the Russian language.

The Depository shall keep the original copy and send its exemplification to each State that has signed this Agreement.

For
the Republic of
Kazakhstan

For
the Kyrgyz Republic

For
the Republic of
Tajikistan

For
the Cabinet of
Ministers of
Turkmenistan

For
the Republic of
Uzbekistan