ANALYSIS OF WATER MANAGEMENT SITUATION WITHIN THE AMUDARYA AND SYRDARYA RIVER BASINS FOR THE NONVEGETATION PERIOD OF 2008–2009 (as of 21.03.09)

Water management situation for the nonvegetation periods within the Amudarya and Syrdarya rivers basins has been analyzed in line with the following indices:

- Water content – by inflows to reservoirs in upstream (Toktogul, Andijan, Charvak, Nurek) and channel inflow to rivers, comparing the actual data and the predicted ones;
- Regimes of reservoirs – by means of the reservoir regulation schedules - the reservoir inflow and release schedules , comparing the actual data and the predicted ones;
- Water allocation schedules – available water supply and water delivery evenness, comparing the planning (quota) and actual data.

1. The Syrdarya River Basin

The rivers water content in the basin characterized by the total inflow to the upper reservoirs was predicted at 4.37 km3; the actual inflow to the Toktogul, Andijan and Charvak reservoirs was 4.42 km3 what was higher on 0.05 km3 (1%).

The actual inflow to the Toktogul reservoir was 4.42 km3 what was higher on 0.05 km3 (2%) than the actual one. The actual inflow to the Charvak reservoir was 1.21 km3 what was higher on 7% than the actual one. But the actual inflow to the Andijan reservoir was less on 9% and was equal 0.78 km3.

The actual releases from the Toktogul reservoir were less than the releases schedule set by "Kyrgyzenergo" nearly on 10% and were equal to 5.51 km3, because of that the total actual release from three reservoirs (Toktogul, Andijan and Charvak) was less the planned one on 0.65 km3 (8%) therefore the accumulated water was higher than the planned volume on 0.4 km3 (or 5%). The water balances of the Toktogul, Andijan and Charvak reservoirs (as compared the planned with actual quantities) are given in the tables 1.1-1.2.

Table 1.1.Total water balance of the Toktogul, Andijan and Charvak reservoirs for nonvegetation period of 2008-2009 (as of 21.03.2009)

	Planned	Actual	Actual - Planned	
			km3	%
Inflow	4.37	4.42	0.05	1.1
Release	7.8	7.15	-0.65	-8.3
Inflow - Release	-3.43	-2.73		
Volume at the end of 10-days period *	7.63	7.99	0.36	4.7
The reservoir drawdown (-), The reservoir filling (+)	-3.27	-2.91		

* on 01.10.2008 Volume = 10.9 km3

Table1.2. Water balance of the Toktogul reservoir
nonvegetation period of 2008-2009 (as of 21.03.09)

	Planned	Actual	Actual - Planned	
			km3	%
Inflow	2.38	2.43	0.05	2.1
Release	6.1	5.51	-0.59	-9.7
Inflow - Release	-3.72	-3.08		
Volume at the end of 10-days period *	6.14	6.52	0.38	6.2
The reservoir drawdown (-), The reservoir filling (+)	-3.477	-3.097		

* on 01.10.2008 Volume = 9.617 km3

The actual inflow to the Kairakkum reservoir was 8,85 km3 what was lower than the predicted one on 1,11 km3 (11 %). The water release from the Kairakkum reservoir was lower the releases schedule on 1 % and was equal to 7,74 km3. The water balance of the Kairakkum reservoir (see table 1.3) shows the presence of the unaccounted inflow equal to 0,4 km3.

Таблица 1.3. Water balance of the Kayrakkum reservoir for
non-growing season 2008-2009 (as of 21.03.09)

	Planned	Actual	Actual - Planned	
			km3	%
Inflow	9.96	8.85	-1.11	-11.1
Drainage inflow	0.39	0.43	0.04	10.3
Release	7.84	7.74	-0.1	-1.3
Inflow - Release	2.51	1.54		
Volume at the end of 10-days period *	3.29	2.80	-0.49	-14.9
The reservoir drawdown (-), The reservoir filling (+)	2.466	1.976		

* on 01.10.2008 Volume = 0.824 km3

The actual inflow to the Chardara reservoir was 7,84 km3 that is less than the planned one on 2,75 km3 or 26 %. The actual releases from the Chardara reservoir were less than the releases schedule on 33% therefore it was possible to accumulate water about 5.19 km3. The water

balance of the Chardara reservoir (see table 1.4) shows the presence of the unaccounted inflow at the rate 0,57 km3.

Table 1.4. Water balance of the Chardara reservoir for non-vegetation period 2008-2009 (as of 21.03.09)

	Planned	Actual	Actual - Planned	
			km3	%
INflow	10.59	7.84	-2.75	-26.0
Release to Arnasay	0.0	0.34	0.34	
Water intake to the Kzyl-Kum canal	0.07	0.32	0.25	357.1
Release to the river	6.15	3.49	-2.66	-43.3
Inflow - Release	4.37	3.69		
Volume at the end of 10-days period *	5.21	5.19	-0.02	-0.4
The reservoir drawdown (-), The reservoir filling (+)	4.279	4.259		

* as of 01.10.2008
Volume = 0.931 km3

The aggregated water balance of 2 sections (Toktogul-Kairakkum and Kairakkum -Chardara) is given in the table 1.5. Analysis of water delivery has been implemented for the balance-sites, countries - water users by comparing the actual water withdrawals with the water withdrawal quota; assessment was implemented by means of indices of water availability and evenness. The analysis results are as follows:

- The losses amounted to 0.73 km3 were discovered at the section Toktogul-Chardara;
- As a whole, the actual water delivery to canals has exceeded quota by 1.26 km3 or 45%, at the same time the actual inflow to the Chardara reservoir was less the planned one by 2,7 km3 or 26%;
- Water availability has been irregular with regard to both countries (sections) and periods (within season).

Thus, in the Republic of Uzbekistan the water deficit by 0.1 km3 or 44% of quota was observed in the Big Namangan Canal, and at the same time the actual water delivery has exceeded quota by 0.15 km3 or 18%.

The minimal water availability within the whole basin was observed in February (about 60%), in Kyrgyzstan - at the end of October - the beginning of November (57-81%), in Uzbekistan - at the middle of March upstream from the Kairakkum reservoir (86%), in Tadjikistan - in October (39-45%), in Kazakhstan - in January- the beginning of February (2-52%).

The actual water delivery to Priaralie was 1,2 km3, whereas the planned one was 1,74 km3.

Table1.5. Water balance of the Naryn and Syrdarya rivers upstream of the Chardara reservoir for the nonvegetation period of 2008-2009 (as of 21.03.09)

km3

№	**Section/**balance item	Planned	Actual	Actual - Planned	
				km3	%
1	**Toktogul - Kayrakkum**				
1.1	Release from the Toktogul reservoir	6.10	5.51	-0.59	-9.7
1.2	Channel inflow (CI)*	5.16	5.10	-0.06	-1.2
1.3	Water withdrawal	1.34	1.75	0.41	30.4
1.4	Inflow to the Kairakkum reservoir	9.96	8.85	-1.11	-11.1
1.5	Residual (1.3+1.4 -1.1 - 1.2)	0.04	-0.01		
2	**Kayrakkum - Chardara**				
2.1	Release from the Kairakkum reservoir	7.84	7.74	-0.1	-1.3
2.2	Channel inflow (CI)**	3.53	3.10	-0.43	-12.2
2.3	Water withdrawal	1.43	2.28	0.85	59.4
2.4	Inflow to the Chardara reservoir	10.59	7.84	-2.75	-26.0
2.5	Residual (2.3+2.4-2.1-2.2)	0.65	-0.72		
	Total residual (1.5 + 2.5)	0.69	-0.73		

* CI of the section Toktogul – Kairakkum including the inflow from Karadarya river включает приток по реке Карадарья
** CI of the section Kairakkum - Chardara including the inflow from Chirchil river
*** Losses (-) or the unaccounted inflow CI (+)

Data refer to the Syrdarya river basin are placed on the CA Water-Info portal: **www.cawater-info.net/syrdarya/**

2. The Amudarya river basin

The Amudarya river actual flow at the Atamurat hydropost (upstream to water intake to the Karakum canal) was 13.19 km3 or 0.87% of the planned one by BWO.

The actual inflow to the Nurek reservoir was 2.98 km3, being close to the predicted one, and the releases from the Nurek reservoir were 6.56 km3, being close to the planned ones. At the end of vegetation period 6.01 km3 of water was accumulated in the reservoir whereas the planned volume was 5.96 km3 (see table 2.1).

Table 2.1. Water balance of the Nurek reservoir for the non-vegetation period 2008-2009 (as of 21.03.09)

	Planned	Actual	Actual – Planned Planned	
			km3	%
Inflow	2.80	2.98	0.18	6.4
Release	6.45	6.56	0.11	1.7
Inflow - Release	-3.65	-3.58		
Volume at the end of 10-days period *	5.96	6.01	0.05	0.8
The reservoir drawdown (-), The reservoir filling (+)	-3.655	-3.605		

* as of 01.10.2008 Volume = 9.615 km3

The actual inflow to the TMHS was 4,06 km3 (the estimated one was 6,13 km3), the release – 4,02 km3 (the estimated one was 4,77 км3). The actual water volume of reservoir was 2.10 km3, being less the planned one by 0.97 km3. Water losses according to calculation of the reservoir water balance are negligible and equal to 0.06 km3 (see table 2.2).

Table 2.2. Water balance of the Tyuyamuyun reservoir for the non-vegetation period 2008-2009 (as of 21.03.09)

	Planned	Actual	Actual – Planned Planned	
			km3	%
Inflow	6.13	4.06	-2.07	-33.8
Release**	4.77	4.02	-0.75	-15.7
Inflow - Release	1.36	0.04		
Volume at the end of 10-days period *	3.07	2.10	-0.97	-31.6
The reservoir drawdown (-), The reservoir filling (+)	0.946	-0.024		

* as of 01.10.2008 Volume = 2.124 km3
** Including the water withdrawal from reservoir

The Amudarya water balance of the sections “Atamurat (upstream to water intake to the Karakum canal) - TMHS” and “TMHS –Samanbay” is given in the table 2.3.

According to the balance estimation the water losses of the section "Atamurat - TMHS" was 3.19 km3 or 24%, but downstream to the TMHS it was 1.44 km3 or 35%. There was practically no the water delivery to the Priaralie because of water deficit.

Table 2.3. The Amudarya river water balance: section "**h/p Kerki (simulated) - h/p Samanbay"** for the nonvegetation period 2008-2009 (as of 21.03.09)

km3

№	**Section**/balance item	Planned	Actual	Actual - Planned	
				km3	%
1	**h/p Kerki (simulated) - TMHS**				
1.1	Water discharge upstream from the Kayrakkum canal	15.20	13.19	-2.01	-13.2
1.2	Channel inflow	0.71	0.42	-0.29	-40.8
1.3	Water withdrawal	7.6	6.36	-1.24	-16.3
1.4	Water discharge at the Darganata site	6.13	4.06	-2.07	-33.8
1.5	Residual (1.3+1.4 -1.1 -1.2) *	-2.18	-3.19		
2	**TMHS- h/p Samanbay**				
2.1	Попуск из ТМГУ	4.77	4.02	-0.75	-15.7
2.2	Channel inflow	0.07	0.07	0	0.0
2.3	Water withdrawal	3.6	2.6	-1	-27.8
2.4	Water discharge at the Samanabay site	0.32	0.05	-0.27	-84.4
2.5	residual (2.3+2.4-2.1-2.2) *	-0.92	-1.44		
	Total residual (1.5 + 2.5) *	-3.10	-4.63		

* Losses (-) or the unaccounted inflow CI (+)

The actual water withdrawal within the river basin was 11,2 km3 whereas the quota is 14,2 km3, probability – 79 %, including within: Tajikistan – 74 %, Uzbekistan – upstream to TMHS - 99 %, downstream to TMHS – 74 %, Turkmenistan – 72%.

Data refer to the Amudarya river basin are placed on the CA Water-Info portal:
www.cawater-info.net/amudarya/