3.3 Conditions for experiments on drainage water reuse

Drainage water salinity used for irrigation and leaching fluctuates in wide range. In laboratory investigations water salinity fluctuated from 2,0 to 16,0 g/l on dry residue (table 3.5). In field investigations where water from specific drains or collectors was used, water salinity varied from 0,7 to 7,0 g/l, and, in most cases, from 2 to 4,0 g/l.

Table 3.4

Pilot projects' parameters

Theme code	Irrigated area, ha (m^2)	Irrigation network characte-ristic and efficiency	Collector-drainage network characteristics									
			specific extent, m/ha	hr, m	B, m	q, l/sec/ha	D hor, m^3/ha	C hor, g/l	vertical drains number	Q в, l/sec	drainage outflow, m^3/ha per year	effluent salinity, g/l
UZBEKISTAN												
0.3.1.Uz.	laboratorial	-	-	-	-	-	-	-	-	-	-	-
0.3. 2.Uz.	25 m^2 plots	-	-	-	-	-	-	-	-	-	-	-
0.3.3 . Uz.	5-12 ha	earthen, efficiency 0,8	35-73	1,5-2,5	-	0,2-0,3	2	21-9-1	-	-	-	-
0.3.4 .Uz.	250 ha	earthen	36	2,4-3,0	400-600	1-3		0,8-2,0	-	-	-	-
0.3. 5.Uz.	102 ha	concrete flumes, efficiency 0,96	45	2,5-3,0	200-400	0,09-0,21	4 000-6 100	2,0-4,4	-	-	-	-
0.3. 6.Uz.	collector Shuruzyak water	-	-	-	-	-	-	-	-	-	-	-

Theme code	Irrigated area, ha (m^2)	Irrigation network characte-ristic and efficiency	Collector-drainage network characteristics									
			specific extent, m/ha	hr, m	B, m	q, l/sec/ha	D hor, m^3/ha	C hor, g/l	vertical drains number	Q в, l/sec	drainage outflow, m^3/ha per year	effluent salinity, g/l
	treatment											
03.7.Uz.	27 ha	concrete flumes, efficiency 0,96	-	2,5-30	160-200	0,14	1 500	9,7-15,7	-	-	-	-
TURKMENISTAN												
03.1.Tur.	plots 2 000 m	-	-	-	-	-	-	2,1-2,8	-	-	-	-
03.2.Tur.	24 ha	earthen, efficiency 0,85	20	3,0-3,5	-	-	-	-	-	-	-	-
KAZAKHSTAN												
03.1.Kaz.	12 000 ha	earthen, concrete flumes, efficiency 0,75	3-5	3,0-3,5	-	-	-	-	60	20-45	2 300	0,7-2,0
03.2.Kaz.	40 ha	earthen, efficiency 0,60-0,65	38-40	2,0-2,2	-	0,22-0,34	6 900-10 800	1,0-10,0	-	-	-	-

KYRGYZSTAN

Theme code	Irrigated area, ha (m^2)	Irrigation network characte-ristic and efficiency	Collector-drainage network characteristics									
			specific extent, m/ha	hr, m	B, m	q, l/sec/ha	D hor, m^3/ha	C hor, g/l	vertical drains number	Q в, l/sec	drainage outflow, m^3/ha per year	effluent salinity, g/l
0.3.1 Kyr.	84	concrete flumes	-	3,5-4,0	-	0,05-0,07	1 480-2 220	1,98-3,8	-	-	-	-

Explanations:

hг - horizontal drains depth, m

B - distance between drains, m

q - drain specific yield, l/s/ha

D hor - drainage outflow, m^3/ha

C hor - drainage effluent salinity, g/l

Qв - vertical drain discharge, l/sec

Table 3.5

Test conditions for drainage water in-contour utilization

Direction and theme code	Conditions of drainage water utilization	Used water salinity, g/l	Assessment of water quality according to existing classifications	Control version water salinity, g/l	Limits of groundwater level regulation, m		Actual irrigation regime under drainage water utilization				
					max	min	number of irrigations	irrigation depth, m^3/ha	irrigation norms for vegetation, m^3/ha	autumn-winter leaching and mois-ture recharge irrigation norms, m^3/ha	annual water supply, m^3/ha
UZBEKISTAN											
03.1. Uz.	Laboratorial test in tubes	2,0-16,0	from good to bad	distilled	-	-	-	-	8 680	-	8 680
03.2. Uz.	Plots, F=25 m^3	2,0-5,6	SAR=2,1-10,6 no danger	ditch water 0,6-1,0	-	-	3-6	400-3 200	3 000-8 400	-	3 000 - 8 400
03.3. Uz.	Fields, F=5-12 ha, cotton irrigation	2,1-3,10	satisfactory	0,4-0,64	2,25	1,0	1-6	500-1 800	3 600-6 900	1 500-6 440	5 100 - 13340
03.4. Uz.	Fields,	0,8-2,0	good	0,4-1,0	2,0	0,6	1,0-6,0	700-6 400	3 600-6 400	1 500-6 400	5 100 - 12 840
03.5. Uz.	Fields, F=102 ha, cotton irrigation.	2,2-4,4	SAR=2-8 no danger	0,5-0,9	2,5	1,2	5-6	660-2 000	5 900-7 900	2 000-3 400	7 650 - 11 500

Direction and theme code	Conditions of drainage water utilization	Used water salinity, g/l	Assessment of water quality according to existing classifications	Control version water salinity, g/l	Limits of groundwater level regulation, m		Actual irrigation regime under drainage water utilization				
					max	min	number of irrigations	irrigation depth, m^3/ha	irrigation norms for vegetation, m^3/ha	autumn-winter leaching and mois-ture recharge irrigation norms, m^3/ha	annual water supply, m^3/ha
03.6. Uz.	Fields and laboratorial. Collector Shuruzyak water treatment	2-5	-	-	2,5	1,5	-	-	-	-	-
03.7. Uz.	Fields F=27 ha.	3,0-7,0	satisfactory and bad	0,7-1,0	3,5	2,0	3	1 000-1 630	4 010	2 000-2 500	6 000 - 6 500
TURKMENISTAN											
03.1.Tur.	Plots F=2 000 м^3 cotton	2,1-2,8	satisfactory	0,5-0,6	2,5	2,0	12	600-800	8750	moisture recharge irrigation by fresh water 1 000	9 750
03.2.Tur	Fields F=24 ha cotton irrigation by magneto-activated water	2,0-3,0	satisfactory	0,73-1,4	3,5	2,4	7	620-900	6 370-7 290	moisture recharge irrigation N=2 500-3 000	8 870 - 10290
KAZAKHSTAN											

Direction and theme code	Conditions of drainage water utilization	Used water salinity, g/l	Assessment of water quality according to existing classifications	Control version water salinity, g/l	Limits of groundwater level regulation, m		Actual irrigation regime under drainage water utilization				
					max	min	number of irrigations	irrigation depth, m^3/ha	irrigation norms for vegetation, m^3/ha	autumn-winter leaching and mois-ture recharge irrigation norms, m^3/ha	annual water supply, m^3/ha
03.1.Kaz.	Fields F=12 000 ha cotton	0,73-2,0	SAR<6 good	0,7-1,0	3,5	1,5	3-5	1 200-1 500	4 000-6 500	moisture recharge irrigation N= 1 300-1 600	5 300 - 8 100
03.2.Kaz.	Fields F=40 ha rice	2,6-3,0	satisfactory	1,0-1,4	3,0	1,5	constant water supply		20 600-25 600	-	20 600-25 600
KYRGYZSTAN											
03.1.Кирг.	Fields F=84 ha lucerne and maize	1,8-2,2	little satisfactory (includes soda)	0,42-0,49	10	6	5-8	600-1 800	maize-4 800; lucerne 7 100	-	4 800 -7100

Note: **SAR -** sodium-absorbtion coefficient, showing relation between Na^+-ion and Ca^{++} и Mg^{++}, в mg-ekv/l. If SAR < 10 - no danger of codification; SAR=10-18 -middle danger; SAR > 18 -high danger

Drainage water quality assessment was conducted by different methods according to international classification taking in to account sodium absorption coefficient (SAR).
Chemical composition assessment showed, that collector drainage water used for re-irrigation had good quality and its SAR value is 2-10. Rarely ground water was unsatisfactory, for example, drainage water of Chu valley which contains soda.
Investigations were carried out in control variants where irrigation was conducted by means of irrigation ditch by water with salinity from 0,4 to 1,4 g/l. Obtained results show, that on the pilot plots ground water table are regulated within0,6 and 2,0 m (under sub-irrigation in Fergana valley), and mainly, from 1,5 to 3,5 m, excluding Chu valley (Kyrgyzstan), where ground water depth was from 6 to 10m.