

ANNEXES TO SECTION 2

List of pilot projects, direction 2

«Study of soil water -salt regime and reclamation-ecological processes on background of subsurface drainage»

Code	№ pilot	Symbol	Authors	Location			Project title
				province	rayon	farm	
Uzbekistan							
02.7 Uz.	1		Nurtaev B.	Fergana	Buvaida	K. Marx	Study of soil water-salt regime and reclamation processes on hardly reclaimed soils of Central Fergana
02.23 Uz.	2		Belousov O.M.	Fergana	Akhunbabayev	collective farm Niyazov	Study of nutrients balance and their removal by drainage water
02.23 Uz.	3		Umarov H.U.	Fergana	Akhunbabayev	collective farm Niyazov	Study and development of technology of autumn-winter (spring) leaching, soil and ground water desalinization on background of subsurface horizontal drainage in Fergana province
02.35 Uz.	4		Baturin G.E.	Syrdarya	Sh.Rashidov	state farm N 6 Titov	Study of close horizontal drainage in state farm N 6 Titov of new zone of Golodnaya steppe
02.3 Uz.	5		Baturin G.E.	Syrdarya	Sh.Rashidov	state farm N 6 Titov	Soil leaching with close and open drainage in state farm state farm N 6 Titov of new zone of Golodnaya steppe
02.34 Uz.	6			Syrdarya	Sh.Rashidov	state farm N 5 Gagarin	Subsurface drainage in state farm N 5 Gagarin of new zone of Golodnaya steppe
02.13 Uz.	7			Syrdarya	Mekhnatabad	state farm «2 Pakhtakor»	Development of intensive technology of hardly reclaimed soil leaching
02.12 Uz.	8		Khasankhanova G.M	Syrdarya		state farm 4 and 5	Study of saline gypsum bearing soils water-salt regime in South-East Golodnaya steppe on background of perfect types of drainage
02.27 Uz.	9		Rachinsky A.A.	Syrdarya	Sh.Rashidov	state farm N 6 Titov	Study of reclamation processes in state farm N 6 Titov of new zone of Golodnaya steppe.

Code	№ pilot	Symbol	Authors	Location			Project title
				province	rayon	farm	
02.14 Uz.	10		Serebrennikov F.V.	Syrdarya	Mekhnatabad	state farm 3 A	Study of soil water -salt regime management in command zone of -Golodnaya steppe canal
02.22 Uz.	11		Gaipnazarov N	Syrdarya			Study of open drainage system workability reduction regularity and its influence on irrigated land reclamation state (old lands of Golodnaya steppe)
02.10 Uz.	12		Khasankhanovala G.M.	Kashkadarya	Karshi steppe	state farm 11	Study of strong saline soils water -salt regime in Charagil siale of Karshi steppe
02.28 Uz.	13		Nasonov V.G.	Kashkadarya	Karshi steppe		Field investigations of water-salt regime and balance of the 1-st turn of development in Karshi steppe
02.25 Uz.	14		Alimdjanov A.	Bukhara	Alat	collective farm F.Khodjaev	Field investigation of close horizontal drainage optimal parameters in Bukhara province
02.20 Uz.	15		Rachinsky A.A.	Khorezm	Yangiaryk	collective farm "Pravda"	Optimization of water use and soil water -salt regime management on background of subsurface drainage
02.29 Uz.	16		Eshchanov O.	Khorezm	Khiva	collective farm «Uzbekistan»	Close horizontal drainage in collective farm «Uzbekistan», Khorezm province
02.1 Uz.	17		Djalilova T.	Khorezm	Khanki	collective farm Navoi	Close horizontal drainage system in Khorezm province ,SANIIRI
02.8 Uz.	18		Kurbanbayev E.	Karakalpakstan	Kegeyli	state farm Halkabad	Selection of optimal parameters and study of technical-economic efficiency of close horizontal drainage in North zone of Karakalpakstan
02.26 Uz.	19		Nabiyev A.N.	Karakalpakstan	Takhtakupyr	state farm Soviet Uzbekistan	Rice irrigation system in Karakalpakstan
02.2 ' Uz.	20		Kurbanbayev E.	Karakalpakstan	Kegeyli	Чимбайский	Study of efficiency and water -salt regime management in irrigation -drainage system in North zone of Karakalpakstan
02.16 Uz.	21		Ramazanov A.	Karakalpakstan	Chimbay	state farm «Oktobor»	Study of water -salt regime and indicators of irrigation -reclamation network workability under rice
Tadjikistan							
02.1 Tad	1		Davlyatov D.I. Rakhmanov B.	Leninabad	Isfara		Grounding of reclamation measures on reclamation-ecological state of land im-

Code	№ pilot	Symbol	Authors	Location			Project title
				province	rayon	farm	
							provement in farms of Isfara-Lyakan valley
02.2 Tad	2		Aliyev I.S. Tursunov D.	Leninabad	Khodjit	Chkalov massif	Development of technologies for land reclamation regime regulation using drainage and soil leaching under prop from Kay-rakkum reservoir
02.3 Tad	3		Davlyatov D.I. Rakhmanov B.	Leninabad	Isfara		Study and development of different types of drainage for soil desalinization and salinization prevention utilizing return water
02.4 Tad	4		Davlyatov D.I. Rakhmanov B.	Khatlon	Dangara		Pre-development land desalinization utilizing precipitation on background of subsurface drainage
02.5 Tad	5		Davlyatov D.I. Rakhmanov B.	Khatlon	Kolkhozabad	state farm 40-year of October	Making more precise drainage parameters on strongly saline soils
02.6 Tad	6		Davlyatov D.I. Rakhmanov B.	Khatlon	Gazitalak	state farm XX Partsiezd	Study of drainage parameters in order to optimize soil water -salt regime
02.7 Tad	7		Olimov Kh.	Khatlon	Yavan valley		Study and prediction of soil water -salt regime and unsaturated zone infiltration
02.8 Tad	8		Aliev I.	Khatlon	Bokhtar	collective farm «Safarov»	Study of vertical drainage efficiency for ground water withdrawal from saline lands (Karalan massif, Vakhsh valley)
Turkmenistan							
02.1 Turk.	1		Kalantayev V.A.	Chardjou	Chardjou	collective farm Ilichevsk	Effectiveness of deep drainage without slope and with flooded mouth
02.2 Turk.	2		Kalantayev V.A.	Chardjou	Chardjou	collective farm «Leningrad»	Study of existing collector-drainage network efficiency, development of measures on its improvement
Kazakhstan							
02.2 Kaz.	1		Vyshpolsky F.F.	South-Kazakhstan	Bugun	state farm «Timirazev»	Improvement of water use and water-salt regime management on background of horizontal drainage
02.4 Kaz.	2		Vyshpolsky F.F.	South-Kazakhstan	Bugun	state farm Timiryazev and Isakhanov	Improvement of water use soil desalinization on background of horizontal drainage (2 plots)
02.6 Kyrg.	3		Magay S.D.	South-Kazakhstan	Shardara	state farm «Komsomol»	Soil water-salt regime management on rice fields on background of horizontal drainage

Code	№ pilot	Symbol	Authors	Location			Project title
				province	rayon	farm	
Kyrgyzstan							
02.5 Kyrg.	1		Duyunov I.K.	Chu	Moscow	state farm Besh-Terek	Leaching through flooded rice on background of permanent horizontal drainage in combination with or without provisional one
02.3 Kyrg.	2		Duyunov I.K.	Chu	Moscow	state farm Besh-Terek	Development of leached lands under sprinkler irrigation (ДДН -70, ДДА-100 and ДА-3)on background of permanent horizontal drainage.
02.2 Kyrg.	3		Duyunov I.K.	Chu	Panfilov	state farm Kel-eчек	Development of soil desalinization process technology on background of drainage and crops-developers (lucerne and sugar beet) irrigation

List of pilot projects, direction - II
 «Study of soil water -salt regime and reclamation-ecological processes on background drainage system»

Code	##	Symbol	Location			Author	Topic title
			province	district	farm		
<u>Syrdarya basin</u>							
<u>Upper reaches</u>							
<u>Objects in Uzbekistan</u>							
02.17. Uz.	17		Fergana	Kuva	all district	Sh.Mukhamedj anov	Vertical drainage system, Fergana province
02.24. Uz.	24		Fergana	Besharyk	collective farm Yakkatut	T.Bekmuratov	Vertical drainage efficiency on saline lands of West Fergana; definition of main parameters of vertical drainage under joint operation of vertical and horizontal drainage
02.33. Uz.	33		Fergana	Besharyk	collective farm Besharyk	A.Usmanov	Soil water-salt regime management in zone of groundwater seepage on background of vertical drainage with abstracted water used for irrigation
<u>Objects in Kyrgyzstan</u>							
02.1. Kyr. Conditionally enclosed in Syrdarya ba-	1		Chu	Panfilov	collective farm Choldovor	I.Duyunov	Study of soil water-salt regime under sprinkler irrigation by DM FREGAT and DA ROSA-3 on background of joint operation of vertical and horizontal drainage

Code	# #	Symbol	Location			Author	Topic title
			province	district	farm		

sin

02.2. Kyr. Conditionally enclosed in Syrdarya ba- sin	2		Chu valley	Moscow, Sokuluk	-	R.Litvak	Development of rational schemes of vertical drainage on Atbashy area by means of geo-filtration
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Syrdarya middle reaches

Objects in Uzbekistan

02.4. Uz.	4		Syrdarya	Dustlik	state farm # 17	N.Kalyuzhnaya	Study of systematic vertical drainage in state farm # 17, Golodnaya steppe
02.18. Uz.	18		Syrdarya	Gulistan	collective farm Navoi	A.Abirov	Study of reclamation efficiency of vertical drainage system on Shuruzyak massif
02.19. Uz.	19		Syrdarya	Soikhunabad	collective farm Socializm	O.Belousov, Kh.Yakubov	Study of hardly reclaimed soil water-salt regime management by autumn-winter leaching and leaching irrigation regime
02.27. Uz.	27		Syrdarya	Shuruzyk and Bayaut sys- tems	Large massifs of vertical drainage system	G.Eremenko	Study of soil reclamation regime on large massifs on background of vertical drainage
02.30. Uz.	30		Syrdarya	all province	large massifs	N.Gaipnazarov	Study of dynamics of meliorative processes and crops yield for long-term period on large massifs of Syrdarya province
02.36. Uz.	36		Golodnaya	Oll oblast	large massifs	N.Reshetkina	Study and development of irrigated lands

Code	# #	Symbol	Location			Author	Topic title
			province	district	farm		
			steppe				water-salt regime management by vertical drainage
02.37. Uz.	37	Syrdarya			state farm 50 years of Uzbekistan	N.Reshetkina	Study of technical-economic effectiveness of vertical drainage system in Golodnaya steppe
			<u>Uzbek objects in Kazakhstan</u>				
02.11. Uz.	11	Chymkent	Pakhtaaral		all large systems	N.Gaipnazarov	Study of vertical drainage operation regime management for stabilization of reclamation-ecological processes on irrigation massifs (1977-1989)
02.12. Uz.	12	Chymkent	North-West part of Golodnaya steppe		large systems	A.Spizin	Study of reclamation regime and water-salt balance management in North-West part of Golodnaya steppe.
02.13. Uz.	13	Chymkent	Djetisay		collective farm «Lenin»	N.Zainutdinov.	Study of technical-economic effectiveness of vertical drainage system with linear wells distribution in collective farm «Lenin» Djetisay
02.14. Uz.	14	Chymkent	Arus-Tyrkistan massif		large system	M.Djuraev	Study and development of set of measures on perfection of vertical drainage operation and improvement of irrigated lands water availability under scarce water resources.
02.7.Uz.	7	Chymkent	Pahtaaral		Pahtaaral farm	N.Reshetkina	Study and irrigated lands water balance and water-salt regime management under conditions of artesian ground water (1960-1975).

Code	# #	Symbol	Location			Author	Topic title
			province	district	farm		
02.9. Uz.	9		Chymkent	Djetisay	large system	R. Ikramov, Sh. Yusupov.	Irrigated lands water-salt regime and vertical drainage operation management.
				<u>Objects in Kazakhstan</u>			
02.1. Kaz.	1		Chymkent	Turkistan	state farm "Ican"	F. Vyshpolsky	Normalization of water consumption and water disposal on base of vertical drainage operation optimization.
02.2. Kaz.	2		Chymkent	Turkestan	collective farm «Kommunizm»	F.Vyshpolsky	Improvement of water use and soil water-salt regime management on background of vertical drainage
				<u>Syrdarya low reaches</u>			
				<u>Objects in Uzbekistan</u>			
02.8. Uz.	8		Chymkent	Kyzylkum massif	large system	R. Ikramov, Sh. Yusupov	Irrigated lands water-salt regime and vertical drainage system operation management on rice systems of Kyzylkum massif
02.10. Uz.	10		Chymkent	Kyzylkum massif	state farm "Dostyk"	G.Yuldashev M.Djuraev	Study of vertical drainage reclamation effectiveness in rice-cotton complex of Kyzylkum massif on hardly reclaimed lands.
				<u>Objects in Kazakhstan</u>			
02.3. Kaz	3		Chymkent	Kyzylkum massif	state farm "Kyzylkum"	S.Magay	Rice fields soil water-salt regime management on background of vertical drainage

Code	# #	Symbol	Location			Author	Topic title
			province	district	farm		

Amudarya basin

Upper reaches

Objects in Tadjikistan

02.1. Tad.	1	Vakhsh valley Khatlon	Bokhtar	collective farm Safarov	I.Aliyev	Study of vertical drainage effectiveness for groundwater withdrawal from irrigated lands (Karalang massif, Vakhsh valley)
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Middle reaches

Objects of Uzbekistan

02.31. Uz.	31	Bukhara	large systems	large systems	N.Reshetkina	Study of soil water-salt regime and reclamation-ecological processes management on background of vertical drainage in Zerafshan delta
02.40. Uz.	40	Syrdarya, Fergana, Bukhara and Chymkent			S.Soyfer	Study of abstracted water salinity and chemical composition changes regularity in process of its use for irrigation
02.42. Uz.	42	Golodnaya steppe - Uzbekistan and Kazakhstan			E.Djanaliyev	Study of active zone of salt stock formation and their influence on desalinization process and drainage effluent chemical composition

Appendix 2.1

List of pilot projects on subsurface drainage (direction 02.02)

Plot №№	Country	Drainable zone	Project code	Project title	Location	Geomorphologic-hydrogeological characteristics					Soil-meliorative characteristics			
						geomorphologic belonging	lithology	permeability coefficient, m/day	ground water table, m	water salinity, g/l (C ₀)	soil types on mechanical composition	salinity		
												salinity degree	salinity type	
Syrdarya basin														
1.	Uzbekistan	Fergana	02.7 Uz.	Study of hardly reclaimed soils water-salt regime and meliorative processes management in Central Fergana	Fergana province, Buvida district, c/f K.Marx area 97,0 ha	Plane made of Golodno stepsky and Syrdaryadarinsky complexes of Syrdarya I,II terraces over flood plain	Top soil, M=15 m, aquifer, M=5-15 m.	0,01-0,2	1-1,8	5-38	light, middle and heavy loam	medium and strongly saline	sulfate	
2.	Uzbekistan	Fergana	02.23 Uz.	Study of nutrients balance and their removal by drainage water	Fergana province, Akhunbayev district, c/f "Niyazov"	weakly corrugated plane	quaternary deposits. top soil-2,5 m underlaid by coarse-grained sand-13,5 m, gravel with sand-22,0 m	0,3-0,6 layer 0,1-0,05	1,4-2,5	5-10	middle and light loam	medium and slightly saline	chloride-sulfate	

Plot №№	Country	Drainable zone	Project code	Project title	Location	Geomorphologic-hydrogeological characteristics					Soil-meliorative characteristics		
						geomorphologic belonging	lithology	permeability coefficient, m/day	ground water table, m	water salinity, g/l (C ₀)	soil types on mechanical composition	salinity	
												salinity degree	salinity type
3.	Uzbekistan	Fergana	02.23 Uz.	Study of autumn-winter-spring leaching technology, soil and ground water desalination on background of subsurface horizontal drainage in Fergana province	Fergana province Akhunbayev district, c/f "Niyazov" area 6,12 ha	Relief weakly corrugated single between Soch and Shahimardan cones, i=0,0025	loam interlaying with sand 30-60 m loam-0-2,5m, coarse-grained sand 13,5m, gravel with sand-22m, loam interlaying with sand-38-60m	0,3-0,6 (0,1-0,05) inter layer	2-2,4	4-45 on chlorine	light and middle loam	slightly and medium saline	sulfate-chloride
4.	Tadjikistan	Fergana	02.1 Tad.	grounding of reclamation measures on	Leninabad province, Isfara district, area-	Plane, altitude 800m	clay-3-9m, gravel-30m,	0,1	1-2,0	1,2-5,0	middle and heavy loam	from slightly to medium	-

Plot №№	Country	Drainable zone	Project code	Project title	Location	Geomorphologic-hydrogeological characteristics					Soil-meliorative characteristics		
						geomorphologic belonging	lithology	permeability coefficient, m/day	ground water table, m	water salinity, g/l (C ₀)	soil types on mechanical composition	salinity	
												salinity degree	salinity type
5.	Kyrgyzstan	Fergana	02,5 Kyrg.	ecological-meliorative state of land improvement in Isfara-Lyakan. leaching through flooded rice on background of permanent horizontal drainage combined with provisional one and without it	20ha Chu province, Moscow district, s/f Besh-Terek, area-25,76 ha	Proluvial-alluvial plane	Top soil - - 20m, light, middle and heavy loam	-	0-3,0	10-15 less 2-5	grey-meadow	strongly saline and salt	sulfate-calcium-sodium
6.	Kyrgyzstan	Fergana	02,5 Kyrg.	Development of leached land under sprinkler	Chu province, Moscow district, s/f Besh-	Proluvial-alluvial deposits	Quaternary deposits- 20m: light, middle and heavy loam	-	1,8-2,9	3,0-30,0	Grey meadow	From slightly to strongly saline	Sulfate-sodic

Plot №№	Country	Drainable zone	Project code	Project title	Location	Geomorphologic-hydrogeological characteristics					Soil-meliorative characteristics		
						geomorphologic belonging	lithology	permeability coefficient, m/day	ground water table, m	water salinity, g/l (C ₀)	soil types on mechanical composition	salinity	
												salinity degree	salinity type
				irrigation (ДДН-70, ДДА-100, ДА-rosa 3) on background of permanent horizontal drainage	Terek, area 17,6 ha		interlaying with sandy loam and sand						
7.	Kyrgyzstan	Fergana	02,5 Kyrg.	To develop technology for soil desalinization on background of drainage and irrigation of crops-developpers (lucerne and sugar beet) "DM Cuban"	Chu province, Panfilov district, s/f Kelechek, area 12,48 ha	Proluvial-alluvial plane	-		2,5-3,0	-	Middle and heavy loam, meadow grey	From non-saline to strongly saline	Sulfate with high gypsum concentration i.e. sodic
8.	Uzbe-	Golod-	02.35	Subsurface	Syrdarya	Proluvial	Thin	0,24-	3,5-	12-25	Light	slightly	Chlori

Plot №№	Country	Drainable zone	Project code	Project title	Location	Geomorphologic-hydrogeological characteristics					Soil-meliorative characteristics		
						geomorphologic belonging	lithology	permeability coefficient, m/day	ground water table, m	water salinity, g/l (C ₀)	soil types on mechanical composition	salinity	
												salinity degree	salinity type
	kistan	naya steppe	Uz.	drainage in s/f N 6 "Titov" of new zone of Golodnaya steppe	province, Sh. Rashidov district, s/f N 6 "Titov", area-60, 150, 200 ha	plane of Golodno-steppe plateau	grained deposits 100-200m	0,35	2,0, after 2,3-2,8		and middle loam, sandy loam	saline	-desulfate
9.	Uzbekistan	Golodnaya steppe	02.3 Uz.	Pilot plots on land leaching with systems of close and open drainage in s/f N 6 "Titov"	Syrdarya province, Sh. Rashidov district, area-25; 29; 50 ha	Plain relief	middle loam with gypsum inter layers on depth of 0,2-0,6m	0,15-0,25; 0,01-0,06	1,6-2,8	24-42	Grey meadow	Spotty saline	Chloride-sulfate, seldom sulfate-chloride
10.	Uzbekistan	Golodnaya steppe	02.34 Uz.	Pilot plot of close horizontal drainage in s/f N 5 "Gagarin" of new	Syrdarya province, Sh. Rashidov district, area-78 ha		Inter laying loam, clay and sandy loam-60 m	Layer: <u>0-1m</u> 0,03-0,06 <u>1-4 m</u> 0,06-0,12	-	40-60	grey-meadow middle and heavy loam	Strongly saline high gypsum content	chloride sulfate seldom sulfate

Plot No.	Country	Drainable zone	Project code	Project title	Location	Geomorphologic-hydrogeological characteristics					Soil-meliorative characteristics		
						geomorphologic belonging	lithology	permeability coefficient, m/day	ground water table, m	water salinity, g/l (C ₀)	soil types on mechanical composition	salinity	
												salinity degree	salinity type
11.	Uzbekistan	Golodnaya steppe	02.13 Uz.	Development of hardly reclaimed lands leaching technology zone of Golodnaya steppe	Syrdarya province, Mehnat district, s/f N 2 "Pah-takor", area-160 ha	Alluvial-proluvial plane, i=0,001-0,005	inter laying loam, sand, sandy loam, clay	-	3-5 m	5-8 m	Light, middle and heavy loam	initial very strongly saline	fate-chloride
12.	Uzbekistan	Golodnaya steppe	02.12 Uz.	Study of saline gypsum bearing soils water-salt regime on background of perfect types of drainage in South-East part of Golodnaya	Syrdarya province, s/f NN 4 and 5 area-110 ha (70+40)	Plane	Quaternary deposits, inter laying loam, sandy loam and clay 100 m	0,05-1,6	1,5-3,5	15-40	Light and middle loam	Strongly and very strongly saline	

Plot №№	Country	Drainable zone	Project code	Project title	Location	Geomorphologic-hydrogeological characteristics					Soil-meliorative characteristics		
						geomorphologic belonging	lithology	permeability coefficient, m/day	ground water table, m	water salinity, g/l (C ₀)	soil types on mechanical composition	salinity	
												salinity degree	salinity type
13.	Uzbekistan	Golodnaya steppe	02.27 Uz.	steppe Study of reclamation processes in s/f N 6 "Titov" of new zone irrigation	Syrdarya province, Sh. Rashdov district, area 11-912 ha	Foothills - plane of Golodnaya steppe plateau, Djizak cone i=0,004	Thin-grained deposits 100-200 m (sand-clay categories)	0,1-0,6	<3P	20-50	Sandy loam, light and middle loam	salt	Chloride-sulfate
14.	Uzbekistan	Golodnaya steppe	02.14 Uz.	soil water-salt regime management in zone of artesian waters and South-Golodnosteppsky canal command zone	Syrdarya province, Mehnatabad district, s/f N 3a, area 8218 ha	Alluvial-proluvial plane i=0,004-0.005	inter laying loam, sandy loam, sand and clay	-	1-5	10-60	Light and middle loam	72,5% of land is strongly saline	Sulfate-chloride and chloride-sulfate
15.	Uzbekistan	Golodnaya steppe	02.22 Uz.	Study of open drainage workability decrease regu-	Syrdarya province, area-223, 660 ha	proluvial plane	-	Loam 0,1-0,2-0,4-0,6 sandy loam	1,5-2,0 -3-4	1-3 m-3-5 sel-dom 5-1-	grey-meadow	light and medium	Sulfate-chloride and

Plot No.	Country	Drainable zone	Project code	Project title	Location	Geomorphologic-hydrogeological characteristics					Soil-meliorative characteristics		
						geomorphologic belonging	lithology	permeability coefficient, m/day	ground water table, m	water salinity, g/l (C ₀)	soil types on mechanical composition	salinity	
												salinity degree	salinity type
				larity and its influence on land reclamation state (old irrigated zone of Golodnaya steppe)			0,4-0,6-0,8-1,0 sand			some where up to 15-20 m		saline	chloride-sulfate
16.	Kazakhstan		02.2 Kaz.	Improvement of water use and soil water-salt regime management on background of horizontal drainage	South-Kazakhstan province, Bugun district, s/f "Timiryzev" and "Isahanov", area 135 ha	Plane	Top-soil 8-15 m, heavy, middle and light loam under laid by gravel deposits	0,35-0,8	2,0-3,5	6,0-15,5	Light, middle and heavy loam	slightly and medium saline	
17.	Kazakhstan		02.4 Kaz.	Soil water salt regime management on	South-Kazakhstan province,	Alluvial plane	Top-soil 10-17 m, loess loam under laid by	0,3-0,6 - 1,7	1,5-3,0	7-14	Heavy and middle loam	strongly saline	Chloride-sulfate

Plot No.	Country	Drainable zone	Project code	Project title	Location	Geomorphologic-hydrogeological characteristics					Soil-meliorative characteristics		
						geomorphologic belonging	lithology	permeability coefficient, m/day	ground water table, m	water salinity, g/l (C ₀)	soil types on mechanical composition	salinity	
												salinity degree	salinity type
				rice field on background drainage	Bugun district, s/f "Timiryzev" and "Isahonov", area 135 ha		gravel-pebble deposits						
18.	Kazakhstan		02.6 Kaz.	Soil water salt regime management on rice field on background of drainage	South-Kazakhstan province, Shardara district, s/f "Komso-mol" area-180 ha	Plane	Two-layer thin-grained deposits 2,1m; loam, sand up to 60m	0,37-1,35-1,45	4-5	4,4	meadow-grey Light, middle and heavy loam	strongly saline	Chloride-sulfate
19.	Tadjikistan	Amudarya upper reaches	02.4 Tad.	Study of advanced land desalination using precipitation	Khatlon province, Dangara district, area-400 ha	Plain proluvial plane	Loam interlaying with clay, sandy loam and sand	0.1-0,2	0-2	15-20	meadow-grey, heavy loam	strongly saline	sulfate chloride

Plot No№	Country	Drainable zone	Project code	Project title	Location	Geomorphologic-hydrogeological characteristics					Soil-meliorative characteristics		
						geomorphologic belonging	lithology	permeability coefficient, m/day	ground water table, m	water salinity, g/l (C ₀)	soil types on mechanical composition	salinity	
												salinity degree	salinity type
20.	Tadji-kistan	Amuda-rya upper reaches	02.6 Tad.	Study of drainage parameters in order to optimize soil water-salt regime on background of subsurface horizontal drainage	Khatlon province Gazimalan district, s/f "XX Part-syezd", area-70 ha	slightly corrugated plane, altitude 519-570	Alluvial loam	0,59-1,23	1,0-1,5	4-5	Loam	non-saline	Sulfate-chloride
21.	Tadji-kistan	Amuda-rya upper reaches	02.5 Tad.	Study of drainage parameters on water logged and saline thick sandy loam soils	Khatlon province, Kolkhozabad district, s/f "40 years of October", area-40 ha	Plane, altitude 370-390 m	Loess sandy loam and loam	0,03-1,25	1,1-2,5	1,2-5,2	Light grey soils, sandy loam and loam	Non-saline	-
22.	Tadji-kistan	Amuda-rya upper reaches	02.7 Tad.	Study and prediction of soil water-salt re-	Yavan valley, area-26 000 ha	Tectonic sink, slightly corrugated,	Loess deposits, heavy loam, thickness	0,02-0,2	1-3 to 40-60	3-12 5-30	Loam, sandy loam	Medium and strongl	Sulfate-magnesi-

Plot №№	Country	Drainable zone	Project code	Project title	Location	Geomorphologic-hydrogeological characteristics					Soil-meliorative characteristics		
						geomorphologic belonging	lithology	permeability coefficient, m/day	ground water table, m	water salinity, g/l (C ₀)	soil types on mechanical composition	salinity	
												salinity degree	salinity type
				gime and infiltration to unsaturated zone		altitude 500-700 m	20-30 m					y saline	sium-sodium
23.	Uzbekistan	Bukhara-Karshy	02.10 Uz.	Amudarya basin, study of strongly saline soil water-salt regime of Charagil sink, Karshy steppe	Kashkadya province, Karshy steppe, s/f N11, area- 50 ha	Alluvial plane of Kashkadya river	Loam interlaying with clay, 3 m	-	-	-	Light, middle and heavy loam		
24.	Uzbekistan	Bukhara-Karshy	02.28 Uz.	Field investigations of water-salt regime and balance of 1-Study turn of Karshy steppe development	Kashkadya province, area - 145 000 ha	Alluvial-proluvial plane of Kashkadya river	Fine-grained deposits, n=2-20 m underground by sand, sandy loam, clay, m=20-60 m	0,4	Before > 5 after 1-2, 2-3 m	1-16-25	Loam, sandy loam	70% of area is non-saline and slightly saline (before development)	

Plot №№	Country	Drainable zone	Project code	Project title	Location	Geomorphologic-hydrogeological characteristics					Soil-meliorative characteristics		
						geomorphologic belonging	lithology	permeability coefficient, m/day	ground water table, m	water salinity, g/l (C ₀)	soil types on mechanical composition	salinity	
												salinity degree	salinity type
25.	Uzbekistan	Bukhara-Karshy	02.25 Uz.	Field investigations of subsurface drainage optimal parameters in Bukhara province	Bukhara province, Alat district, c/f "Khodjayev", area 250 ha	Zerafshan 2-nd continental delta, i=0,0002-0,0003	Sandy loam, clay up to 10 m	0,12-0,3 0,5-3,0	1,6-2,8	4-60 2-15	light, middle and heavy loam, clay	non-saline, medium saline and strongly saline	-
26.	Turkmenistan		02.1 Turk.	Deep without slope drainage with flooded mouth effectiveness	Chardjou province, c/f "Ilich", area-49,5 ha	Modern deposits of Amudarya, loam clay, sandy loam 30 m	Fine-grained deposits, 1,8-2,2 m; sand 27-30 m	1,0	1,6-3,0	1,0-10,0	Heavy and middle loam	slightly saline	Sulfate sodium-calcium
27.	Turkmenistan		02.2 Turk.	Assessment of evaluation collector-drainage network efficiency to develop measures	Chardjou province, c/f Leninograd, area-2 000 ha	Modern deposits of Amudarya, loam clay, sandy loam up to 50 m	Fine-grained deposits 1,5-2,5 m under laid by coarse-grained sand up to 30-50 m	1,0	1,2-2,5	5,0	Loam, sandy loam	Medium and strongly saline	Chloride-sulfate

Plot No.	Country	Drainable zone	Project code	Project title	Location	Geomorphologic-hydrogeological characteristics					Soil-meliorative characteristics		
						geomorphologic belonging	lithology	permeability coefficient, m/day	ground water table, m	water salinity, g/l (C ₀)	soil types on mechanical composition	salinity	
												salinity degree	salinity type
28.	Uzbekistan	Amudarya lower reaches	02.20 Uz.	Optimization of water use and soil water-salt regime management on background of subsurface drainage on its increase	Khorezm province, Yangiariq district, c/f "Pravda", area-303,7 ha;	Amudarya alluvial plane, i=0,0003-0,0004	Fine-grained deposits m=1,5-2,5m beneath-sand, m ₁ =1,5 m ₂ =12-40	0,14-40,0	1-2,5	5-19	Loam and clay	strongly saline and salts	-
29.	Uzbekistan	Amudarya lower reaches	02.29 Uz.	Close horizontal drainage in c/f "Uzbekistan", Khiva district, Khorezm province	Khiva district, Khorezm province c/f "Uzbekistan", area-129,6 ha	Amudarya ancient delta, i=0,0004-0,0005	Loam, sand, m=3-10 m	0,24-0,30	Before 0,9-1,2	4,71	Light, middle and heavy loam	medium and strongly saline	-
30.	Uzbekistan	Amudarya lower	02.1 Uz.	Close horizontal drainage	Khorezm province, Khanka	Ancient alluvial plane	Sandy loam, loam	0,3-0,6	0,5-1,0	4,6-15,3	Sandy loam, light	from non-saline	Sulfate-chlo-

Plot No.	Country	Drainable zone	Project code	Project title	Location	Geomorphologic-hydrogeological characteristics					Soil-meliorative characteristics		
						geomorphologic belonging	lithology	permeability coefficient, m/day	ground water table, m	water salinity, g/l (C ₀)	soil types on mechanical composition	salinity	
												salinity degree	salinity type
		reaches		system in Khorezm province, SANIIRI	district, c/f "Navoy", area-214 ha	i=0,0003					loam, clay	to strongly saline and salt	ride
31.	Uzbekistan	Amudarya lower reaches	02.8 Uz.	Selection of close horizontal drainage optimal parameters in Northern zone of Karakalpakstan	Karakalpakstan, Kageily province, c/f "Khalkabad", area-160 ha	Multi layer and two-layer quaternary deposits	Fine-grained deposits, m=2-10 m, sand m=10-15 m	0,05-1,0	1,5-3,0	5-20	Sandy loam, loam, sand	strongly saline and salt	chloride-Sulfate
32.	Uzbekistan	Amudarya lower reaches	02.26 Uz.	Rice irrigation system in Karakalpakstan	Karakalpakstan, Takhtakupir district, s/f "Soviet Uzbekistan", area -145 ha	Amudarya plain delta, i=0,0003-0,0001	Fine-grained deposits, m ₁ =1,5-2,5, loam and clay	0,02-0,35	1,3-2,5	2,8-12,7	Light, middle loam, clay	From slightly strongly saline	Sulfate-chloride, chloride-sulfate
33.		Amuda	02.2	Study of	Karakal-	Alluvial	Multi-layer	0,05-1,5	1,9-2,3	4,0-	-	75% of	-

Plot №№	Country	Drainable zone	Project code	Project title	Location	Geomorphologic-hydrogeological characteristics					Soil-meliorative characteristics		
						geomorphologic belonging	lithology	permeability coefficient, m/day	ground water table, m	water salinity, g/l (C ₀)	soil types on mechanical composition	salinity	
												salinity degree	salinity type
	bekistan	-rya lower reaches	Uz.	effectiveness of existing irrigation - drainage systems soil water-salt regime and ecological-reclamation processes management in Northern zone of Karakalpakstan	pakstan, Kegeily and Chimbay district, area- 26500 ha	quaternary deposits, i=0,0003	deposits			25,0		area is strongly saline	
34.	Uzbekistan	Amudarya lower reaches	02.16 Uz.	Study of rice irrigation systems soil water-salt regime and operation indicators	Karakalpakstan, Chimbay district, s/f "October", area 45 ha	Aral delta	side Clay, loam, sandy loam, sand	-	3-5 5-10	18- 44,6	Light, middle loam, sand	strongly saline	-

Climatic conditions of the pilot projects on vertical drainage

Plot No	Plot's index	Location	Sum of effective temperatures, C°	Average annual precipitation, mm	Evaporability, mm	Moistening coefficient	Relative air humidity, %	Average annual air temperature, C°
<u>Syrdarya upper reaches</u>								
<u>Objects of Uzbekistan</u>								
1	02.17. Uz.	Fergana valley, Kuva district	4030-4090	160-200	1800-2000	0.08-0.11	44-70	13.8-14.1
2	02.24. Uz.	Fergana province, Besharyk district	4000-4100	97-124	1450-1500	0.06-0.08	64	13.6
3	02.33. Uz.	Fergana province, Besharyk district	4000-4100	97-124	1450-1500	0.06-0.08	64	13.6
<u>Objects of Kyrgyzstan</u>								
4	02.1. Kyr.	Chu province, Panfilov district	3600	382	1020-1170	0.33	64.2	8.9-9.1
5	02.2. Kyr.	Chu valley, Moscow, Sokuluk, Alamedin districts	3600	383	1020-1170	0.33	64.2	8.9-9.1

Syrdarya middle reaches

Plot No	Plot's index	Location	Sum of effective temperatures, C°	Average annual precipitation, mm	Evaporability, mm	Moistening coefficient	Relative air humidity, %	Average annual air temperature, C°
<u>Objects of Uzbekistan</u>								
6	02.4. Uz.	Syrdarya province, Dustlik district, state farm № 17	4000-4100	250-300	1420-1700	0.14-0.18	55-75	13-14
7	02.18. Uz.	Syrdarya province, Gulistan district	4000-4100	250-350	1420-1700	0.14-0.19	55-60	12.5-13.0
8	02.19. Uz.	Syrdarya province, state farm Socializm	4300-4400	324	1217	0.26	66	13.4
9	02.27. Uz.	Syrdarya province, Bayaut and Shuruzyak massifs	4000-4100	250-300	1200-1600	0.14-0.19	60-65	12.5-13.0
10	02.30. Uz.	Syrdarya province	4300-4400	300-340	1090-1150	0.26-0.29	50-65	12.9-14.9
11	02.36. Uz.	Golodnaya steppe	4000-4100	202-425	1500	0.13-0.28	55-65	12.5-13.0
12	02.37. Uz.	Syrdarya province, state farm 50 years of Uzbekistan	4000-4100	250-350	1120-1280	0.19-0.27	55-60	12.5-13.0
<u>Objects of Uzbekistan in Kazakhstan</u>								
13	02.11. Uz.	Chymkent province, Pakhtaaral district	4000-4100	260-300	1200-1500	0.17-0.20	55-60	12.5-13.5
14	02.12. Uz.	Chymkent province,	4000-4100	250-350	1200-1600	0.16-0.21	55-60	12.5-13.5

Plot No	Plot's index	Location	Sum of effective temperatures, C°	Average annual precipitation, mm	Evaporability, mm	Moistening coefficient	Relative air humidity, %	Average annual air temperature, C°
North-West part of Golodnaya steppe								
15	02.13. Uz.	Chymkent province, Djetysay district, collective farm Lenin	4000-4100	250-350	1200-1500	0.17-0.20	55-60	12.5-13.5
16	02.14. Uz.	Chymkent province, Arys-Turkestan massif	4000-4100	188-215	1200-1500	0.12-0.14	55	12.1
17	02.7. Uz.	Chymkent province, state farm Pakhtaaral	4000-4100	250-350	1120-1280	0/19-0/27	55-60	12.0
18	02.9. Uz.	Chymkent province, Djetysay and Kirov districts	4000-4150	240-360	1150-1360	0.17-0.26	63	12.8-13.8
<u>Objects of Kazakhstan</u>								
19	02.1. Kaz.	Chymkent province, Turkestan district, state farm Ikan	4000-4100	150-250	1200-1400	0.11-0.18	50-60	13-15
20	02.2. Kaz.	Chymkent province, Turkestan district, state farm Kommunizm	4000-4100	150-220	1200-1400	0.11-0.17	50-60	13-15
<u>Syrdarya low reaches</u>								
<u>Objects of Uzbekistan</u>								

Plot No	Plot's index	Location	Sum of effective temperatures, C°	Average annual precipitation, mm	Evaporability, mm	Moistening coefficient	Relative air humidity, %	Average annual air temperature, C°
21	02.8. Uz.	Chymkent province, Kyzylkum massif	4100-4400	136-330	1040-1080	0.13-0.30	63-65	12.5-15.2
22	02.10. Uz.	Chymkent province, Kyzylkum massif	4150-4590	160-255	1240-1480	0.11-0.17	63-65	12.5-15.2
<u>Object of Kazakhstan</u>								
23	02.3. Kaz.	Chymkent province, Shardara district, state farm Kyzylkum	4600-4800	165-210	1240-1480	0.11-0.14	54-57	11.7-12.0
<u>Amudarya basin</u>								
<u>Upper reaches</u>								
<u>Objects of Tadjikistan</u>								
24	02.1. Tad.	Vakhsh valley, Khatlon province, Bokhtar district	5500-6000	290	1500-1600	0.18	60	15.5
<u>Amudarya middle reaches</u>								
<u>Objects of Uzbekistan</u>								
25	02.31. Uz.	Sub-aerial delta of Zarafshan, Bukhara province		125	2075	0.06	-	14.2-15.1

Plot No	Plot's index	Location	Sum of effective temperatures, C°	Average annual precipitation, mm	Evaporability, mm	Moistening coefficient	Relative air humidity, %	Average annual air temperature, C°
26	02.40. Uz.	Bukhara province, Kagan district		119	2075	0.06	-	14.2-15.1
27	02.41. Uz.				Regional objects			
28	02.42. Uz.				Regional objects			

Geomorphological-hydrogeological characteristics of the pilot projects on vertical drainage

Plot No	Plot's index	Geomorphology	Lithology	Permeability, m/day		Ground water table,	Head, m		Salinity, g/l	
				K _φ . 1	K _φ . 2		± Δ h	± g	C _o	C _r
<u>Uzbekistan</u>										
<u>Syrdarya upper reaches</u>										
1	02.17. Uz.	Hilly, slope i = 0.004-0.04	multi-layer m ₁ = 20-50 m	0.5-1.0	20-40	0.5-3.0	+1.0	-	3-5	0.5-1.0
2	02.24. Uz.	Zone of groundwater seepage and secondary submergence i = 0.0015-0.002	two-layer m ₁ = 6-18 m	0.5	12.5-22.4	1.5-2.0	+0.5	-	3-5 - 10	0.5-1.0
3	02.33. Uz.	Isfara river cone of removal i = 0.0015-0.002 slightly corrugated plane	two-layer m ₁ = 6-18 m	0.17-1.0	12.5-19.0	1.5-2.0	+0.5	-	3-5 up to 10	0.4-0.8 seldom 2.0
<u>Kyrgyzstan</u>										
4	02.1. Kyr.	Proluvial river plane in foothills i = 0.004	multi-layer m ₁ = 14-16 m	0.1-1.0	-	0-5	-	-	3-30	0.2-0.4
5	02.2. Kyr.	Alluvial-proluvial plane i = 0.005-0.02	multi-layer m ₁ = 15-25 m	0.1-1.0	-	1-2	+0.5	-	0.2-10.0	up to 1.0

Plot No	Plot's index	Geomorphology	Lithology	Permeability, m/day		Ground water table,	Head, m		Salinity, g/l	
				$K_{\phi. 1}$	$K_{\phi. 2}$		$\pm \Delta h$	$\pm g$	C_o	C_r
<u>Syrdarya middle reaches - Uzbekistan</u>										
6	02.4. Uz.	Syrdarya alluvial deposits $i = 0.0001-0.0002$	two-layer quarter- nary deposits $m_1 = 25-30$ m	0.05	5-10	before de- velopment: 10-15 m, after de- velopment: 1.5-2.0 m	-0.3	-	10-15	4-18
7	02.18. Uz.	alluvial deposits $i = 0.0001-0.0002$	two-layer $m_1 = 26-34$ m	0.1-0.5	30-50	1.7-4.2	-	-	2.5-4.7 up to 11.5	0.7-1.0
8	02.19. Uz.	Slightly corrugated plane $i = 0.0003-0.0005$	two-layer $m_1 = 18-25$ m	0.07-0.1	40-45	2.03-3.5	+0.5	-	5.0-8.0	1.3-1.9
9	02.27. Uz.	Slightly corrugated plane $i = 0.0003-0.0005$	two-layer $m_1 = 20-30$ m	0.03-0.07	20-45	1-2.0	-	-	15-25	0.3-3.0
10	02.30. Uz.	Alluvial and proluvial plane $i = 0.0001-0.002$	two-layer $m_1 =$ up to 35 m	0.1-0.3	15-20	1.5-4.0	-	-	from 1-3 up to 15- 20	0.3-3.0
11	02.36. Uz.	alluvial-proluvial and al- luvial deposits $i = 0.0001-0.002$	two- and multi- layer $m_1 =$ from 3 up to 400 m	0.02-3.0	5-100	from 1-3 up to 5- 20	-	-	from 1-5 up to 18- 36	0.3-3.0
12	02.37. Uz.	alluvial-proluvial plane $i = 0.0001-0.0003$	two-layer $m_1 = 18-25$ m	0.07-0.1	40-45	1-2	-	-	15-25	0.5-1.0

Plot No	Plot's index	Geomorphology	Lithology	Permeability, m/day		Ground water table,	Head, m		Salinity, g/l	
				$K_{\phi. 1}$	$K_{\phi. 2}$		$\pm \Delta h$	$\pm g$	C_o	C_r
<u>Objects in Kazakhstan</u>										
13	02.11. Uz.	Alluvial and proluvial deposits $i = 0.0004-0.0008$	two- and multi-layer $m_1 =$ from 20 up to 80 m	0.07-0.12	16-30	2.2-3.5	-	-	1-5	0.5-1.0
14	02.12. Uz.	Alluvial and proluvial deposits - $i = 0.0004-0.002$	two-layer $m_1 = 15-40$ m	0.03-0.07	16-30	2.2-3.5	-	-	8-15	0.5-1.0
15	02.13. Uz.	alluvial plane $i = 0.0001-0.0002$	two-layer $m_1 = 8-40$ m	0.05-0.25	16-25	from 8-10 up to 1-3	+0.3	-	from 3-10 up to 40	from 1-3 up to 6-8
16	02.14. Uz.	alluvial foothills of Karatau	two-layer $m_1 = 0.2-20$ m	0.5-0.8	20-400	from 1.5-2.5 up to 4.5	-	-	2-5	up to 1.0
17	02.7. Uz.	Syrdarya alluvial plane $i = 0.0003-0.0005$	two and multi-layer $m_1 = 15-25$ m	0.1-0.15	20-30	up to 10-15 after development 1-2.5	+0.25	-	5-7	4-5
18	02.9. Uz.	Syrdarya alluvial plane $i = 0.0002-0.0003$	two and multi-layer $m_1 = 5-25$ m	0.13-0.15	25-35	before development 10-15, after development 1.2-2.5	+0.25	-	5-10	4-5

Objects of Kazakhstan

Plot No	Plot's index	Geomorphology	Lithology	Permeability, m/day		Ground water table,	Head, m		Salinity, g/l	
				K _φ . 1	K _φ . 2		± Δ h	± g	C _o	C _r
19	02.1. Kaz.	foothills i = 0.002-0.006	two and multi-layer m ₁ = 0.8-2.0 up to 20 m	0.2-0.5	20-50 up to 150 in sand	from 1.5-2.5 up to 4.5	-	-	2-5	up to 1.0 seldom 1.5
20	02.2. Kaz.	foothills i = 0.002-0.006	two and multi-layer m ₁ = 0.8-2.0 up to 20 m	0.2-0.5	20-50 up to 150	from 1.5-2.5 up to 4.5	-	-	2-5	0.5-0.6
<u>Syrdarya low reaches</u>										
<u>Objects of Uzbekistan</u>										
21	02.8. Uz.	Syrdarya alluvial plane i = 0.0003-0.0005	two-layer m ₁ = 0.5-11 m	0.3-0.4	12 and higher	2-3	-	-	1.2-3.8 и более	0.8-1.5
22	02.10. Uz.	alluvial plane i = 0.0003-0.0005	two-layer m ₁ = 0.1-10 m	0.3-0.4	9-16	before development 10 m and higher after development 2-3 m	-	-	1-3	0.6-1.6
<u>Objects of Kazakhstan</u>										
23	02.3. Kaz.	Flat alluvial plane i = 0.0002-0.0003	two-layer m ₁ = 0.1-3 m	0.37	12	before development 4-5 m	-	-	1-3	0.8-1.5

Plot No	Plot's index	Geomorphology	Lithology	Permeability, m/day		Ground water table, after development 2-3 m	Head, m		Salinity, g/l	
				$K_{\phi. 1}$	$K_{\phi. 2}$		$\pm \Delta h$	$\pm g$	C_o	C_r

Amudarya upper reaches

Objects of Tadjikistan

24	02.1.Tad	3-rd alluvial terrace of Vakhsh river $i = 0.01-0.0017$	two-layer $m_1 = 6-7$ m	0.02-1.0	10-20	0.5-3	+0.4	-	near canals 3-5, 10-25 up to 50 g/l	10-15
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Amudarya middle reaches

Objects of Uzbekistan

25	02.31. Uz.	flat relief $i = 0.0005$	two-layer $m_1 =$ up to 15 m	0.5-1.0	40-45	2-3	-	-	2-5, 5-10 seldom 30-40	0.8-2.0
26	02.40. Uz.	2-nd terrace above flooded of Zerafshan river $i = 0.0005-0.0006$	two-layer $m_1 = 4-12$ m	0.5-4.0	10-50	2-3	-	-	20-40	1.3
27	02.41. Uz.									regional objects
28	02.42. Uz.									regional objects

Soil-reclamation characteristics of pilot plots on vertical drainage

Plot No	Index	Soil type	Water-physical properties					Salinization				
							K _t	salinity degree	salinity type	sum of salt within 0-100 cm layer	CL	salt distribution

Syrdarya upper reachesObjects of Uzbekistan

1	02.17. Uz.	loam, sandy loam	-	-	-	-	0.5	-	-	-	-	-	-
2	02.24. Uz.	middle and heavy loam	1.56	2.72	0.11	-	-	up to 46 % strongly saline	sulfate and chloride	1.5-2.0	0.05	superficial up to 3-4 m	
3	02.33. Uz.	sandy loam, middle and light loam	1.43	2.60	0.19	-	-	90 % non-saline, slightly medium saline, rest is or medium saline	sulfate-chloride	up to 0.3-0.5	0.01-0.02	superficial 3-4 m	

Objects of Kyrgyzstan

4	02.1. Kyr.	Loam and sand stone	-	-	-	-	-	from non-saline salts	sa- sulfate sodium	1.0-1.5	-	superficial up to
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Plot No	Index	Soil type	Water-physical properties					Salinization				
							K _t	salinity degree	salinity type	sum of salt within 0-100 cm layer	CL	salt distribution

2-3 m

5	02.2. Kyr	middle heavy loam	and	1.2-1.58	field investigations have not been conducted					sulfate	-	-	-
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Syrdarya middle reaches

Objects of Uzbekistan

6	02.4. Uz.	middle heavy loam	and	-	-	-	-	-	medium strongly	and	chloride-sulfate	-	-	superficial up to 3 m
7	02.18. Uz.	middle loam		-	-	-	-	-	medium strongly	and	sulfate-chloride	0.7-1.2	0.01-0.03	superficial up to 3-4 m
8	02.19. Uz.	middle loam		1.3-1.5	2.6-2.7	-	2.56	0.15-0.2	strongly saline spots of salt	sa- with	sulfate and chloride-sulfate	2.03 %	0.16	superficial up to 3-4 m
9	02.27.Uz.	middle heavy loam	and	1.4-1.55	2.6-2.7	0.06	2.8-3.5	-	medium strongly	and	sulfate and chloride-sulfate	in Ba-yaut 0.4-1.0	0.07-1.2	superficial up to 3-5 m

in Shu-ruzyak

Plot No	Index	Soil type	Water-physical properties					Salinization					
							K _t	salinity degree	salinity type	sum of salt within 0-100 cm layer	CL	salt distribution	
											1.8-3.5%		
10	02.30. Uz.	middle and heavy loam	1.3-1.56	2.65-2.7	0.06-0.1	-	-	from slightly saline to strongly saline	from chloride-sulfate and chloride-sulfate	from 0.4 to 0.85 and to 1.87 %	0.07-0.15	different, from 3 to 25 m	
11	02.36. Uz.	sandy loam, light, middle and heavy loam	1.3-1.56	2.65-2.7	0.06-0.1	-	-	slightly, medium and heavy loam	from chloride-sulfate and chloride-sulfate	0.3-4.0 %	0.01-1.2	different, from 3 to 25 m	
12	02.37. Uz.	heavy loam	1.35-1.56	2.62-2.72	0.06-0.1	-	-	medium strongly line, salts	and sa-sulfate and chloride-sulfate	1.5-3.0 %	0.2-0.4	syperficial within 0-3 m layer	
<u>Objects of Uzbekistan in Kazakhstan</u>													
13	02.11. Uz.	middle and light loam	1.35-1.6	2.63-2.7	0.08	1.2-1.8	-	strongly medium line	and sa-sulfate	chloride-sulfate, sulfate	0.5-1.2	0.03-0.2	all thickness

Plot No	Index	Soil type	Water-physical properties					Salinization					
							K _t	salinity degree	salinity type	sum of salt within 0-100 cm layer	CL	salt distribution	
14	02.12. Uz.	flaky light, middle and heavy loam	1.35-1.6	2.6-2.75	0.08-0.1	1.2-1.8	-	medium strongly line	and sulfate chlo-	sulfate and sulfate	0.5-1.8	0.03-0.3	full depth 15-40
15	02.13. Uz.	sandy loam, light and middle loam	1.35-1.56	2.6-2.71	0.08-0.1	1.2-1.8	-	medium strongly line	and sulfate, chloride-sulfate	and	1.2-2.4	0.2-0.4	full depth 15-30 m
16	02.14. Uz.	sandy loam, loam	1.25-1.4	2.61-2.72	0.11-0.15	-	-	non-saline, slightly saline	chloride-sulfate		0.2-0.5	0.01-0.02	surface 1-3 m
17	02.7. Uz.	middle and light loam	1.35-1.6	2.63-2.7	0.08	1.2-1.8	-	medium strongly line	and chloride-sulfate, sulfate		0.5-1.2	0.03-0.2	full depth 15-25 m
<u>Objects of Kazakhstan</u>													
19	02.1. Kaz.	middle and heavy loam	1.4-1.56	2.62-2.75	0.1-0.12	-	-	non-saline, slightly saline	chloride-sulfate		0.2-0.5	0.01-0.02	superficial to 1-3 m
20	02.2. Kaz.	Sandy loam, loam	1.35-1.55	2.64-2.70	0.1-0.12	-	-	non-saline, slightly saline	chloride-sulfate		0.17-0.69	0.01-0.025	superficial to 1-3 m

Plot No	Index	Soil type		Water-physical properties					Salinization				
								K _t	salinity degree	salinity type	sum of salt within 0-100 cm layer	CL	salt distribution

Syrdarya low reaches

Objects of Uzbekistan

21 02.8. Uz. loam, sandy loam, 1.30-1.70 2.60-2.72 0.11-0.18 - - non-saline, sulfate slightly saline 0.17-0.7 - superficial to 1-3 m

22 02.10. Uz. Sandy loam, loam. sandy 1.35-1.68 2.68 0.11-0.18 - - non-saline, chloride-sulfate, sulfate до СИЗ 0.17-1.4 0.01-0.09 superficial to 1-3 m

Objects of Kazakhstan

23 02.3. Kaz. 1.41-1.54 2.63-2.72 0.11-0.18 - - medium line sa-chloride-sulfate 0.34-0.40 0.06-0.08 superficial to 1-3 m

Amudarya basin

upper reaches

Objects of Tadjikistan

24 02.1. Tad. Light, middle and heavy 1.28-1.72 2.48-2.81 0.08-0.13 - - medium strongly line and sa-chloride-sulfate, sulfate-chloride- 1.2-3.0 0.2-0.4 full depth 6-7 m

Plot No	Index	Soil type	Water-physical properties					Salinization				
							K _t	salinity degree	salinity type	sum of salt within 0-100 cm layer	CL	salt distribution

middle reaches

Objects of Uzbekistan

25	02.31. Uz.	light loam, sandy loam	1.28-1.40	2.62-2.71	0.09-0.11	0.75	-	medium strongly line	and chloride-sulfate	0.5-1.0	-	superficial to 0.2-0.5 m
26	02.40. Uz.	light loam, sandy loam	1.3-1.40	2.62-2.73	0.1-0.12	0.75	-	medium strongly line	and chloride-sulfate, sulfate-chloride-	0.5-1.0	-	superficial to 1.0 m

Characteristics of irrigation-drainage network, close drains parameters (direction 02.02)

No	Project code	Irrigated area, ha	Construction peculiarities		Close drainage main parameters					
			irrigation network	drainage network	specific extent, m/ha	depth, m	drain spacing, m	drainage modulus, l/sec/ha	drainage outflow, m ³ /ha per year	drainage effluent salinity, g/l
1	02.7 Uz	97	Concrete flumes. efficiency- 0.96-0.98	Close drains and open collectors. Tile tubes d=200 mm, plastic tubes with gravel-sand filling	40.0	2.5-3.0	200-250	0.16-0.21	5640	2.0-8.0
2	02.23' Uz	9.0	Concrete flumes efficiency 0.92-0.45	Close drains, length 500-1300 m. Asbestos-cement tubes, d=144 mm with gravel-pebble filling	40.0	2.7 - 3.0	280.0	0.2 - 0.3	6000	5 - 12
3	02.23 Uz	6.12	see project 02.23' Uz	see project 02.23' Uz	40.0	2.7- 3.0	280	0.2 - 0.3 ; 0.5 (leaching)	6000	5 - 12
4	02.1. Tad.	20	Open earthen canals	Close drains made of asbestos-cement tubes with gravel-sand filling	50.0	2.2 - 2.4	120	1.5		3 - 5
5	02.2 Kyr.	1248.0	Concrete canals to each sprinkler machine EDFM "Kuban"	Close drains made of ceramic tubes d=250-300 mm with gravel-sand filling. Collectors made of ceramic and concrete tubes, d=200-300 mm and 400-800 mm	20.0	3.5 - 4.5	400 - 420	0.015-0.11	210 - 2340	1.8 - 8.9
6	02.3 Kyr.	17.6	Concrete flumes to sprinkler machines DDN-70 and DDA-100M	Close drains made of ceramic tubes d=150-350 mm with gravel-sand filling (screen)	60	3.5	177	0.01-0.113	1415-1710	7-22.0
7	02.35 Uz	60; 150; 200	Flumes (JIP-60, JIP-80) efficiency- 0.92-0.96	Close drains and collectors. Polyethylene tubes d=100-150 mm length 6-8 m, asbestos-cement tubes d=100-150 mm length 3-4 m, ceramic tubes d=100-200 mm length 0.33-0.6=1.0 m and tile tubes	42-105	2.5-3.5	100-250	0.12-0.17	1.5-2.7	8.6-39.2

No	Project code	Irrigated area, ha	Construction peculiarities		Close drainage main parameters					
			irrigation network	drainage network	specific extent, m/ha	depth, m	drain spacing, m	drainage modulus, l/sec/ha	drainage outflow, m ³ /ha per year	drainage effluent salinity, g/l
8	02.12 Uz	70; 40	Flumes, efficiency 0.92-0.96	Close drains over 40 ha, vertical drainage over 70 ha. Drains: tile, ceramic with sand-gravel screens	-	2.8	-	0.038	1200	11.0
9	02.27 Uz	11912	Inter-farm canals are lined. Distributors - flumes, efficiency 0.92-0.96	see project 02.35 Uz	75	2.5-4.0	135.0	0.04-0.094	1260-2970	8-15
10	02.14 Uz	8218	On-farm distributors - lined canals; field distributors - concrete flumes with parabolic cross-section JIP-60, JIP-80, JIP-100	Close collectors - 10.4 % extent; tile tubes, length 55 cm and plastic perforated tubes d=65/75 mm, screen - sand-gravel mix	112.8	2.5	90.0	0.19-0.2	5600	10.9-27.9
11	02.2 Kyr	70	Earthen canals	Close drains, asbestos-cement tubes with sand-crashed stone screen	40-45.0	2.5-3.0	100.0 200.0 300.0	0.06-0.1	3150	6.0-11.6
12	02.6 Kaz.	180	Group distributors and field distributors in earthen channel	Close drains, asbestos-cement tubes d=200 mm with gravel filling	20-100	1.6	100-600	0.2-0.6	2100-7300	2.2-3.2
13	02.4 Tad.	400	no data	PVC tubes, ceramic 150 and d=200-300 mm with sand-gravel screen	37.8	3.5-4.0	105-155	0.01-0.05	976-1165	29-66
14	02.6 Tad.	70	no data	PVC tubes, screen: sand-gravel	84.0	1.8-3.5	170-340	0.03-0.23	13800-15200	-
15	02.5 Tad.	40	Flume network, efficiency- 0.84	Ceramic, asbestos-cement tubes, screen: sand-gravel	67.2	1.6-3.5	60-140	0.13-0.34	4100-10720	1.48-4.3
16	02.7 Tad.	26000	Magistral and distributive earthen canals, efficiency- 0.83. on-farm network - flumes	Close drains	no data	no data	no data	0.09-0.145	2840-4570	10.5-12.4
17	02.28 Uz.	145000	On-farm network - concrete flumes (efficiency 0.96-0.98), inter-farm network - concrete on polyethylene film (ef-	Vertical drainage, horizontal and combined drainage; tile tubes with gravel-sand filling	12.57	3.0-3.5	200-250	0.04-0.15	1280-4800	2.2-20

No	Project code	Irrigated area, ha	Construction peculiarities		Close drainage main parameters					
			irrigation network	drainage network	specific extent, m/ha	depth, m	drain spacing, m	drainage modulus, l/sec/ha	drainage outflow, m ³ /ha per year	drainage effluent salinity, g/l
			efficiency 0.96- 0.97)							
18	02.25 Uz	250	85 % flumes (JIP-100), rest of area - earthen canals	Plastic corrugated tubes with sand-gravel screen		2.2-2.5	80-150-300-400	0.05-0.08	1620-2440	4-50
19	02.1 Tur	49.5	Earthen canals	Close drains without slope and flooded mouth; polyethylene tubes	28.0	2.55-3.06	500	0.05-0.20	4500	1.5-3.0
20	02.2 Tur	2000	Earthen canals	Vacuum drainage system; spacing 500-800 m, depth 2-2.7 m, vertical drain depth 6 m, polyethylene tubes		2.0-2.2	500-800	0.04-0.6	5040	3.0-9.2
21	02.20 Uz.	303.0	Earthen canals	Asbestos-cement, sandy-concrete and ceramic tubes; screen: sand-crashed stone mix	30.0	1.5-3.0	150-300	0.476	1500	3.2-4.6
22	02.29 Uz.	129.6	Flumes, efficiency- 0.86	Plastic corrugated tubes; screen - textile and sand filling	74.4	1.80	100.0	0.12-0.16	3700-5000	3.1-4.1
23	02.1 Uz.	214	Earthen canals and flumes, efficiency- 0.86	Plastic corrugated tubes d=125-200 mm; tile, concrete tubes with sand-gravel screen	70.0	1.3-1.6	40-80	0.01-0.20	1838	1.14-12
24	02.8 Uz.	160	Earthen canals	Asbestos-cement tubes d=300 mm with gravel-sand filling; corrugated tube with sand-gravel filling	23.0	2.1-2.7	400	0.12-0.18	2650	12-34
25	02.26 Uz.	145	rice system, earthen canals	Area 33.91 ha; asbestos-cement tubes d=150 mm; tile tube d=150-200-300 mm	36.0	2.0	200-230	0.53-0.84	16710-26400	1.5-4.6
26	02.2' Uz.	500 000	Earthen canals, efficiency: inter-farm and magistral canals - 0.85-0.92 on-farm - 0.65;	Open collectors; depth: inter-farm - 2.5-3.5 m; on-farm - 1.8-2.0 m	30-32	1.8-3.6	-	-	2068-6670	1.9-4.3

No	Project code	Irrigated area, ha	Construction peculiarities		Close drainage main parameters					
			irrigation network	drainage network	specific extent, m/ha	depth, m	drain spacing, m	drainage modulus, l/sec/ha	drainage outflow, m ³ /ha per year	drainage effluent salinity, g/l
			system - 0.56							
27	02.16 Uz	45	Rice irrigation system, earthen canals	Open drains, outfalls depth 1.5 m; collector depth 1,8 m; on-farm collectors 2.5-3.1 m	44-47	1.8-2.5	-	0.29-0.55	9400-17300	9.5-11.9

Vertical drainage pilot plots characteristics

Index	Irrigated area, ha	Irrigation network					Collector-drainage network					
		canal's channel	specific length, m/ha	network efficiency	on-farm system efficiency	system efficiency	specific length, m/ha	drain depth, m	distance between drains, m	drainage modulus, l/sec/ha	horiz. drainage outflow, m ³ /ha/year	Drainage effluent salinity, g/l
<u>Syrdarya upper reaches</u>												
<u>Objects of Uzbekistan</u>												
02.17. Uz.	26650	earthen and concrete	-	-	-	-	19.6	2.5-4.0	-	-	-	-
02.24. Uz.	678	earthen	21	-	0.9-0.95	0.65-0.70	40.5	1.5-3.5	-	0.14	4415	-
02.33. Uz.	565	earthen	-	-	-	0.65-0.70	20.3	2.5-3.0	200-250	0.159	1860	1.8-3.0
<u>Objects of Kyrgyzstan</u>												
02.1. Kyrg.	65.3	concrete tubes	-	-	0.96-0.98	-	12.5	3.5	-	0.028	883	9.1-11.7
02.2. Kyrg.	Field investigation have not been conducted											
<u>Syrdarya middle reaches</u>												
<u>Objects of Uzbekistan</u>												
02.4. Uz.	551.9	concrete	-	-	0.96	0.96	-	-	-	0.057	1800	-

Index	Irrigated area, ha	Irrigation network					Collector-drainage network					
		canal's channel	specific length, m/ha	network efficiency	on-farm system efficiency	system efficiency	specific length, m/ha	drain depth, m	distance between drains, m	drainage modulus, l/sec/ha	horiz. drainage outflow, m ³ /ha/year	Drainage effluent salinity, g/l
02.18. Uz.	50	concrete	-	-	-	0.96	-	-	-	0.04	1100	-
02.19. Uz.	3000	earthen	-	-	-	0.65-0.75	12-20	1.8-2.2	-	0.03	950	2.65
02.27. Uz.	117100	earthen	-	-	-	0.6-0.65	12-14	1.8-2.2	-	0.03-0.05	950-1576	3-4
02.30. Uz.	403520	earthen and concrete	-	0.95	0.73	0.65-0.70	21.4-107	2-3	-	0.095	2990	-
02.36. Uz.	850000	earthen and concrete	-	-	-	0.6-0.8	8-20	1.5-2-3	-	0.03-0.1	950-3154	0.7-20
02.37. Uz.	3000	earthen	-	-	-	0.65-0.75	25-45	1.5-3.5	-	0.03-0.035	980-1090	0.7-15
<u>Objects of Uzbekistan in Kazakhstan</u>												
02.11. Uz.	59661	earthen and concrete	-	0.90	0.75-0.80	0.65-0.70	8-15	2-2.5	-	0.03-0.05	1100-1500	0.7-15
02.12. Uz.	157000	earthen and concrete	-	-	-	0.65-0.70	8-15	1.5-2.5	-	0.03-0.05	1100-1500	0.6-15
02.13. Uz.	5700	earthen and concrete	-	-	-	0.65-0.75	8-20	1.5-3.0	-	0.04-0.05	1150-1500	0.7-20
02.14. Uz.	52400	earthen	16.6	-	-	0.77	9-10	2.5-3.0	-	0.05-	1560-	-

Index	Irrigated area, ha	Irrigation network					Collector-drainage network					
		canal's channel	specific length, m/ha	network efficiency	on-farm system efficiency	system efficiency	specific length, m/ha	drain depth, m	distance between drains, m	drainage modulus, l/sec/ha	horiz. drainage outflow, m ³ /ha/year	Drainage effluent salinity, g/l
		and concrete								0.095	3000	
02.7. Uz.	13500	earthen and concrete	-	-	0.94	0.7-0.75	12-14	2.5-3.0	-	0.03-0.05	1100-1500	0.7-15
02.9. Uz.	117000	earthen	-	0.8-0.9	-	0.65-0.75	15-18	2.5-3.0	-	0.08-0.108	2700-3400	-
<u>Objects of Kazakhstan</u>												
02.1.Kaz.	12000	field investigation have not been conducted.	16.6	-	-	0.75	-	-	-	0.061	1920	-
02.2. Kaz.	500	field investigation have not been conducted.	-	-	-	0.75	-	-	-	0.07	2240	-
<u>Syrdarya low reaches</u>												
<u>Objects of Uzbekistan</u>												
02.8. Uz.	77700	earthen	-	0.92	-	0.6-0.65	27.5	2.5-3.5	-	-	-	-
02.10. Uz.	1327	concrete	24	0.90	0.90	0.65-0.75	15-20	-	-	0.012-	390-1090	-

Index	Irrigated area, ha	Irrigation network					Collector-drainage network					
		canal's channel	specific length, m/ha	network efficiency	on-farm system efficiency	system efficiency	specific length, m/ha	drain depth, m	distance between drains, m	drainage modulus, l/sec/ha	horiz. drainage outflow, m ³ /ha/year	Drainage effluent salinity, g/l
0.035												
<u>Objects of Kazakhstan</u>												
02.3. Kaz.	488	earthen	25-30	-	-	0.65-0.75	15-25	-	-	0.078-0.290	2490-9160	-
Amudarya basin Upper reaches												
<u>Objects of Tadjikistan</u>												
02.1. Tad.	400	earthen	20	-	-	0.65-0.7	22	1.5-2.0	200-600	0.05-0.12	2840-3784	-
<u>Amudarya middle reaches</u>												
<u>Objects of Uzbekistan</u>												
02.31. Uz.	51900	earthen	-	-	-	0.65-0.7	8.46	1.5-2.5	-	0.017	550	-
02.40. Uz.	21500	earthen and concrete	-	0.9	0.75	0.65-0.7	32	2.4	-	0.04	1260	-
02.41. Uz.	937000	regional objects										
02.42. Uz.	666080	regional objects										

Constructive parameters and technical characteristics of vertical wells

Code, index	Number of wells	Well depth, m	Captured layer thickness, m	Filter type	Filter depth, m	Aquifer deposits	Well command area, ha	Well discharge, l/sec/m	Well specific yield, l/sec/m	Drainage modulus, l/sec/ha	Drainage outflow, m ³ /ha per year	Abstracted water salinity, g/l
<u>SyrDarya upper reaches</u>												
<u>Objects of Uzbekistan</u>												
02.17. Uz.	230	30-70	-	-	12-25	-	115	20-60	1.7-5	0.13-0.24	4100-7670	0.5-1.0 seldom 2.5
02.24. Uz.	7	23-61	15-26	gravel-sand	7-18	gravel-pebble	90-100	60-70	5-7.5	0.14	4415-7884	0.45-1.6
02.33. Uz.	5	32-48	15-26	gravel-sand	11.8-25	pebble-gravel-sand	113	10-40	3-8	0.12-0.18	4730	0.6-1.5
<u>Objects of Kyrgyzstan</u>												
02.1. Kyr.	2	105	16-55	-	-	-	30	30	-	0.007-0.013	210-416	0.26-0.37
02.2. Kyr.	Field investigations have not been conducted											
<u>SyrDarya middle reaches</u>												
<u>Objects of Uzbekistan</u>												

Code, index	Number of wells	Well depth, m	Captured layer thickness, m	Filter type	Filter depth, m	Aquifer deposits	Well command area, ha	Well discharge, l/sec/m	Well specific yield, l/sec/m	Drainage modulus, l/sec/ha	Drainage outflow, m ³ /ha per year	Abstracted water salinity, g/l
02.4. Uz.	8	60-100	40-50	gravel-sand	-	fine-grained sand	68	20-50	-	0.19-0.253	6248-8004	4.0-18.0
02.18. Uz.	12	60-70	-	perforated with gravel screen	-	gravel-pebble	250	75-85	8-12	0.04-0.08	1100-2500	0.67-1.0
02.19. Uz.	28	65-80	50-100	slotted with gravel screen	25-40	gravel, sand	110	100-200	10-15	0.1-0.18	3800-5700	1.3-1.9
02.27. Uz.	Shu-ruzyak 212, Bayaut 101	50-80	50-100 10-50	slotted with gravel screen	10-40	gravel, sand, pebble	320 500	30-100 25-50	7-15 6-11	0.19 0.11	5990 3470	0.3-4.0
02.30. Uz.	599	35-80	10-100	slotted or perforated	10-40	gravel, sand, pebble	220-500	25-100	6-15	0.095-0.16	3000-5000	0.3-6.0
02.36. Uz.	1100	40-100	10-100	slotted or perforated	10-40	gravel-pebble	288	12-100	6-15	0.11-0.3	3470-9460	0.3-6.0
02.37. Uz.	28	65-80	50-100	slotted or perforated	20-35	gravel-pebble	107	100-150	8-15	0.1-0.17	3400-5435	1.5-2.5
<u>Objects of Uzbekistan in Kazakhstan</u>												
02.11. Uz.	280	50-70	15-50	slotted or perforated	20-36	gravel-pebble	213	38	1-10	0.05-0.082	1600-2600	0.1-4.0
02.12. Uz.	1794	15-50	15-50	slotted or perforated	20-36	gravel-pebble	90-100	30-50	5-8	0.15-0.28	4730-8830	0.5-4.5

Code, index	Number of wells	Well depth, m	Captured layer thickness, m	Filter type	Filter depth, m	Aquifer deposits	Well command area, ha	Well discharge, l/sec/m	Well specific yield, l/sec/m	Drainage modulus, l/sec/ha	Drainage outflow, m ³ /ha per year	Abstracted water salinity, g/l
02.13. Uz.	18	55-75	-	slotted or perforated	26	fine-grained sand	297	60-75	4.2	0.085-0.21	2700-6500	1.0-3-6.0
02.14. Uz.	504	30-45	54	-	-	-	104	35-40	-	0.04-0.13	1360-4010	1.5-2.0
02.7. Uz.	78	55-75	15-50	slotted with gravel screen	15-30	gravel-sand	166	50-75	4-6	0.11-0.16	3500-5000	4-4.5
02.9. Uz.	Djetysay 285, Kirov 273	55-75	-	slotted with gravel screen	25-26	gravel-sand	190-220	50-75	4-6	0.04-0.19	1400-6000	4-5
<u>Objects of Kazakhstan</u>												
02.1. Kaz.	60	25-30	10-30	gravel-sand	15-18	gravel-pebble	200	20-45	2-4	0.050-0.061	1420-1920	0.5-1.5
02.2. Kaz.	5	25-30	25-30	gravel-sand	15-18	gravel, pebble, clay	100	45-59	3-4	0.07-0.085	2240-2680	0.5-0.6
<u>SyrDarya low reaches</u>												
<u>Objects of Uzbekistan</u>												
02.8. Uz.	208	37-55	12-53	gravel-sand	10-27	fine and medium-grained sand	210-370	35-50	3-5	0.06-0.24	1800-7500	1-3.5
02.10. Uz.	8	40-59	29-72	slotted with gravel screen	15-20	medium-grained sand	215	35-45	1.8-5.6	0.07-0.20	2090-3410	0.94-1.4

Code, index	Number of wells	Well depth, m	Captured layer thickness, m	Filter type	Filter depth, m	Aquifer deposits	Well command area, ha	Well discharge, l/sec/m	Well specific yield, l/sec/m	Drainage modulus, l/sec/ha	Drainage outflow, m ³ /ha per year	Abstracted water salinity, g/l
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Objects of Kazakhstan

02.3. Kaz.	6	50	30-60	slotted	20	fine-grained sand	80	40-60	3-5	0.371-0.315	11710-9930	0.8-1.5
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AmuDarya upper reaches

Objects of Tadjikistan

02.1. Tad.	3	51	up to 100	-	-	gravel	130	36-68	-	0.28-0.52	8895-16405	4.8-10.4
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AmuDarya middle reaches

Objects of Uzbekistan

02.31. Uz.	232	25-45	1.8-45	perforated with gravel screen	8-10	gravel-pebble	225	5-120	3.1-13	0.019-0.15	600-4800	1.5-3.0
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02.40. Uz.	127	20-25	3-30	slotted	8-10	gravel-pebble	170	20-35-45	3.5-10	0.04-0.072	1200-2300	1.3-3.5
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02.41. Uz. Regional objects – Golodnaya steppe, Fergana valley, Bukhara province

02.42. Uz. Regional object – all Golodnaya steppe

Reclamation regime indicators changes on background of close horizontal drainage (direction 02.02)

Plot's No	Project code	Drainage zone	Water supply, m ³ /ha		Drainage out-flow, th. m ³ /ha		Drainage effluent salinity, g/l		Ground and artesian water level regulation limits, m			Groundwater table depletion rate after irrigation, cm/day	Groundwater salinity changes, g/l		Drainage out-flow (D) versus water supply (W) ratio		Average D/W value over drainage zones (for rice systems)	Drainage effluent salinity changes, g/l		
			per year	including growing period	max	min	max	min	max	min	± Δh		initial	final	from	up to		initial	final	
Syrdarya basin																				
1	02.7 Uz	Fergana	8.4-11.5	6.5-8.5	6.8	5.1	10.0	5.0	2.5	1.0	-	4.6-5.2	5-38	5-10	0.59	0.6	0.32-0.43	5.5-10.0	2-4	
2	02.3 Kyr	-"	3.49-8.41	3.49-8.41	1.71	1.41	22.0	7.0	2.9	1.8	± 1.1	-	10.2	7.5	0.2	0.4		12	7.0	
3	02.2 Kyr	-"	7.3-8.0	7.3-8.3	2.34	0.21	8.8	1.6	3.3	2.5	± 0.8	-	1.8-8.9	1.8-8.9	0.17	0.29		4.8	2.2	
4	02.35 Uz	Golodnaya steppe	4.6-11.5	-	2.7	0.12	39.2	8.6	2.8	2.3	-	10.0	12-25	4-8	0.23	0.30	0.25-0.29	18-30	5-14	
5	02.12 Uz	-"	8-9	4.64	1.3	1.1	11.6	10.9	2.8	1.5	-	-	15-40	14-15	0.14	0.14		-	-	
6	02.27 Uz	-"	0.6-9.0	-	2.97	1.26	15.0	8.0	3.0	2.5	-	0.05	20-50	5-10	0.26	0.33		-	-	
7	02.14 Uz	-" (rice)	25-30	9-10	10.47	2.81	27.9	10.9	2-3	1-2	-	-	40-60	10-35	0.11	0.35		15-20	-	
8	02.2 Kaz.	-"	8.1-10.0	8.1-8.6	4.0	3.1	-	-	3.5	1.0	-	-	6-15	-	0.37	0.4	(0.12-0.32)	-	-	
9	02.6 Kaz.	-" (rice)	17-25	-	7.3	2.1	3.2	2.2	4.5	2.0	-	-	4.4	2.1-3.4	0.12	0.29		-	-	

Plot's No	Project code	Drainage zone	Water supply, m ³ /ha		Drainage out-flow, th. m ³ /ha		Drainage effluent salinity, g/l		Ground and artesian water level regulation limits, m			Groundwater table depletion rate after irrigation, cm/day	Groundwater salinity changes, g/l		Drainage out-flow (D) versus water supply (W) ratio		Average D/W value over drainage zones (for rice systems)	Drainage effluent salinity changes, g/l		
			per year	including growing period	max	min	max	min	max	min	± Δh		initial	final	from	up to		initial	final	
Amudarya basin																				
10	02.4 Tad	Amudarya upper reaches	-	-	1.67	0.98	6.6	2.9	3.5	1.0	-	5-60	15-20	2-3	-	-	0.29-0.32	6.6	2.9	
11	02.5 Tad	-"-	12.5	10.0	15.3	13.8	4.3	1.48	2.0	1.5	-	20-30	4.3	2.5-3	-	-		2-3	1-2	
12	02.7 Tad	-"-	8.8-25.3	-	4.5-7.3	2.84	12.4	10.5	3.0	2.5	-	-	5-30	5-30	0.29	0.32		12.4	10.5	
13	02.25 Uz	Bukhara-Karshi	8.0-10.2	-	2.4	1.5	52.0	2.5	2.08	1.17	-	8-100	60	4-20	0.19	0.23	0.19-0.23	20-52 9.4-8.5	9-35 2.5-4	
14	02.1 Tur.	-"-	8.0	5.0	4.95	-	3.0	1.5	3.0	1.6	-	20.0	3-10	1.5-3.0	-	0.61		1.5-3.0	1-2	
15	02.2 Tur.	-"-	11.4	6.3	5.04	-	9.2	1.8	3.5	1.2	-	1-20	3-5	1.8-2.0	-	0.44		3.5	1.7-1.8	
16	02.20 Uz	Amudarya low reaches	22.3-26.2	13.6	15.6	14.4	4.6	3.2	2.0	1.5	-	10-12	6-19	3.5-4.0	0.41	0.45	-"-	-	-	
17	02.29 Uz	-"-	7.4-8.7	3.7-4.6	5.0	3.7	4.1	3.1	2.28	0.66	-	-	4.7	3.1	0.5	0.57		4.06	3.1	
18	02.1 Uz	-"-	6.6-9.0	3.8-4.5	3.4	0.75	12.0	1.14	3.5	1.5	-	15-20	4-15	25-4	0.11	0.38		0.37-0.48	-	-

Plot's No	Project code	Drainage zone	Water supply, m ³ /ha		Drainage out-flow, th. m ³ /ha		Drainage effluent salinity, g/l		Ground and artesian water level regulation limits, m			Groundwater table depletion rate after irrigation, cm/day	Groundwater salinity changes, g/l		Drainage out-flow (D) versus water supply (W) ratio		Average D/W value over drainage zones (for rice systems)	Drainage effluent salinity changes, g/l	
			per year	including growing period	max	min	max	min	max	min	± Δh		initial	final	from	up to		initial	final
19	02.8 Uz	-''-	5.5-10.5	2.5-3.5	5.6	2.6	34.0	12.3	3.0	1.5	-	20-25	18.0	6.0	0.47	0.53	(0.29-0.47)	12.0	8.0
20	02.26 Uz	-''- (rice)	21.3-28	21.3-28	16.4	6.8	4.6	1.5	2.3	1.4	-	4.3	2.7-12.4	2.7-12.4	0.32	0.58		-	1.5-2.71
21	02.2' Uz	-''- (rice)	14.9-33.8	11.1-22.8	6.7	2.1	4.3	1.9	2.4	1.6	-	-	4-25	3-5	0.14	0.20		6.7-2.1	2.5-4.0
22	02.16 Uz	-''- (rice)	24.3-38.9	-	17.3	9.9	11.9	0.8	3.5	0.5	-	6-14	18.6-44.6	7.2-11.2	0.4	0.44		18-44	9-11.29

Conditions of experiments on vertical drainage pilot plots

Code, index	Conditions of experiment, pilot plot or large system, main direction	Well number	Drainage outflow, m ³ /ha	Actual irrigation regime				Annual water supply, m ³ /ha
				number of irrigations	irrigation depth, m ³ /ha	irrigation norm, m ³ /ha	norm of autumn-winter leaching and moisture re-charge leaching, m ³ /ha	
<u>SyrDarya upper reaches</u>								
<u>Objects of Uzbekistan</u>								
02.17. Uz.	F = 26650 ha main crop cotton	230	4100-7670	4-6	1000-1770	6680-7080	1300-2000	8980-9080
02.24. Uz.	F=678 ha main crop cotton	7	4415-7884	4-7	700-2500	9170-9600	2000-3000	9600-11100
02.33. Uz.	F=565 ha main crop cotton	5	3780-5680	5-6	870-2090	6500-8350	920-1330	7800-9360
<u>Objects in Kyrgyzstan</u>								
02.1. Kyr.	F= 60 ha lucerne and maize for silo	2	210-416	lucerne 4-13 maize 10	130-2320 380-800	4930-7060 6360	1400-2100 -	6330-9160 6360
02.2. Kyr.	232 th. ha – field investigations have not been conducted (calculations)							

Code, index	Conditions of experiment, pilot plot or large system, main direction	Well number	Drainage outflow, m ³ /ha	Actual irrigation regime				Annual water supply, m ³ /ha
				number of irrigations	irrigation depth, m ³ /ha	irrigation norm, m ³ /ha	norm of autumn-winter leaching and moisture re-charge leaching, m ³ /ha	

SyrDarya middle reaches

Objects of Uzbekistan

02.4. Uz.	F= 552 ha main crop cotton	8	6248-8004	3	2250-2980	6760-8950	-	9600-11450
02.18. Uz.	F = 3000 ha main crop cotton	12	1100-2500	2	1850	3700	2200	5900
02.19. Uz.	F = 3000 ha main crop cotton	28	3800-5700	3	910-2300	4800-6500	2800-3600	11000-12500
02.27. Uz.	large systems F = 117100 ha cotton	313	1250-4500	2-3	2000-3500	6000-7000	2000-3000	9000-11000
02.30. Uz.	large systems F = 403500 ra cotton	599	3000-25000	2-3	2500-2730	5000-8200	1200-4600	4400-12800
02.36. Uz.	regional systems F = 850000 ra cotton	1100	1250-4500	2-3	2000-23500	6000-7000	2000-3000	9000-11000
02.37. Uz.	F = 3000 ha cotton	28	1640-5000	2-3	1970-2900	5900-8700	2000-3000	7900-11760

Code, index	Conditions of experiment, pilot plot or large system, main direction	Well number	Drainage outflow, m ³ /ha	Actual irrigation regime				Annual water supply, m ³ /ha
				number of irrigations	irrigation depth, m ³ /ha	irrigation norm, m ³ /ha	norm of autumn-winter leaching and moisture recharge leaching, m ³ /ha	

Objects of Uzbekistan in Kazakhstan

02.11. Uz.	large systems F = 59661 ha cotton	280	1500-2600	2-3	1320-2500	3970-5000	1570-2500	6470-7500
02.12. Uz.	regional systems F = 157000 ha cotton	1794	1260-4500	2-3	1650-2200	5000-6500	2000-2500	8500-12500
02.13. Uz.	F = 5700 ha cotton	18	1500-4600	2-3	1970-2330	5900-7000	2500-6500	11000-13500
02.14. Uz.	large systems F = 52400 ha cotton	504	1360-4010	-	-	-	-	5150-13850
02.7. Uz.	F = 13500 ha cotton, livestock	78	3500-5000	2-3	2400-2800	3200-8400	2500-7800	7200-13300
02.9. Uz.	regional systems F = 117000 ha cotton	558	1400-6000	2-3	1280-2180	3830-6540	1360-7800	7000-11000

Objects of Kazakhstan

02.1. Kaz.	12000 ha cotton, livestock	60	1420-1920	-	-	-	-	4000-10000
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Code, index	Conditions of experiment, pilot plot or large system, main direction	Well number	Drainage outflow, m ³ /ha	Actual irrigation regime				Annual water supply, m ³ /ha
				number of irrigations	irrigation depth, m ³ /ha	irrigation norm, m ³ /ha	norm of autumn-winter leaching and moisture re-charge leaching, m ³ /ha	
02.2. Kaz.	500 ha cotton	5	2240-2680	2-4	1500-2250	6000-6500	1500-2000	7500-8500
<u>SyrDarya low reaches</u>								
<u>Objects of Uzbekistan</u>								
02.8. Uz.	regional systems F = 77700 ha rice, livestock	208	1800-7500	constant for rice for feeding 2-3	rice 2100 livestock 5500 for massif 13300			rice 20000-22400 livestock 5370-5650 for massif 12700-14030
02.10. Uz.	F = 1724 ha	8	2090-3410	3-5	540-2300	6860-8930	200-1220	6860-9390
<u>Objects of Kazakhstan</u>								
02.3. Kaz.	F = 488 ha rice	6	9930-11710		constant for rice			22830-28550
<u>AmuDarya upper reaches</u>								
<u>Objects of Tadjikistan</u>								
02.1. Tad.	F = 400 ha	3	8895-16405	-	-	-	-	8400-12500

Code, index	Conditions of experiment, pilot plot or large system, main direction	Well number	Drainage outflow, m ³ /ha	Actual irrigation regime				Annual water supply, m ³ /ha
				number of irrigations	irrigation depth, m ³ /ha	irrigation norm, m ³ /ha	norm of autumn-winter leaching and moisture re-charge leaching, m ³ /ha	

cotton and lucerne

AmuDarya middle reaches

Objects of Uzbekistan

02.31. Uz.	large systems F= 51900 ra cotton	232	3100-4800	-	-	6000-6500	2500-4000	8500-10500
02.40. Uz.	large systems F= 21500 ra cotton	127	1200-2300	-	-	4800-6200	2700-3000	7500-9200
02.41. Uz.	Object encompasses several regions: Golodnaya steppe, Fergana valley							
02.42. Uz.	Object encompasses all Golodnaya steppe							

Main results of close horizontal drainage study in Uzbekistan

Main natural indicators and designed drainage parameters	Fergana province, c/f "Bolshevik" and "Soviet" of Altyaryk district	Golodnaya steppe, s/f N 6 "Titov"		
		Southern part of farm, 1- Study pilot plot	Central part of farm	Northern part of farm
Syrdarya basin				
Gross area, ha	350	60	150	200
Surface slope gradient	Highest to NW; 0.0021-0.003 the smallest in S-W; 0.0002-0.0003	0.005	0.003	0.001
Lithology	Middle and heavy loam with shoh inter-layers on depth of 0.7-1.2 m. Beneath - heavy loam with interlayers of sandy loam, clay and sand	Light and middle loam with gypsum interlayer on depth of 0,5-1,0 m. Bed rock-clay with thickness 4-5 m on depth of 20 m	Light and middle loam with gypsum interlayer on depth of 0,8-1,0 m. Bed rock-clay with thickness 4-5 m on depth of 20 m	Light and middle loam with gypsum interlayer on depth of 1,0-1,2 m. Bed rock depth is 8-15 m
Natural drainability (ground water outflow availability)	Naturally weakly drained area	Naturally very weakly drained area	Naturally very weakly drained area	Naturally very weakly drained area
Drainage operation condition (cleavage, bedrock position)	Multi-layer media, bedrock is very deep.	Multi-layer media, bedrock depth 30-35 m	Multi-layer media, bedrock depth 20-25 m	Multi-layer media, bedrock depth 8-15 m
Drainage operation regime (head)	Low head	Low head due to South Golodnostepsky canal influence	Low head due to vegetation irrigations	Low head due to vegetation irrigations
ground water natural regime: during growing period, before leaching; during leaching; after	On irrigated fields 1.2 - 1.6; 2.3-3.0; 1.0-1.2; 1.8-2.5; On non-irrigated fields	Before and after leaching and vegetation irrigations 2.6-3.0 m, during growing period 1.5-2.5 m	Before and after leaching and vegetation irrigations 2.8-3.0 m, during growing period 1.8-2.3 m	Before and after leaching and vegetation irrigations 2.6-3.0 m, during growing period 1.8-2.3 m.

Main natural indicators and designed drainage parameters leaching up to 1- Study irrigation, m	Fergana province, c/f "Bolshevik" and "Soviet" of Altyaryk district 2.0-2.5; 3.0-3.5; 1.8-2.5; 2.4-2.6	Golodnaya steppe, s/f N 6 "Titov"		
		Southern part of farm, 1- Study pilot plot	Central part of farm	Northern part of farm
Soil type	Marshy and meadow-marshy	Marshy (hydromorphis and grey-meadow)	Grey-meadow	Grey-meadow
Permeability coefficient of unsaturated zone soil, m/day	0.2-2.0	0.12-0.24	0.28-0.5	0.3-0.58
Ground water salinity before drainage construction, g/l	On non-irrigated lands 15-21 On irrigated lands 4-8	20-45	25-30	25-30
Ground water salinity type	Sulfate, seldom carbonate-chloride with high content of sodium	Sulfate - sodium	Sulfate - chloride with high content of sodium	Sulfate - chloride with high content of sodium
Soil salinity degree before drainage construction	Strongly saline and salts	Strongly saline and salts	Slightly saline, medium and strongly saline	Slightly saline, medium saline
Salinity type	Sulfate, chloride-sulfate	Chloride-sulfate, sulfate-chloride	Chloride-sulfate	Chloride-sulfate
Drain depth, m	2.8-3.2	2.5-3.0	2.6-3.5	2.8-4.0
Drain spacing, m	238-380	90-100	100-120	160-180
Drain length, m	1.663-1.713 (всего 8.395)	0.8-1.0	1.0-1.2	1.2-1.3
Specific extent, m/ha	Total extent 36.5, including close 24.2	102	75	42-45
Tube material and diameter mm	Asbesto-cement, 141-189, length 3-4 m	Polyethilen tubes 100-150 length 6-8 m. Asbesto-cement 100-150 m, length 3-4 m.	Polyethilen, tile and ceramic 100-200. Length of ceramic tubes 0.33-0.6-1.0 m	Tile and ceramic tubes 100-150 mm, Length 0.33-1.0 m
Perforation type, slot width (orifice diameter)	Round d=8 mm 26-30 orifices per 1 m; total ori-	Slopped 100 x 3, step 300 mm, openness 0.3-0.5 %	Longitudinal slots, orifices 5 mm, openness	Openness 0.3 %

Main natural indicators and designed drainage parameters	Fergana province, c/f "Bolshevik" and "Soviet" of Altyaryk district	Golodnaya steppe, s/f N 6 "Titov"		
		Southern part of farm, 1- Study pilot plot	Central part of farm	Northern part of farm
mm	face surface - 0.254-0.34 %			
Screen material and thickness, sm	Gravel-sand mix, 15-20 sm	Sand-gravel mix, 10-15 sm	Sand-gravel mix, 10-15 sm	Sand-gravel mix, 10-20 sm
Average drainage modulus l/s/ha	0.22	0.12	0.17	0.16
Irrigation depth, m ³ /ha	1500-1800	980-2195	525-3040	886-3477
Number of irrigation	3-4.5	3-4	2-3.5	2-5
Leaching norm, th.m/ha	2.5-3.0, реже 4.5-6.15	Operation norm 3, seldom 5	2.5-3.0	3.0-3.5
Ground water regime between drains in spring and autumn, mm	Leaching period (I-III) 0.8-1.2; growing (VI-IX) 1.2-1.6; after vegetation before leaching (X-XII) 2.4-2.8; after leaching before vegetation (IV-VI) 1.8-2.3	During capital leaching 0.1-0.2; during operations leaching (I-III) 1.8-2.0; during vegetation (VI-IX) 2.4-2.5; After vegetation before operational leaching (X-XII) 2.5-3.0. After capital and operation leaching (XI-IV) 2.0-2.4	During operational leaching (I-III) 1.8-2.2; during vegetation (VI-IX) 2.4-2.6; after vegetation before operational leaching (X-XII) 3.0-3.5; After operational leaching before vegetation (I-IV) 2.2-2.4	During operational leaching (I-III) 1.6-2.0; vegetation. (VI-IX) 2.2-2.4; After vegetation before leaching (X-XII) 3.2-3.8 after leaching before vegetation (I-IV) 2.0-2.4
Ground water level recommended depth for growing period, m	Critical 2.0-2.2, recommended 1.5-2.0	Critical 2.4-2.5, recommended 2.5-2.8	Critical 2.4-2.5, recommended 2.5-2.6	Critical 2.4-2.5, recommended 2.45-2.5
Working head, m	1.0-1.5	0.8-1.0	0.4-0.5	0.2-0.4
Ground and drainage water mineralization changes, g/l	During 10 years ground water salinity decreased from 9.03 to 4.85, on chlorine from 0,245 to 0,075, drainage water from 6,11 to 4,017, and on chlorine from 0.167	During 9 years ground water salinity decreased from 20-45 to 15-19, drainage water from 44.8 to 16.1	During 9 years ground water salinity decreased from 25-30 to 11-11,2, drainage water from 26 to 9,1	During 8 years ground water salinity decreased from 25-30 to 12-16, drainage water from 19.8 to 12.1

Main natural indicators and designed drainage parameters	Fergana province, c/f "Bolshevik" and "Soviet" of Altyaryk district				Golodnaya steppe, s/f N 6 "Titov"		
	to 0.07			Southern part of farm, 1- Study pilot plot	Central part of farm	Northern part of farm	
Ground and drainage water salinity type	Carbonate-sulfate			Sulfate-sodium	Sulfate-sodium	Sulfate-sodium	
Ground water lowering rate, cm/day	1.5-3.5; lowering duration 40-60 day			4.0-6.2; lowering duration 40-50 day	5-9; lowering duration 35-45 day	3-6; lowering duration 50-65 day	
Ground water depletion rate after irrigation and leaching, cm/day	4-5			12-16	8-13	6-12	
soil salinity degree	slight and medium			slight and medium	slight, medium	slight, medium	
Volume of salt influx per year, th/ha	36.6			46.6	14.2	17.0	
Water expenses for the salt removal, m ³	150			105-140	122-144	135-160	
Recommended drainage modules, l/sec/ha (for vegetation, during leaching)	0.25 0.35			Mean 0.35 Mean 0.6-0.7	Mean 0.26 Mean 0.4-0.6	Mean 0.26 Mean 0.4-0.6	
Recommended irrigation depth, m ³ /ha	№ 1-1500, № 2-1800, № 3-1500, №4 – 1200, totally 6000			For operation period			
				№ 01 operation– 3500, № 1-900, № 2 – 1000, № 3 – 900, total 6300	№ 01 operation.- 3000, № 1 – 800, № 2 – 2000, № 3 – 900, total 5700	№ 01 operation. – 3000, №1 – 800, № 2 – 1000, № 3 – 900, total 5700	
Recommended leaching norm, m ³ /ra (slightly saline, strongly saline and salts)	Light loam	middle loam	Heavy loam	slightly saline – 10300	slightly saline – 5660	slightly saline – 4570	
	1.5	soil		medium saline – 17200	medium saline – 13400	medium saline – 11200	
	2.5	2.0	3.0	strongly saline – 38600	strongly saline – 29300	strongly saline – 26000	
	4.0	4.0	6.0	salts – 44000	salts – 32000	salts – 28000	
	6.0	8.0	16.0				
		12.0	24.0				

Main natural indicators and designed drainage parameters	Fergana province, c/f "Bolshevik" and "Soviet" of Altyaryk district	Golodnaya steppe, s/f N 6 "Titov"		
		Southern part of farm, 1- Study pilot plot	Central part of farm	Northern part of farm
Drain depth th/m	3.0-3.5	2.8-3.5	3.0-3.5	3.0-3.5
Permeability coefficient, m/day	K< 1.0 (low permeability) K=2.0 (medium permeability) K> 2.0 (high permeability)	K=0.1-0.24	K= 0.5-0.6	K= 0.5-0.6
Drain spacing, mm	150-174, 200-250, 250-300	90-100	100-120	160-180
Drain diameter, mm	Upper (500m length) 150 200 250 (according to design)	100-200 (depending on drain length)	100-200 (depending on drain length)	100-150 (depending on drain length)
Recommended filling and its thickness, cm	Gravel-sand mix with content of fraction 5-20 mm to 10 %, 0.25-5 mm 30-85 %, 0.25 mm not more 7%	sand- gravel mix $D_{10} - 0.15-0.3$ mm $D_{50} - 1.0-2.0$ mm $D_{60} - 1.4-2.5$ mm irregularity coefficient 7-10, glass mates	sand- gravel mix $D_{10} - 0.15-0.3$ mm $D_{50} - 1.0-2.0$ mm $D_{60} - 1.4-2.5$ mm irregularity coefficient 7-10, glass mates	sand- gravel mix $D_{10} - 0.15-0.3$ mm $D_{50} - 1.0-2.0$ mm $D_{60} - 1.4-2.5$ mm irregularity coefficient 7-10, glass mates
Recommended year of above drain stripes development, year	On 3-5	each 1-2	each 1-2	each 2-3
Duration of reclamation period, year	6-7	8-10	6-8	6-8
Term return, year	5-6	6-8	5-6	5-6
Annual economic benefit from close drainage introduction, rouble/ha	580		409-669	

Main results of close horizontal drainage study in Uzbekistan

Main natural indicators and established designed drainage parameters	Khorezm province, Yangiaryk district, collective farm "Pravda"	Bukhara province, Alat district, collective farm "F.Khodjaev"
Amudarya basin		
Gross area, ha	303.7	250
Site surface gradient	-0.0002	0.0002...0.0003
Lithology	from surface - loam, 1.5-2.0 m, grey sand, 10 m; red fine - grained sands, 40-50 m	interlaying sandy loam, loam, clay, permeability coefficient 0.1-0.4 m/day
Natural drainability (groundwater outflow availability)	naturally low drained zone	naturally low drained zone
Drainage operation conditions (cleavage, bedrock position)	multi-layer media, bedrock depth 60-70 m	multi-layer media, bedrock depth 10 m
Drainage operation regime (head)	low head	low head
Groundwater natural regime: during vegetation; before leaching; during leaching; after leaching before 1 st irrigation, m	during leaching 0.0-1.3 m; during vegetation 1.5-2.0 m; during non-vegetation period 2.0-2.6 m	on irrigated fields average for vegetation, 1.67-2.08 m
Soil type	meadow	meadow-desert
Unsaturated zone permeability, m/day	upper loam layer 0.15-0.40; grey sand 19.0; red sand 1-3 m	1 st sub-site 0.5-0.3 m/day; 2 nd sub-site 0.5-0.3 m/day
Groundwater salinity before drainage construction, g/l	8.8	1 st sub-site - 4-60; 2 nd sub-site- 2-15
Groundwater salinity type	sulfate	sulfate
Soil salinity degree before drainage construction	strongly saline and salts	1 st sub-site - medium and strongly saline; 2 nd sub-site - slightly and non-saline
Salinity type	sulfate	sulfate, more seldom chloride-sulfate
Drain depth, m	2-3	1st sub-site - 2.4-2.95 2nd sub-site - 2.2-2.6
drain spacing, m	150-300	1st sub-site 80-150 m 2nd sub-site - 300-400 m
Drain length, m	0.26-0.9 (total 9.136)	1st sub-site 400-650 m 2nd sub-site 350-450 m
Specific extent, m/ha	total 41, including close ≈ 39	1st sub-site 65-125 m/ra 2nd sub-site 25-35 m/ra
Tube material and diameter, mm	asbestos-cement 141-189, length 3-4 m. sand-concrete – 150, length 0.8-1.0 m. sand-concrete on clay cement– 150, length – 0.8 m. ceramics – 289,	plastic corrugated

Main natural indicators and established designed drainage parameters	Khorezm province, Yangiaryk district, collective farm "Pravda"	Bukhara province, Alat district, collective farm "F.Khodjaev"
	length 1.0 m	
Perforation type, slot width (orifice diameter), mm	round d = 5-8 mm, openness 0.2 – 0.5 %	
Screen material and thickness, cm	1) gravel-sand mix, 15-20 cm; 2) two-layer filter, 30-40 cm; 3) one-layer filter made of coarse sand, 5-10 cm; 4) crashed stone filter in basement of drainage tube 10-20 cm	protection winding with gravel-sand filling
Average drainage modulus, l/sec/ha	0.49	0.05-0.08 (2437 – 1623 m ³ /ha)
Irrigation depth, m ³ /ha	700-2500	cotton – 2.8 – 2.0 th. m ³ /ha maize – 1.2 – 1.6 th. m ³ /ha wheat – 1.8 – 2.2 th. m ³ /ha
Number of irrigation	3-4	cotton – 3-4 maize 5-6 wheat – 4-5
Leaching norm, th. m ³ /ha	3-6	2.5-3, seldom 3-4
Groundwater regime between drains in spring and autumn, m	leaching period (III) 0-1.3, vegetation (VI-IX) 1.5-2.0; after vegetation before leaching 2.0-2.6 m	
Recommended groundwater depth for vegetation, m	critical 2.0-2.8, recommended 1.8-2.0	critical 2.0-2.2, recommended 1.6-1.75
Working head, m	0.5-1.0	0.3-0.8
Ground- and drainage water salinity changes, g/l	during 3.5 years of drainage operation groundwater salinity decreased from 8.8 to 3.5	during 3 years drainage effluent salinity on strongly saline soils decreased from 20-52 to 9-35 g/l; on less saline soils - from 9.4-8.5 to 2.5-4.0 g/l
Ground- and drainage water salinity type	sulfate	sulfate
Groundwater lowering rate, cm/day	10-20; depletion duration 5-10 day	
Groundwater depletion rate during irrigation and leaching, cm/day	10-20	0.08-1.13 m/day
Soil salinity degree	non-saline and slightly saline, somewhere medium saline	areas with medium and strongly saline soils reduced by 3-5 times, salts disappeared
Annual salt removal, t/ha	46.0	salt removal during 4 years 274 t/ha (1st sub-site), 27.7 t/ha (2nd sub-site)
Water expenses for 1 t salt removal, m ³	260	
Recommended drainage modulus l/sec/ha (during vegetation, leaching)	0.4-0.5 1.2	
Recommended irrigation depth, m ³ /ha	№ 1-1500, № 2-1500, № 3-1500, №4 - 1200, total 6000	
Recommended leaching norm, th. m ³ /ha (slightly, strongly saline and salts)	slightly saline - 3000 medium saline - 5000 strongly saline - 6300 salts - 7500	

Main natural indicators and established designed drainage parameters	Khorezm province, Yangiaryk district, collective farm "Pravda"	Bukhara province, Alat district, collective farm "F.Khodjaev"
Drain depth, m	2.5-3.0	on light soils 1.9-2.3 m, on heavy soils 2.0-2.4
Permeability coefficient, m/day		
Drain spacing, m	200-300	80-150 m
Drain diameter, mm	upper (200 m length) 150 (according to design)	according to design
Recommended filter filling and its thickness, cm	gravel-sand filling, thickness 10-15 cm; gravel fraction diameter 0.5-2.0 mm	
Recommended year of above drain stripes development, year	on 2	on 3-5
Reclamation period duration, year	3-4	4-5
Return term, year	3-4	
Annual economic benefit from close drainage introduction, rouble/ha	482-515	

Water saving on background of different types of drainage
(direction 2 "Water-salt regime and ecological-reclamation processes management
on background of drainage, irrigation and leaching")

Administrative unit, district, province, republic	Specific water intake and disposal (average for 5 years)			Water supply and drainage outflow change limits within pilot plot			Water supply by field border		water saving at expense of:		
	water intake by province border, th. m ³ /ha	water disposal by province border, th. m ³ /ha	water disposal share from water intake, %	plot index	water supply, th. m ³ /ha	drainage outflow, th. m ³ /ha	actual, th. m ³ /ha	determined for plot, th. m ³ /ha	increased drainability, m ³ /ha	surface release reduction, m ³ /ha	total, m ³ /ha
Uzbekistan:											
Karakalpakstan	16.1	4.59	28	on background of horizontal drainage			9.42	9.0	420	490	910
				02.8 Uz 02.2 Uz 02.26 Uz Average 9.0	3.5-10.5 14.9-22.8 21.0-28.0 average 9.0	2.6-5.6 6.8-26.4 2.1-6.7 average 4.1					
Andijan	14.3	8.07	57	Analogue Fergana	8.07	7.0	9.38	8.07	1310	1070	2380
Bukhara	17.7	5.34	30	02.25 Uz	8.0-10.2 average 9.1	1.5-2.4 average 2.4	10.5	9.1	1400	1960	3360
Djizak	9.84	2.46	26	Analogue Syrdarya	8.1	3.82	8.10	8.1	-	-	-
Kashkadarya	13.7	2.84	22	on background of horizontal drainage			9.77	9.0	770	340	1110
				02.10 Uz 02.28 Uz	4.0-5.0 13.4-28.3	- 3.7-3.8					
				on background of vertical drainage							

Administrative unit, district, province, republic	Specific water intake and disposal (average for 5 years)			Water supply and drainage outflow change limits within pilot plot			Water supply by field border		water saving at expense of:		
	water intake by province border, th. m ³ /ha	water disposal by province border, th. m ³ /ha	water disposal share from water intake, %	plot index	water supply, th. m ³ /ha	drainage outflow, th. m ³ /ha	actual, th. m ³ /ha	determined for plot, th. m ³ /ha	increased drainability, m ³ /ha	surface release reduction, m ³ /ha	total, m ³ /ha
				02.28 Uz	17.0-22.7 Average 9.0	2.5-2.7 Average 2.5					
Navoi	14.9	5.12	34	Analogue Bukhara	9.1	2.4	9.99	9.1	890	2720	3610
Namangan	12.8	7.36	56	Analogue Fergana	8.07	7.0	8.71	8.07	640	360	1000
Surkhandarya	17.90	3.62	24	Analogue Kashkardarya	9.0	2.5	11.6	9.0	2600	1120	3720
Syrdarya	10.0	4.22	41.0	on background of horizontal drainage			7.83	8.10	-270	400	-
				02.35 Uz	4.6-11.5	0.12-0.7					
				02.27 Uz	6.0-9.0	1.26-2.97					
				02.12 Uz	8.0-9.0	1.1-1.3					
				on background of vertical drainage							
				02.12 Uz	8.0-9.0	1.04-1.5					
				02.04Uz	7.19-8.2	1.8-6.83					
				02.19Uz	6.97-9.3	1.27-4.75					
				02.17Uz	7.0-9.1	1.25-4.5					
				02.30Uz	5.5-7.5	4.0-5.0					
			02.31Uz	6.1-9.4	0.6-4.8						
			02.36Uz	6.75-9.0	1.2-5.67						
			02.37Uz	6.9-9.2	1.64-5.0						
			02.40Uz	6.45-8.6	1.2-2.3						
			02.18Uz	5.9-6.2	1.1-2.5						
				Average 8.1	Average 3.82						
Fergana	15.3	9.02	60	On background of horizontal			9.79	8.07	1720	2020	3740

Administrative unit, district, province, republic	Specific water intake and disposal (average for 5 years)			Water supply and drainage outflow change limits within pilot plot			Water supply by field border		water saving at expense of:		
	water intake by province border, th. m ³ /ha	water disposal by province border, th. m ³ /ha	water disposal share from water intake, %	plot index	water supply, th. m ³ /ha	drainage outflow, th. m ³ /ha	actual, th. m ³ /ha	determined for plot, th. m ³ /ha	increased drainability, m ³ /ha	surface release reduction, m ³ /ha	total, m ³ /ha
				drainage							
				02.7 Uz	8.4-11.5	5.1-6.8					
				On background of vertical drainage							
				02.07Uz	6.69-8.92	4.1-7.67					
				02.24Uz	7.5-8.25	4.4-7.9					
				02.33Uz	7.77-9.32	3.78-5.68					
					Average 8.07	Average 7.0					
Khorezm	22.6	10.8	55	On background of horizontal drainage			14.28	9.95	4330	3330	7660
				02.29 Uz	7.4-8.7	3.7-5.0					
				02.1 Uz	6.6-9.0	0.75-3.4					
				02.20 Uz	14-16	14					
					Average 9.95	Average 7.46					
Kazakhstan: South-Kazakhstan				On background of horizontal drainage							
				02.2 Kaz	10-11	8.1-8.6					
	10.84	2.29	21.0	02.6 Kaz	17-25	2.1-7.3	6.61	8.1	-	-	-
				02.4 Kaz	8.5	2.8					
				On background of vertical drainage							
			02.1Kaz	5.62-7.5	1.42-1.92						
			02.2.Kaz	6.07-8.09	2.24-2.68						
			02.11Uz	6.47-8.62	1.5-2.6						
			02.12Uz	7.5-10.05	1.21-4.20						

Administrative unit, district, province, republic	Specific water intake and disposal (average for 5 years)			Water supply and drainage outflow change limits within pilot plot			Water supply by field border		water saving at expense of:		
	water intake by province border, th. m ³ /ha	water disposal by province border, th. m ³ /ha	water disposal share from water intake, %	plot index	water supply, th. m ³ /ha	drainage outflow, th. m ³ /ha	actual, th. m ³ /ha	determined for plot, th. m ³ /ha	increased drainability, m ³ /ha	surface release reduction, m ³ /ha	total, m ³ /ha
				02.13Uz	7.9-11.28	1.5-4.6					
				02.14Uz	6.7-9.57	1.58-3.5					
				02.7Uz	7.8-10.4	1.0-5.0					
				02.9Uz	9.0-10.35	1.5-3.0					
				02.10Uz	6.92-9.46	2.0-3.41					
					Average 8.1	Average 3.2					
Kyzyl-Orda	17.11	3.46	20	1.01Kaz 1.09Kaz	8.1	3.2	10.26	8.1	2160	260	2420
Kyrgyzstan	10.8	6.95	64	On background of horizontal drainage			6.26	8.1	-	4450	4450
				02.5 Кыр	9.5-12.6	1.84-7.9					
				02.3 Кыр	3.41-3.49	1.41-1.71					
				02.2 Кыр	7.8-8.3 2.3-3.1	0.21-2.34					
				on background of vertical drainage							
				02.1 Кыр	7.02-8.38	0.21-0.416					
					Average 8.1	Average 2.5					
Tadjikistan Leninabad	18.13	5.43	30	On background of horizontal drainage			10.15	8.0	2150	680	2830
				02.1 Tad	14.5-16	4.5-5.0					
						Average 4.75					
Khatlon	19.55	11.94	61.0	On background of horizontal drainage			10.36	8.1	2360	3640	6000

Administrative unit, district, province, republic	Specific water intake and disposal (average for 5 years)			Water supply and drainage outflow change limits within pilot plot			Water supply by field border		water saving at expense of:		
	water intake by province border, th. m ³ /ha	water disposal by province border, th. m ³ /ha	water disposal share from water intake, %	plot index	water supply, th. m ³ /ha	drainage outflow, th. m ³ /ha	actual, th. m ³ /ha	determined for plot, th. m ³ /ha	increased drainability, m ³ /ha	surface release reduction, m ³ /ha	total, m ³ /ha
				02.4 Tad	-	0.98-1.67					
				02.6 Tad	-	13.8-15.2					
				02.5 Tad	-	13.1-15.3					
				02.7 Tad	8.8-25.3	2.84-7.3					
				On background of vertical drainage							
				02.1 Tad	10.5-13.24	8.89					
						Average 8.3					
Districts of republican subserviences	14.05	1.95	14.0	Analogue ично Khatlon	8.1	8.3	7.3	-	-	-	-
Turkmenistan	13.37	3.79	28.4	On background of horizontal drainage			7.48	9.7	-	-	-
				02.1 Tur	8.0	4.95					
				02.2 Tur	11.4	5.04					
					Average 9.7	Average 5.0					

Actual water-salt balances of pilot plots with vertical drainage

Pilot index	Main elements of water-salt balance, m ³ /ha, t/ha											water exchange between unsaturated zone and groundwater m ³ /ha	Salt influx, t/ha	Salt removal, t/ha	salt balance within unsaturated zone, t/ha (+)
	Inflow per year				Total	Outflow per year			Total	Balance elements ratio					
	precipitation	water supply	filtration	ground water inflow		evapotranspiration	drainage outflow	ground water outflow		$\frac{W+P}{ET}$	$\frac{DO}{W+P}$				
P	W	F	GI		ET	DO	GO								

Syrdarya upper reachesObjects of Uzbekistan

02.17. Uz.	1640	10370	1435	4160	17605	8240	8470	-	16710	1.45	0.71	-3770	18.2	29.2	-11
02.24. Uz.	750	9670	-	4724	15100	7750	8000	-	15750	1.34	0.76	-2670	11.6	24.0	-12.4
02.33. Uz.	1259	7700	1685	3465	14109	7861	6840	-	14701	1.13	0.76	-2006	12.8	18.9	-6.1

Objects of Kyrgyzstan

02.1. Kyr.	144	9600	-	-	9744	7718	327	-	8045	1.26	0.034	-2026	3.03	16.29	-13.26
02.2. Kyr.	Field investigations have not been conducted, only forecast calculations were made														

Syrdarya middle reaches

Pilot index	Main elements of water-salt balance, m ³ /ha, t/ha														
	Inflow per year				Total	Outflow per year			Total	Balance elements ratio		water exchange between unsaturated zone and groundwater m ³ /ha	Salt influx, t/ha	Salt removal, t/ha	salt balance within unsaturated zone, t/ha (+)
	precipitation	water supply	filtration	ground water inflow		evapotranspiration	drainage outflow	ground water outflow		$\frac{W+P}{ET}$	$\frac{DO}{W+P}$				
P	W	F	GI	ET	DO	GO									

Objects of Uzbekistan

02.4. Uz.	2500	8950	-	-	11450	5775	6248	-	12023	1.98	0.54	-5675	11.2	64.4	-53.2
02.18. Uz.	2298	7043	-	-	9341	7540	2000	-	9540	1.23	0.21	-1801	9.4	3.4	+6.0
														16.4	-7.0
02.19. Uz.	2000	10500	-	-	12500	8000	4750	-	12750	1.56	0.38	-4500	12.6	19.0	-6.4
02.27. Uz.	2000	9000	-	-	11000	7840	3850	-	11690	1.40	0.35	-3160	10.5	21.9	-11.4
02.30. Uz.	1870	8200	-	-	10070	7500	4000	-	11500	1.34	0.40	-2570	9.8	16.3	-6.5
	2150	5800	-	-	7950	8320	1500	-	9820	0.95	0.18	+370	6.96	3.2	+3.8
02.36. Uz.	2320	9000	-	-	11320	9100	4415	-	13515	1.24	0.39	-2220	10.8	22.08	-11.3
02.37. Uz.	3160	10960	-	-	14120	7500	6640	-	14140	1.88	0.47	-6620	16.4	25.4	-8.6

Objects of Uzbekistan in Kazakhstan

02.11. Uz.	2220	7500	-	-	9720	7780	2800	-	10580	1.25	0.28	-1940	9.56	14.80	-5.2
	2450	5700	-	-	8150	8256	1500	-	9756	0.98	0.18	+106	8.55	4.8	+3.8

Pilot index	Main elements of water-salt balance, m ³ /ha, t/ha														
	Inflow per year				Total	Outflow per year			Total	Balance elements ratio		water exchange between unsaturated zone and groundwater m ³ /ha	Salt influx, t/ha	Salt removal, t/ha	salt balance within unsaturated zone, t/ha (+)
	precipitation	water supply	filtration	ground water inflow		evapotranspiration	drainage outflow	ground water outflow		$\frac{W+P}{ET}$	$\frac{DO}{W+P}$				
	P	W	F	GI	ET	DO	GO								
02.12. Uz.	3148	5477	3290	-	11318	8516	3200	-	11716	1.32	0.28	-2802	11.5	13.5	-2.0
02.13. Uz.	2360	7000	2140	-	11500	8500	3050	-	11550	1.35	0.26	-3950	10.3	22.8	-12.5
02.14. Uz.	1820	7480	700	540	10540	7730	2275	422	10427	1.36	0.22	-2810	12.6	16.86	-4.26
02.7. Uz.	2481	6568	-	-	9049	9920	151	-	10071	0.91	0.02	+871	7.45	0.45	+7.0
	2540	7645	-	-	10185	7046	3481	-	10527	1.44	0.34	-3139	12.7	31.4	-18.7
02.9. Uz.	1880	9120	-	-	11000	8250	4000	-	12250	1.33	0.36	-2750	10.03	21.63	-11.6
	1971	5209	766	-	7946	8035	1400	697	10132	0.98	0.18	+89	11.14	3.14	+8.0
<u>Objects of Kazakhstan</u>															
02.1. Kaz.	2080	6700	330	420	9530	7080	1900	500	10400	1.24	0.22	-1700	3.65	5.1	-1.5
02.2. Kaz.	1840	6000	1500	2050	11390	8300	2400	-	10700	1.37	0.31	-1040	7.2	7.2	0
<u>Syrdarya low reaches</u>															
<u>Objects of Uzbekistan</u>															
02.8. Uz.	1400	20200	-	-	21600	8150	7000	-	15150	2.65	0.32	-13600	24.2	34.0	-9.8

Pilot index	Main elements of water-salt balance, m ³ /ha, t/ha														
	Inflow per year				Total	Outflow per year			Total	Balance elements ratio		water exchange between unsaturated zone and groundwater m ³ /ha	Salt influx, t/ha	Salt removal, t/ha	salt balance within unsaturated zone, t/ha (+)
	precipitation	water supply	filtration	ground water inflow		evapotranspiration	drainage outflow	ground water outflow		$\frac{W+P}{ET}$	$\frac{DO}{W+P}$				
P	W	F	GI	ET	DO	GO									
02.10. Uz.	2770	8680	828	707	12985	8130	4880	-	13010	0.71	0.43	-3320	12.26	14.64	-2.4
	<u>Objects of Kazakhstan</u>														
02.3. Kaz.	2100	22830	-	-	24930	13780	11600	-	25380	1.81	0.46	-11150	28.4	33.4	-5.0
	<u>Amudarya upper reaches</u>														
	<u>Objects of Tadjikistan</u>														
02.1. Tad.	2748	11326	3216	10374	27666	8895	15294	4032	28221	1.58	1.08	-5179	82.9	116.1	-33.2
	<u>Amudarya middle reaches</u>														
	<u>Objects of Uzbekistan</u>														
02.31. Uz.	1226	9366	1588	2561	14714	7637	6085	2604	16326	1.38	0.57	-2955	13.77	23.07	-9.3
02.40. Uz.	1390	7280	2701	-	11371	6691	3486	1196	11374	1.29	0.40	-1979	10.37	22.46	-12.09
02.41. Uz.	object encompasses several regions														
02.42. Uz.	objects encompass all Golodnaya steppe														

Regulation of unsaturated zone water-salt regime and top fine-grained soil
on background of vertical drainage

Code, index	Drainage modulus, l/sec/ha		Drainage outflow, m ³ /ha		Groundwater table regulation limits, m		Groundwater table lowering rate, cm/day		Salt balance, (±), t/ha	Groundwater salinity, g/l		Soil salinity within 0-1 m layer, % ha or t/ha	
	initial	achieved	initial	achieved	initial	achieved	initial	achieved		initial	achieved	initial	achieved

Syrdarya upper reaches

Objects of Uzbekistan

02.17. Uz.	0.13	0.24	4100	7670	1.5-2.0	2-3.5	1.5-2.0	> 10	-11	10-50	6-7	NS, WS	NS, WS
02.24. Uz.	0.14	0.22	4415	7884	1.5	1.8-3.5	1.5-2.0	8-15	-12.4	5-10	2-4	WS+MS = = 80 %	NS = 60 % WS = 40 %
02.33. Uz.	0.12	0.18	3780	5680	0.6-1.5	2-3	1.5-2.0	>8-10	-6.1	5-6	2-4	NS = 92 % WS = 8 %	NS = 100 %

Objects of Kyrgyzstan

02.1. Kyr.	0.007	0.013	210	416	3.6-3.8	2-3	-	-	-13.3	3-30	2-27	65 t/ha	35 t/ha
02.2. Kyr.	Field investigations have not been conducted, only forecast calculations were made												

Syrdarya middle reaches

02.4. Uz.	0.057	0.217	1800	6830	1.5-2.0	2-3.5	6	>10	-53.2	10-50	6-7	90 % засолен.	90 % NS.
02.18. Uz.	0.04	0.08	1100	2500	1.7-2.2	2-3	1.5-2.4	> 5	+6.0 -7.0	2.5-5	2.5-4	-	-

Code, index	Drainage modulus, l/sec/ha		Drainage outflow, m ³ /ha		Groundwater table regulation limits, m		Groundwater table lowering rate, cm/day		Salt balance, (±), t/ha	Groundwater salinity, g/l		Soil salinity within 0-1 m layer, % ha or t/ha	
	initial	achieved	initial	achieved	initial	achieved	initial	achieved		initial	achieved	initial	achieved
02.19. Uz.	0.042	0.15	1270	4750	1.8-2.2	2.5-4.0	2.5	> 5	-6.4	16-17	5-6	SS = 70 % MS = 30 %	WS = 65 % NS = 35 %
02.27. Uz.	0.042	0.12- 0.14	1250	4000- 4500	1.0-1.5	2.5-3.5	0.4	3-4	-11.4	8-25	3-6	SS = 66 % NS = 34 %	SS = 9 % NS = 91 %
02.30. Uz.	0.127	0.048	4000	1500	3.0	2.0	3-6	0.5	-6.5 +3.8	4.9	11.9	SS = 24 % WS = 76 %	SS = 60 % WS = 40 %
02.36. Uz.	0.04	0.18	1200	5670	1.2-1.8	2.5-3.5	1.5-2.5	>7-	-11.3	5-36	3-6	SS = 43 % WS = 57 %	SS = 4 % WS = 96 %
02.37. Uz.	0.05	0.160	1640	5000	1-2	2-3.5	0.5-1.5	5-10	-8.6	15-25	3-5	MS+SS = 70 %	NS+WS = 80 %
<u>Objects of Uzbekistan in Kazakhstan</u>													
02.11. Uz.	0.082	0.05	2600	1500	2-2.5	2-2.4	0.1-0.5	2-4	-5.2 +3.8	5-10	3-5	WS+MS = 88 %	SS = 39 % WS = 61 %
02.12. Uz.	0.04	0.14	1260	4410	1-1.5	1.5-4.5	0.5	3-4	-2.0	8-16	3-5	75 % saline	90 % NS
02.13. Uz.	0.05	0.15	1500	4600	1-2	2-5	0.5	3-5	-12.5	3-40	3-5	WS = 30 % SS MS = 70 %	NS WS = 80 % MS = 20 %
02.14. Uz.	0.052	0.11	1580	3500	1.5-2	2-5	0.5-1.0	5-10	-4.3	2-5	2-5	-	-
02.7. Uz.	0.03	0.16	1000	5000	1-1.5	1.8-3.5	0.2-0.4	>5	-18.7	5-10	3.5-4.0	70 % saline	94 % NS

Code, index	Drainage modulus, l/sec/ha		Drainage outflow, m ³ /ha		Groundwater table regulation limits, m		Groundwater table lowering rate, cm/day		Salt balance, (±), t/ha	Groundwater salinity, g/l		Soil salinity within 0-1 m layer, % ha or t/ha	
	initial	achieved	initial	achieved	initial	achieved	initial	achieved		initial	achieved	initial	achieved
02.9. Uz.	0.04	0.09- 0.19	1000- 1500	3000- 6000	1.2-1.5	2-3.5	0.6	>10	-11.6	5-10	3-6	70 % saline	75 % NS
<u>Objects of Kazakhstan</u>													
02.1. Kaz.	0.061	0.05	1920	1420	1.5-2.0	1.5-2.0	0.5-1.0	>5	-1.5	3-5	2-3	MS = 30 % NS = 70 %	WS = 20 % NS = 80 %
02.2. Kaz.	0.07	0.085	2240	2680	1-3	2.5-3.5	0.5	>5-6	0	2.0	1-1.5	MS = 30 % NS = 70 %	NS = 100 %
<u>Syrdarya low reaches</u>													
<u>Objects of Uzbekistan</u>													
02.8. Uz.	0.14	0.24	4280	7500	0-3.4	0-3.5	0.5	4-5	-9.8	4-5	3-4	NS+WS = 60 %	NS+WS = 75 %
02.10. Uz.	0.07	0.20	2090	3410	2-2.5	2.5-3.5	0.5	4	-2.4	2-3	1-3	WS+MS = 95 %	NS = 94 %
<u>Objects of Kazakhstan</u>													
02.3. Kaz.	0.371	0.315	11710	9930	1.2-2.5	1.2-2.5	-	-	-5.0	1.2-2.2	1.2-1.4	spares: 91 t/ha	stay: 47 t/ha
<u>Amudarya upper reaches</u>													

Code, index	Drainage modulus, l/sec/ha		Drainage outflow, m ³ /ha		Groundwater table regulation limits, m		Groundwater table lowering rate, cm/day		Salt balance, (±), t/ha	Groundwater salinity, g/l		Soil salinity within 0-1 m layer, % ha or t/ha	
	initial	achieved	initial	achieved	initial	achieved	initial	achieved		initial	achieved	initial	achieved

Objects of Tadjikistan

02.1. Tad.	0.28	0.52	8895	16405	1-2	2.5-3.0	0.75	>10	-33.2	10-15	3-5	SS = 91 %	SS = 20 %
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Amudarya middle reaches

Objects of Uzbekistan

02.31. Uz.	0.019	0.15	600	4800	0.5-2.0	1.5-3.2	1.5-3	>8-10	-9.3	5-10	1.2-3	MS+SS = 90 %	NS+WS = 94 %
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02.40. Uz.	0.04	0.073	1200	2300	1.5-2.0	2.5-2.9	0.1-0.2	3-5	-12.1	20-40	5-10	MS+SS = 90 %	NS+WS = 95 %
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02.41. Uz. regional objects

02.42. Uz. regional objects

NS - non-saline; WS - slightly saline; MS - medium saline; SS - strongly saline.

Abstracted water salinity change on pilot plot of vertical drainage depending on
complexity of top soil desalinization

Plot index	Lithology and thickness, (M _T), m	Permeability, m/day		Groundwater table lowering rate, cm/day		Initial salinity; salt distribution	Dry residue chlorine, %	Initial ground water salinity, g/l	Abstracted water salinity, g/l	
		top soil permeability	aquifer permeability	under natural conditions	under vertical drainage operation				initial	achieved

Syrdarya upper reaches

Objects of Uzbekistan

02.17. Uz.	multi-layer m ₁ = 20-50 m	0.5-1.0	20-40	1.5-2.0	>10	NS., WS	<u>up to 0.5 %</u> 0.015	2.5-7.0	0.5-1.0	0.5-1.0
02.24. Uz.	two-layer m ₁ = 6-18 m	0.5	12.5-22.4	1.5-2.0	8-15	WS, MS, SS	<u>1.5-2.0 %</u> 0.5	5-10	0.45-1.6	0.45-1.6
02.33. Uz.	two-layer m ₁ = 6-18 m	0.17-1.0	12.5-19.0	-	-	NS., WS	<u>0.3-0.5 %</u> 0.02	5-6	0.6-1.5	0.6-1.5

Objects of Kyrgyzstan

02.1. Kyr.	multi-layer m ₁ = 14-16 m	0.1-1.0	-	-	-	SS, MS	0.5-1.2 % sodium	3-30	0.26	0.37
02.2. Kyr.	multi-layer m ₁ = 15-25 m	0.1-1.0	field investigations have not been conducted							

Plot index	Lithology and thickness, (M _T), m	Permeability, m/day		Groundwater table lowering rate, cm/day		Initial salinity; salt distribution	Dry residue chlorine, %	Initial ground water salinity, g/l	Abstracted water salinity, g/l	
		top soil permeability	aquifer permeability	under natural conditions	under vertical drainage operation				initial	achieved

Syrdarya middle reaches

Objects of Uzbekistan

02.4. Uz.	two-layer m ₁ = 25-30 m	0.05	5-10	-	>6	WS, MS	1.2-1.5 %	10-50	4-5	4-5
02.18. Uz.	two-layer m ₁ = 26-34 m	0.1-0.5	30-50	1.5-2.4	>6	MS, SS up to 3.5 m	<u>0.7-1.2 %</u> 0.01-0.03	2.5-5.0	0.67-1.0	0.67-1.0
02.19. Uz.	two-layer m ₁ = 18-25 m	0.07-0.1	40-45	2.5	>8-10	SS	<u>2.03 %</u> 0.16 %	16-17	1.3-1.9	1.3-1.9
02.27. Uz.	two-layer m ₁ = 20-30 m	0.03-0.07	20-45	0.3-0.5	3-4	WS, MS, SS - superficial and deep	<u>0.5-3.5 %</u> 0.03-1.2 %	8-25	0.8-1.5	2.5-3.7
02.30. Uz.	two-layer m ₁ = up to 35 m	0.1-0.3	15-20	0.3-0.5	3-6	WS, MS,SS	<u>0.5-1.2</u> 0.02-0.03	11.9	1.5-5.0	2-5
02.36. Uz.	two- and multi-layer m ₁ = 3-400 m	0.02-3.0	5-100	1.5-2.5	>6-8	MS, SS different	<u>0.5-3.5</u> 0.03-1.2	5-36	1.5-15.0	1.5-15.0
02.37. Uz.	two-layer m ₁ = 18-25 m	0.07-0.1	40-45	0.5-1.5	5-10	MS, SS superficial	<u>1.5-3.0 %</u> 0.2-0.4 %	15-25	1.5	2.5

Plot index	Lithology and thickness, (M _T), m	Permeability, m/day		Groundwater table lowering rate, cm/day		Initial salinity; salt distribution	Dry residue chlorine, %	Initial ground water salinity, g/l	Abstracted water salinity, g/l	
		top soil permeability	aquifer permeability	under natural conditions	under vertical drainage operation				initial	achieved

Objects of Kazakhstan

02.11. Uz.	two- and multi-layer m ₁ = 20-80 m	0.07-0.12	16-30	0.1-0.5	2.5-4.0	WS, MS, SS on full depth	<u>0.5-1.2</u> 0.03-0.2	5-10	3-5	5-6
02.12. Uz.	two-layer m ₁ = 15-40 m	0.03-0.07	16-30	0.5	3.5-4.0	WS, MS, SS on full depth	<u>0.5-1.8</u> 0.03-0.3	8-15	3.5-4.0	4.0-4.5
02.13. Uz.	two-layer m ₁ = 8-40 m	0.05-0.25	16-25	0.5	3-5	MS, SS	<u>1.2-2.4</u> 0.2-0.4	10-40	1-3	1.5-3.5
02.14. Uz.	two-layer m ₁ = 0.2-20 m	0.5-0.8	20-400	0.5-1.0	5-10	WS, MS	<u>0.2-0.5</u> 0.01-0.03	2-5	0.5-1.5	0.5-1.5
02.7. Uz.	two- and multi-layer m ₁ = 15-25 m	0.1-0.15	20-30	0.2-0.4	>5	WS, MS, SS on full depth	<u>0.7-1.5</u> 0.03-0.3	5-10	4-4.5	4.5-5.0
02.9. Uz.	two- and multi-layer m ₁ = 5-25 m	0.13-0.15	25-35	0.6	>10	WS, MS, SS on full depth	<u>0.6-1.8</u> 0.04-0.3	5-10	4-5	4-5

Objects of Kazakhstan

02.1. Kaz.	two- and multi-layer	0.2-0.5	20-50-150	up to 1.0	>5	NS, MS, WS	<u>0.2-0.5</u> 0.01-0.03	3-5	0.5-1.5	0.7-2.5
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Plot index	Lithology and thickness, (M _T), m	Permeability, m/day		Groundwater table lowering rate, cm/day		Initial salinity; salt distribution		Dry residue chlorine, %	Initial ground water salinity, g/l	Abstracted water salinity, g/l	
		top soil permeability	aquifer permeability	under natural conditions	under vertical drainage operation					initial	achieved
	m ₁ = 0.8-20 m										
02.2. Kaz.	two- and multi-layer m ₁ = 0.8-20 m	0.2-0.5	20-50-150	up to 1.0	>5	NS, MS	WS,	<u>0.2-0.5</u> 0.01-0.03	2.0	0.5-0.6	0.5-0.6
<u>Syrdarya low reaches</u>											
<u>Objects of Uzbekistan</u>											
02.8. Uz.	two-layer, m ₁ = 0.5-11 m	0.3-0.4	>12	0.5-3.0	5-10	NS, WS	superficial	<u>0.3-0.4</u> 0.06-0.65	3.8-5.0	1-3.5	1-3.5
02.10. Uz.	two-layer, m ₁ = 0.1-10 m	0.3-0.4	9-16	0.07	>8-10	WS, MS	superficial	<u>0.2-1.0</u> 0.03-0.07	2-3	0.94	1.38
<u>Objects of Kazakhstan</u>											
02.3. Kaz.	two-layer, m ₁ = 0.1-3 m	0.37	12	-	-	MS	superficial	<u>0.3-0.4</u> 0.06-0.075	2.2	0.8	0.8
<u>Amudarya upper reaches</u>											
<u>Objects of Tadjikistan</u>											
02.1. Tad.	two-layer, m ₁ = 6-7 m	0.02-1.0	10-20	0.5	>2.8	WS, MS, SS		<u>2.5-3.0 %</u> up to 0.8	10-50	6.0	10.4

Plot index	Lithology and thickness, (M _T), m	Permeability, m/day		Groundwater table lowering rate, cm/day		Initial salinity; salt distribution	Dry residue chlorine, %	Initial ground water salinity, g/l	Abstracted water salinity, g/l	
		top soil permeability	aquifer permeability	under natural conditions	under vertical drainage operation				initial	achieved

Amudarya middle reaches

Objects of Uzbekistan

02.31. Uz.	two-layer, m ₁ = up to 15 m	0.5-1.0	40-45	1.5-3.0	>8-10	MS, SS superficial 0.2-0.5 m	0.5-1.0 %	5-10	1.5-3.0	1.5-3.0
02.40. Uz.	two-layer, m ₁ = 4-12 m	0.5-4.0	10-50	0.1-0.2	>3-5	MS, SS	0.5-1.0 %	20-40	1-3	3-8

Explanations: NS - non-saline; WS - slightly saline; MS - medium saline; SS - strongly saline.

Assessment of reclamation efficiency and irrigation water expenses per agricultural production unit
(direction 2: «Regulation of water-salt regime and ecological-reclamation processes management
on background of drainage, irrigation and leaching (vertical drainage)»)

Plot index	Soil-climatic zone	water allowance	Agricultural crop	Data type	Water supply, m ³ /ha per year		Drainage modulus	Soil 0-1 m layer salinity, %, ha or t/ha	Yield, c/ha	Yield increase (+) or decrease (-)	Irrig. water expenses per yield unit, m ³ /c	Irrig. water productivity at field level, kg/m ³	
					net	gross						experiment	FAO recommend.

UZBEKISTAN

02.04	Ц-П-Б	V	cotton	initial	8950	9850	0.057	90 % saline	22	+12(55)	406	0.245	0.4-0.6
				achieved	7190	8200	0.217	90 % NS	37		194	0.515	
02.17	Ц-П-А	V	cotton	initial	6770	9030	0.13	-	27	+5(19)	250	0.399	0.4-0.6
				achieved	6690	8920	0.24	-	32		210	0.478	
02.18	Ц-П-Б	V	cotton	initial achieved	5300	5840	0.04	-	12.4	+9(73)	470	0.232	0.4-0.6
02.19	Ц-П-Б	V	cotton	initial	6970	9300	0.04	SS=70% MS=30%	5	+20(400)	1860	0.071	0.4-0.6
				achieved	6970	9300	0.15	WS=65% NS=35%	25		372	0.360	
02.24	Ц-П-А	V	cotton	initial	8100	8910	0.14	WS+MS=80%	25	+10(40)	356	0.309	0.4-0.6

Plot index	Soil-climatic zone	water allowance	Agricultural crop	Data type	Water supply, m ³ /ha per year		Drainage modulus	Soil 0-1 m layer salinity, %, ha or t/ha	Yield, c/ha	Yield increase (+) or decrease (-)	Irrig. water expenses per yield unit, m ³ /c	Irrig. water productivity at field level, kg/m ³	
					net	gross						experiment	FAO recommend.
				achieved	7500	8250	0.22	NS=20% NS=60%	35		235	0.466	
								MS=40%					
02.27	Ц-П-Б	V	cotton	initial	5200	7020	0.042	SS=66% NS=31%	10	+20(200)	702	0.192	
				achieved	7000	9100	0.14	SS=9%	30			0.420	0.4-0.6
								NS=91%					
02.30	Ц-П-Б	IV	cotton	initial	6540	9340	0.127	SS+MS=24% WS=76%	22.4	-4.9(22)	571	0.342	0.4-0.6
				achieved	5475	7500	0.048	SS=60%	17.5		428	0.319	
								WS=40%					
02.31	Ц-П-А	IV	cotton	initial	6200	7750	0.019	MS+SS=90%	14	+16(114)	554	0.225	0.4-0.6
				achieved	6110	9400	0.15	NS	30		313	0.490	
								WS=94%					
02.33	Ц-П-А	V	cotton	initial	7800	9360	0.12	NS=92% WS=8%	27	+8(30)	347 266	0.346	0.4-0.6
				achieved	7770	9320	0.18	NS=100%	35			0.450	
02.36	Ц-П-Б	V	cotton	initial	6000	7500	0.04	SS=43%	15	+15(100)	500	0.250	0.4-0.6

Plot index	Soil-climatic zone	water allowance	Agricultural crop	Data type	Water supply, m ³ /ha per year		Drainage modulus	Soil 0-1 m layer salinity, %, ha or t/ha	Yield, c/ha	Yield increase (+) or decrease (-)	Irrig. water expenses per yield unit, m ³ /c	Irrig. water productivity at field level, kg/m ³	
					net	gross						experiment	FAO recommend.
				achieved	6750	9000	0.20	SS=4%	30		300	0.444	
02.37	Ц-П-Б	V	cotton	initial	6000	6300	0.05	MS SS=70%	14	+14(100)	450	0.233	0.4-0.6
				achieved	6900	9200	0.16	NS WS=80%					
02.40	Ц-П-Б	V	cotton	initial	5140	6850	0.04	MS SS=90%	12.7	+9.2(72)	539	0.247	0.4-0.6
				achieved	6450	8600	0.073	NS WS=95%	21.9		393	0.340	
OBJECTS OF UZBEKISTAN IN KAZAKHSTAN													
02.11	Ц-П-Б	IV	cotton	initial	7500	9375	0.082	MS SS=12% WS=88%	36	-9(25)	260	0.480	0.4-0.6
				achieved	6470	8620	0.048	WS=61% MS SS=39%	27		239	0.418	
02.12	Ц-П-Б	V	cotton	initial	5500	7150	0.05	75% saline	11	+21(190)	650	0.200	0.4-0.6
				achieved	7500	10050	0.14	NS=90%	32		345	0.462	
02.13	Ц-П-Б	V	cotton	initial	7880	11250	0.05	WS=30% MS	16	+12.1(76)	703	0.202	0.4-0.6

Plot index	Soil-climatic zone	water allowance	Agricultural crop	Data type	Water supply, m ³ /ha per year		Drainage modulus	Soil 0-1 m layer salinity, %, ha or t/ha	Yield, c/ha	Yield increase (+) or decrease (-)	Irrig. water expenses per yield unit, m ³ /c	Irrig. water productivity at field level, kg/m ³	
					net	gross						experiment	FAO recommend.
				achieved	7900	11280	0.15	SS=70% NS	28.1		401	0.356	
								WS=80% MS=20%					
02.14	Ц-П-Б	V	cotton	initial	6800	9700	0.05	-	15.7	+8.5(54)	617	0.230	0.4-0.6
				achieved	6700	9570	0.11	-	24.2		395	0.360	
02.7	Ц-П-Б	V	cotton	initial	8400	10500	0.03	70% saline	24	+8(33)	437	0.285	0.4-0.6
				achieved	7800	10400	0.16	NS=94%	32		351	0.410	
02.9	Ц-П-Б	V	cotton	initial	8800	10120	0.04	70% saline	19	+19(100)	532	0.216	0.4-0.6
				achieved	9000	10350	0.14	NS=75%	38		272	0.422	
02.10	Ц-1-A1	IV	cotton	initial	6860	9380	0.07-0.1	WS+MS=	24		409	0.349	
				achieved	6920	9460	0.14-0.20	95% NS=94%	32	+8(33)	296	0.462	0.4-0.6
KAZAKHSTAN													
02.1	C-П-A1	V	cotton	initial	7500	10000	0.061	MS=30% NS=70%	15		666	0.200	0.4-0.6
										+10(67)			

Plot index	Soil-climatic zone	water allowance	Agricultural crop	Data type	Water supply, m ³ /ha per year		Drainage modulus	Soil 0-1 m layer salinity, %, ha or t/ha	Yield, c/ha	Yield increase (+) or decrease (-)	Irrig. water expenses per yield unit, m ³ /c	Irrig. water productivity at field level, kg/m ³	
					net	gross						experiment	FAO recommend.
				achieved	5625	7500	0.05	NS=80%	25		300	0.444	
								WS=20%					
02.2	C-II-A1	IV	cotton	initial	5500	6500	0.017	NS=70%	12		540	0.218	
								MS=30%		+13(108)			0.4-0.6
				achieved	6070	8090	0.017	NS=100%	25		372	0.418	
KYRGYZSTAN													
02.1	Ц-II-Б	IV	lucerne	initial	5400	6000	0.007	65t/ha	131	+58(44)	46	2.18	1.5-2.0
				achieved	7020	8380	0.013	35 t/ha	189		44	2.25	
TADJIKISTAN													
02.1	Ю-1-Г	IV	cotton	initial	-	13240	0.52	SS=91%	13	+6.3(48)	1018	0.09	0.4-0.6
				achieved	-	10522	0.28	SS=20%	19.3		545	0.183	
			lucerne	initial	-	13240	0.52	SS=91%	38	+51(134)	348	0.290	1.5-2.0
				achieved	-	10522	0.28	SS=20%	89		118	0.845	

Abbreviations: NS - non-saline; WS - weakly saline; MS- medium saline; SS - strongly saline.