

**REGISTER OF RESEARCH ON IRRIGATION AND DRAINAGE**

**QUESTIONNAIRE**

<b>A</b>	<b>Project title:</b> Selection of optimal parameters and investigation of economic and reclamation efficiency of lose horizontal drainage (CHD) for northern part of Karakalpakistan.
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<b>B</b>	<b>Topic n° :2</b>	Sub-topic n°: 1,2
<b>1)</b>	1	Technical field n°: 2
<b>2)</b>	Category n°: 0	

<b>C</b>	<b>Project location:</b>		
	Country: Republic of Kazakhstan	Area: 160 ha	
	Karakalpakistan, Kegeily district, collective farm "Khalkabad"		

<b>D</b>	<b>Duration of the project</b>		
	Year in which the project was started: 1975	Project completed: 1995	
		Dates of Expertise: 1977, 1985,1991	

<b>E</b>	<b>Organizations and technical staff involved</b>				
1	Supervisor/project coordinator: Kurbanbayev Erezhep Organization: SANIIRI  Address: 12, Dosnazarova str, Nukus telephone: 7 - 36122- 32509 E-mail:			fax:	%
					Staff resources 100
	Other counterparts:	Organizations	Surname	First name	
1					%
2					%
3					%
4					%
	Other collaborators:		man-years		

<b>F</b>	<b>Funding agencies</b>	
	Full name or acronym	Percentage of project finance provided
1	Ministry for Land Reclamation and Water Management	100%
2		%
3		%

<b>G</b>	<b>Summary of research project</b>
<p><b>1 Objective and Technical field:</b>  Feasibility study for close drainage application in Karakalpakistan. Study of soil water-salt regime particularities and groundwater regime on background of CHD . Selection of optimal versions of cheap and long working design of CHD with regard to local conditions of AmyDray lower reaches and local material use.  Objectives: Improvement of irrigated lands reclamation state on background of CHD.</p>	
<p><b>2 Scientific and technical approaches:</b>  Irrigated lands reclamation state improvement by means of drainage construction. Selections of cheap types of drainage with use of local materials. Selection of optimal versions of reclamation regime (on background of CHD), providing agricultural crops high yield lowest costs.</p>	
<p><b>3 Environment characteristics:</b>  Climate is sharply continental.  Average annual temperature is 12 °C, relative air humidity is 51 - 81%  Frost-free period duration is 200-230 days. Evaporativity is high (1200mm/year), precipitation is low (80-100mm/year).  Geomorphology: multilayer quaternary sediments consisting of sandy loam, loam and sand. Cover sediments thickness is 2-10m, thickness of fine-grained sand, underlying cover loam is 10-15m.  Cover sediments permeability coefficient is 0,05-1,0m/day, for sand - 1-15m/day.  Groundwater level is 1,5-3,0m. Water salinity is 5-20 g/l.  Before land development (1985) lands were mainly strongly salinized but by 1995 strongly salinized lands area was only 25-30% of whole area. Type of salinity is chloride - sulphate.</p>	
<p><b>4 Parameters of Pilot Projects and Technical Solutions:</b>  CHD efficiency was studied by dense network of observation wells all over the site as well as on separate transects for groundwater depletion curve observation. Water accounting was performed according to commonly accepted methodology. Soil water-salt regime changes were studied by soil survey including determination of soil permeability coefficient, volume and specific weight, etc.</p>	
<p><b>5 Methodology:</b>  Area of CDH construction is 160 ha. Drainage extent is 3100m and open drain - 1600m. Spacing is 400m. Length of each drainage line is 1000 m. Area of each check (200x200m) is 4 ha and furrow length is 200m.  Four versions of close drainage design: a) using asbestos-cement tubes d-300mm with gravel-sand treatment: b) corrugated tube with gravel-sand treatment: c) corrugated tube with treatment from local sand: d) corrugated tube without treatment.  Primary drains depth is 2.1-2,7 m with spacing 400m. Drainage outflow is pumped out by pumping station located at the drain's tail.</p>	
<p><b>6 Results:</b>  Since 1985 irrigation and drainage network construction was started. Dense network of observation wells for soil water-salt regime changes and groundwater behavior study. In 1991 construction was completed.  Construction of CHD created possibility:  - to manage by soil salt-water regime;  - to create optimal area drainability and optimal groundwater level depth. Drainage modulus was 0,12-0,18 l/sec/ha and drainage outflow value was increased up to 20 l/sec versus 3-8 l/sec (before CHD construction);</p>	

- to reduce drainage effluent salinity since 1985 till 1995 from 12,0 to 5,8 g/l i. e. by 2 times;
- to raise land use efficiency up to 0,8 versus 0,32 before CHD construction;
- to provide high groundwater depletion rate after leaching and irrigation. This rate achieved 20-25 cm/day (5,7 cm/day on adjacent field);
- to manage by topsoil desalinization rate by leaching regime of irrigation. Within the experimental site cotton irrigation norm was 2500-3500 cu.m/ha; irrigation norm for rice was 22000-25000 cu.m/ha on adjacent fields. Leaching rate was 3000-7000 cu.m/ha. Total water-intake (without rice) varies within 5500-10.500 cu.m/ha. This type of regime created favorable conditions for topsoil desalinization. Within 1985-1995 area of strongly salinized lands was reduced from 81ha (67,5%) to 18,2 ha (14,6%). Non-salinized lands area increased from 0 to 26,3 ha; slightly salinized lands area did not change; middle salinized lands area increase by 2,5 times from 24ha (20%) to 65,6 ha (52,3%);
- to reduce groundwater salinity from 18,0 g/l (1985) to 6,0 g/l (1995), i. e. by 3 times;
- to increase drainage outflow from 12 th. cu.m (1985) to 425,2 tj.cu.m (1993); This was caused by rice growing area increase. within income item of water balance water-intake constitutes 98%, which expense items total evaporation constitutes 60% and drainage outflow 40%, losses due to poor field leveling are 8% and surface runoff is 5%;
- to increase sharply salt removal out of irrigated lands up by 6 times from 667 t (1985) to 3648 t (1995);
- to raise cotton yield from 1,23t/ha (1986) to 1,76/ha (1995).

Observations showed, that within zone of influence of drain - 3 and drain -4 designed drainage modulus was not achieved because of their low workability. Drainage outflow should be pumped from area 100-200 ha that is too expensive.

H	Suggested key-words		
1	Close horizontal drainage	4	Soil salinization
2	Filter filling	5	
3	Water-salt balance	6	

I	Most recent publications (maximum 3)			
1	Author(s): E. Kurbanbayev			
	Title: Results of close horizontal drainage efficiency study in collective farm Khalkhabad are considered.			
	Publication details:			
	Year of publication: 1989	free access <input checked="" type="checkbox"/>	restricted <input type="checkbox"/>	confidential <input type="checkbox"/>
2	Author(s):			
	Title:			
	Publication details:			
	Year of publication:	free access <input type="checkbox"/>	restricted <input type="checkbox"/>	confidential <input type="checkbox"/>
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	Title:			
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