REGISTER OF RESEARCH ON IRRIGATION AND DRAINAGE

QUESTIONNAIRE

A	Project title:
	Study of open horizontal drainage system productivity regularity and its influence on indices of irrigated lands (old developed zone of Golodnaya Steppe)

B	Topic n°: 2	Sub-topic n°: 2
1)	1	Technical field n°: 3
2)	Category n°: 02	

C	Project location	
	Country: Republic of Uzbekistan	Area: 223,66 th. ha
Mary province, SyrDarya province		

D	Duration of the project:	
	Year in which the project was started: 1966	Project completed: 1978
		Dates of Expertise: 1978

E	Organizations and technical staff involved	
1	Supervisor/project coordinator: Gaipnazarov N.	%
	Organization: SANIIRI	Staff resources 100
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	Other counterparts: Organizations Surname First name	
1		%
2		%
3		%
4		%
Other collaborators: man-years		

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

G	Summary of research project

1 *Objective and technical field:*

Identification of open horizontal drainage failures regularity, definition of its influence on irrigated lands reclamation conditions.

2 *Scientific and technical approaches:*

Study of different natural and artificial factors influence on drainage system's productivity.

3 *Environment characteristics:*

Pilot site's borders are: SyrDarya river on the north and east; Central Golodnostepsky and Eastern collectors on the west; Djetisay collector on the south. Since December till March 60% of precipitation occurre, that leads to groundwater level rise and influences drainage system operation. Temperature changes between day and night in early spring lead to alternative freezing and melting of collectors slope. High temperatures in summer lead to vegetation development inside the collectors.

Relief: proluvial plain with altitude 250 -300m and slope 0,001 - 0,002. Surface is slightly corrugated. Groundwater level is 1,5 - 4m. loam permeability coefficient is 0,1 - 0,6m/day; sandy loam 0,4 - 1,0m/day; sand 2,5 - 20m/day. Slightly salinizated groundwater spread over I and II SyrDaray bottoms. Within Shuruzyak sink and Bayaut scheme groundwater salinity is 3 - 10 g/l. Within Djetisay and Sardoba sinks its salinity is 5 - 20 g/l and more salinity type is sulphate -chloride and cholide -sulphate. Groundwater inflow to III bottoms is 0,0135 l/sec/ha, outflow is 0,0005 l/sec/ha, difference is +0,013 l/sec/ha. Within the area of artesian water spreading of I;II bottoms inflow from beneath is 0,011 l/sec/ha, drainage by river is 0,0139 l/sec/ha, difference is 0,003 l/sec/ha. Within I;II bottoms outside of artesian water spreading area inflow is 0,0008 l/sec/ha, drainage by river 0,05 l/sec/ha, difference is 0,049 l/sec/ha.

Soils: grey - medow, slightly and middle salinizated .

Soil water-physical properties: volume weight of skeleton is 1,42 - 1,53 tn/cu.m; porosity is 43 - 47%, number of plasticity is 3 - 19, strength of shift resistance under normal (0,5 kg/sq.cm) pressure is 0,40 - 0,64 kg/sq.cm.

4 *Parameters of Pilot Projects and Technical Solutions:*

For drainage failure regularity study methods of mathematical statistics were used. Conformity of theoretical and empirical distributions were verified by certain criterion, logarithms equity and by median of actual distribution of mean arithmetic versions. Drainage system productivity decrease influence on reclamation conditions of land was determined by methods of common and private water-salt balance.

5 *Methodology:*

Area of pilot site is 223,66th/ha (gross) or 144.02 th/ha (net). Water supply is performed through canal Dustlik, South - Golodnostepsky canal and machine - canal system. In-farm irrigation network lined by concrete extent is 14,7%, density is 24,1m/ha, efficiency is 0,70 - 0,73. Inter-farm network efficiency is 0,92 - 0,95. Horizontal drainage density is 28,6 m/ha, drain's depth is 1,93 - 2,66 m. Number of vertical drainage wells is 636, load on one well is 351 ha.

6 *Results:*

Following factors of impact on drainage productivity are considered:

1) engineering and hydrological, 2) biological, 3) operational.

To study drains' slope stability soil - profiles were divided by types which showed that stability raises with heavier soil mechanical composition and growth of gypsum content. As result investigations close relationship (Kk=0,73) between slopes stability and soil effective diameter was found. Profiles type I -II are constituted by soils with effective diameter bigger than 0,004 mm, profiles type III - IV less than 0,004mm.

Study found that siltation is more intensive for all types of soil within the first year after cleaning more in collectors and light soils and less in drains and heavy soils. Later siltation intensity stabilizes itself and slows down. Cleaning frequency is 2,9 (I), 3,0 (II), 36 (III), 4,4 (IV) years.

Siltation intensity: type I - 23,5 ; type II - 15,9; type III - 14,7 cm/year. Empirical distribution of cleaning frequency and settlement intensity, which is best approximated by theoretical log-normal low of distribution is obtained. Relationship between drains' working depth and vegetation development is found. Irrigated land zoning on siltation and vegetation development is performed. Actual common water-salt balance for Bayaut, Gulistan, Mirzoabad, SyrDarya districts for 1982 - 1986 show that within zone of vertical drainage open horizontal drainage removes 718 - 2868 cu.m/ha water per year which constitutes 12,9 - 54,9 % of total drainage outflow or 16 - 46% of salts. By method of grouping of drainage system technical state and irrigated land reclamation conditions was found that with technical state deterioration groundwater level and salinity increase. Area of non-salinizated lands decreased from 19 to 8% (1990 - 1996), middle salinizated lands increased from 4 to 8,3 % (1990 - 1996). Cotton yield decreased from 2,85 to 1,7 t/ha (1990 - 1996) . By calculations of water-salt balances for Gulistan district was proved that drains' 0,6m siltation will lead to increase after 10 years of groundwater level 0,4m water salinity 7 g/l and soil salinization 0,18%. Taking into account all these forecasts recommendations on time and volume of drains' cleaning in Gulistan district were developed which allow to provide optimal soil water-salt regime and crops yield growth. Economic effect is 56,7 th rouble/year.

H	Suggested key-words		
1	Collector-drainage network	4	Productivity
2	Operational reliability	5	Reclamation state
3	Failure	6	

I	Most recent publications (maximum 3)			
1	Author(s): N. Gaipnazarov			
	Title: Study of open horizontal drainage failure regularity within old developed zone of Golodnaya Steppe			
	Publication details: On the base of field tests and laboratory analysis assessment of drainage system productivity is given with assistance of mathematical statistics and theory of chance methods.			
	Year of publication: 1978	free access [•]	restricted[ ]	confidential [ ]
2	Author(s):			
	Title:			
	Publication details:			
	Year of publication:	free access [ ]	restricted[ ]	confidential [ ]
3	Author(s):			
	Title:			
	Publication details:			
	Year of publication:	free access [ ]	restricted[ ]	confidential [ ]