REGISTER OF RESEARCH ON IRRIGATION AND DRAINAGE

QUESTIONNAIRE

A	**Project title:**
	Development of set of measures on vertical drainage system operation perfection and water supply improvement for irrigated lands of Aris-Turkestan scheme under scare water resources.

B	**Topic n^{o} :2**	Sub-topic n^{o}: 2
1)	1	Technical field n^{o}: 3
2)	Category n^{o}: 02	

C	**Project location:**		
	Country: Republic of Kazakhstan	Area: 52,4ha	
Chimkent province.			

D	**Duration of the project**		
	Year in which the project was started: 1987	Project completed:	1989
		Dates of Expertise:	1989

E	**Organizations and technical staff involved**	
1	Supervisor/project coordinator: Djurayev Murodjan	%
	Organization: SANIIRI Address: 11, Karasu -4, Tashkent telephone: 65-32-41 fax: E-mail:	Staff resources 70
Other counterparts:	Organizations Surname First name	
1	Ganikhodjayev Borikhon, SANIIRI	30%
2		%
3		%
4		%
Other collaborators:	man-years	

F	**Funding agencies**	
	Full name or acronym	Percentage of project finance provided
1	Chimkent Reclamation Department	100%
2		%
3		%

G	Summary of research project

1 *Objective and technical fields:*

Development of measures on groundwater removal enchancing by vertical drainage well, optimization of conjunctive use of surface and groundwater and re-allocation scare water resources among districts and farms.

2 *Scientific and technical approaches:*

Study of groundwater hydrochemical regime, dynamic groundwater stock revision.

Meaning: recommendations development on optimal groundwater discharge and water resources re-distribution for reliable irrigation lands supply.

3 *Environment characteristics:*

Geomorphology: alluvial premountain plain.

Climate: sharply continental. Average air temperature is 12.1 ^{0}C. Precipitation 188,1-214,6mm. Maximum relative humidity in December-January is 75-82% and minimum one is 28-37%. Wind velocity is 14-15 m/sec, direction is north and north-west. Cover sediments are loam and sandy loam (0,2-20m) which are underlaid by gravel-pebble depositions (54m). Cover loam permeability coefficient is 0,5-0,8 m/day, for gravel-pebble sediments 200-400 m/day. Groundwater level is 1,5-7m; its salinity is 1-5 g/l. Salinizated lands area is 22th.ha. Salinization type is chloride-sulphate.

4 *Projects and Technical Solutions:*

Irrigated area is 52,4 ha. Cotton encompasses about 60% of land. Land use efficiency is o,58-0,71. Irrigation is performed from Turkestan canal which length is 140km and discharge is 45 cm.m/sec. Water is supplied by gravity. System's efficiency is 0,77. There are 504 vertical drainage wells (VDW), their depth is 30-40 l/sec. Average yield of each well is 35-45 l/sec. Area served by one well is 104 ha. Extent of open collector-drainage network is 523km.

5 *Methodology:*

Field investigations on water and salt movement, water-salt balance elements measurements. Pilot sites are located within state farms «Timiryazev», «Isakhanov», «Satpayev» and «Communism», which are equipped by updated devices and equipment for measurement of water balance elements.

6 *Results:*

Aris-Turkestan irrigation system was supplied by water since 1976 less than before on 26-47%, i.e. it was 234,6-355,4 mln cu.m instead of 440,7-499,6 mln. cu.m. Water supply coefficient was 0,50-1,11. Taking into account groundwater it was actually 0,84-1,16 respectively. Salinization type is sulphate-chloride. Before land development groundwater level was 4-10m. After development irrigation became main source of groundwater recharge (90%), groundwater level stabilization was observed within 1981-1989; groundwater level is 1-5 m (59-90% of irrigated land). Groundwater salinity varies within wide limits depending on level, soil salinization, territory's darinability. Salinity 1-3 g/l prevails. System's useful operation efficiency is 0,07-0,48. Pumped water salinity is 0,5-2,0 g/l, whose quality is satisfactory for irrigation. Salinizated lands are located mostly within Bugun district due to unsatisfactory drainability. Soil moisture regime study showed that in Turkestan district intensive VDS operation within growing season adversely influences soil moisture within non-growing period. Before next irrigation moisture within the calculated layer decreases to 58-62% FFMC. Total and private water-salt balances had alternative mark depending on year supply. Irrigation leaching regime efficiency is 0,85-1,15. Main salt influx occurred at expense of irrigation water. Salt removal was executed by drainage and groundwater outflow. Salt accumulation was observed only within Bugun district where within unsaturated zone accumulation was 1,2-2,5 t/ha. Cotton yield in Bugun district was 1,57-2,42 t/ha, in Turkestan district 0,83-0,23 t/ha due to low water supply. For optimal reclamation regime

and groundwater level support on optimal depth water supply for Bugun district should be 2200 cu.m/ha or 55.028 mln cu.m/year. For this purposes VDS should work within the growing period with operation efficiency 0.75-85 and within non-growing season within efficiency 0,06-0,26. Pumped groundwater use for irrigation allows to decrease water intake from Turkestan canal to Bugun district on 49,772mln.cu.m/year and this amount of water should be transferred to Turkestan district. After this measure has been undertaken VDS in Turkestan district will with efficiency 0,2-0,3 within growing season and provide intake of 37,208 mln. cu.m/year. Within dry years system should work with higher efficiency within the growing period (0,62-0,72). Optimization of VDS work and surface water resources re-distribution would allowed to obtain higher cotton yield.

H	**Suggested key-words**		
1	Irrigation regime	4	Soil water-salt regime
2	Groundwater level	5	Vertical drainage system
3	Soil salinization	6	Water resources re-distribution

I	**Most recent publications (maximum 3)**			
1	Author(s): D. Muradjan, G. Borikhon			
	Title: Specific features of drainage water use for irrigation.			
	Publication details: Investigations' results are described on definition of VDC operation rational regime for groundwater level support on optimal depth using it for irrigation.			
	Year of publication: 1992	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 [ ]