REGISTER OF RESEARCH ON IRRIGATION AND DRAINAGE

QUESTIONNAIRE

A	**Project title:**
Study of soil reclamation regime management within large schemes on background of vertical drainage.	

B	**Topic n^o : 2**	Sub-topic n^o: 2
1)	2	Technical field n^o: 2
2)	Category n^o: 01	

C	**Project location**		
Country: Republic of Uzbekistan		Area: 117100 ha	
SyrDarya province			

D	**Duration of the project:**		
Year in which the project was started: 1960		Project completed:	1985
		Dates of Expertise:	1985

E	**Organizations and technical staff involved**	
1	Supervisor/project coordinator: Eremenko G. Organization: VNIIGIM Address: 44, B. Academichesky, Moskow telephone: fax: E-mail:	% Staff resources 100
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:*

Management by soil reclamation regime, prevention of soil salinization and land productivity increase by means of groundwater pumping providing water-salt regime management with regard to leaching regime of irrigation.

2 *Scientific and technical approaches:*

Prevention of soil salinization and land and water productivity increase on the base of drainage improvement and salt removal by means of groundwater pumping with optimal regime.

Meaning: Elaboration of the set of water reclamation recommendations on irrigation water and irrigated lands productivity increase and water saving.

3 *Environment characteristics:*

Climate: average temperature is 12,5 - 13 ^{0}C. Evaporativity is 12 - 16th.cu.m/ha. Humidity deficit is 9 - 13th.cu.m/ha

Lithology: Cover loam (20 - 30 m) is middle and heavy with clay stratum with permeability coefficient (Kp) 0,03 - 0,07 m/day and overflow coefficient (B) $\geq$ 700 m/day.

Hydraulic links between groundwater and artesian water are characterized by W = 0,002 - 0,05m/day. Within the Bayaut scheme easy soluvable salts are distributed all over cover loam thickness. Their content is 0,4 - 0,5% on solid residue and 0,01 - 1,0% on chlorine. Salinization type is sulphate and sulphate-chloride. Groundwater level is 1-2m, salinity is 15 - 15g/l sulphate-chloride. Within Shuruzyak scheme main quantity of salt is concentrated within upper layers (2 -2,5m) and varies within 1,8 - 3,5% on solid residue and 0,07 -1,2% on chloride - ion. Soils have low water (μ=0,06) and salt specific yield (α=2,8 - 3,5).

4 *Parameters of Pilot Projects and Technical Solutions:*

Total area of Shuruzyak scheme is 68,4th.hacultivated. Crop is cotton. Land use efficiency is 0,45 -0,76. It is located within Kirov canal's command zone. Total area of Bayaut scheme is 48,7th.ha. Collector-drainage network specific extent within these schemes before 1950 did not exceed 12 - 14m/ha, depth 1,8 - 2,2 m. In 1965 - 1966 vertical drainage system (VDS) was constructed: within Shuruzyak scheme 212 wells, total discharge 13 cu.m/sec, specific yield 7 -15 l/sec/m. Within Bayaut scheme 89 wells, total discharge 5,1 cu.m/sec, specific yield 6 - 11 i/sec/m.

5 *Methodology:*

Field observations on movement of water, salt and all elements of water-salt balance within unsaturated zone, groundwater, cover loam and irrigated lands as a whole. There were permanent balance stations with area of 100 - 500 ha, where regular observations were performed. Balance stations are equipped by all necessary metering devices. Systems analysis was used for data processing.

6 *Results:*

Due to low specific extent of drainage network groundwater level was 1,0 - 1,5 and 73 -78% water were spent for evaporation. That is why VDS was constructed in 1969 - 1975, that provided water-salt balance change due to higher drainability of land, downward direction of filtration, groundwater level decrease. Underground overflow from cover loam into the aquifer achieved 3,0 - 4,5 th.cu.m/ha. Actual drainage outflow was 4 -5 th. cu.m/ha.

Analysis of water-salt balance shows that sustainable process of soil desalinization with 15 - 20 th/ha salt removal is provided by irrigation norm of 6000 cu.m/ha by autumn-winter leaching by rate 2000 -3000 cu.m/ha. Together with rainfall it is main inflow in amount of 9000 -11000 cu.m/ha. In this case infiltration water desalinizing discharge (difference between total inflow and evapotranspiration) is 900 -2000 cu.m/ha (15 - 20% of total water supply). Under such regime of irrigation and leaching during 5 -7 years of vertical drainage

operation full soil desalinization occurs, including unsaturated zone and cover loam, groundwater salinity decrease from 8 -15 to 3 -5 g/l. Strengthened salt removal from unsaturated zone and groundwater salinity decrease led to reclamation background smoothening. Non-salinizated and slightly salinizated soil area in 1974 increased 2,5 times and achieved 87% against 31% of total area. Middle and strongly salinizated areas decreased from 6 to 9%. Cotton yield grew on 0,5 - 1,1 t/ha and achieved 2,8 - 3,2t/ha within Shuruzyak and Bayaut schemes. Simultaneously with yield growth water expenses per unit of production decreased: from 4030 to 2800 cu.m/t for Shuruzyak and from 4000 -6000 to 2500 -3000 cu.m/t for Bayaut. Within 1974 - 1976, 1981 -1983 dry years there was the water resources deficit in the SyrDarya basin and irrigation norm decrease together with worse water quality deterioration. Water supply was cut down on 15 - 25%, VDS maintenance became worse. Cotton yield within these years also decreased. Results obtained within 1960 -1985 show that soil desalinization strategy aimed to support leaching regime of irrigation all over a year on background of vertical drainage in most effective method of soil water-salt balance regulation.

H	**Suggested key-words**		
1	VDS	4	Water-salt balance
2	Territory drainability	5	Leaching regime of irrigation
3	VDP pumping regime	6	Water and land productivity

I	**Most recent publications (maximum 3)**			
1	Author(s): N. Reshetkina,, Kh. Yakubov			
	Title: Vertical Drainage			
	Publication details: Results of long-term field investigations of vertical drainage efficiency in Golodnaya Steppe, drainability increase and unsaturated zone and cover loam desalinization. Possibility of soil water-salt balance and water-salt regime management is proved, which provide increase of land productivity and water save.			
	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 [ ]