

**REGISTER OF RESEARCH ON IRRIGATION AND DRAINAGE**

**QUESTIONNAIRE**

<b>A</b>	<b>Project title:</b> Study of reclamation regime and irrigated water-salt balance management of north-west part of Golodnaya Steppe
----------	---

<b>B</b>	<b>Topic n° : 2</b>	Sub-topic n°: 2
1)	01	Technical field n°: 2

<b>C</b>	<b>Project location</b> Chimkent province		
	Country: Republic of Kazakhstan	Area:	157000 ha
	<b>Precise details if possible</b>	Locality(ies):	
	Country(ies):	Others(s):	
	City(ies):		

<b>D</b>	<b>Duration of the project:</b>		
	Year in which the project was started 1965	Project completed: 1985	
		Expected completion date: 1965, 1985	

<b>E</b>	<b>Organizations and technical staff involved</b>			
1	Supervisor/project coordinator (SURNAME, First name): Spizin A.		100 %	
	Organization: VNIIGIM		Staff Resources	
	Address: 44, B.Academicheskaya, Moscow	telephone:		
	E-mail:	fax:	2)	
	Other counterparts:	Organizations (full name or acronym)	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 (see instruction on page 1)</b>
----------	--

### *1 Objective and technical fields:*

Soil reclamation regime management, prevention of soil salinization and land productivity increase by groundwater pumping providing water-salt balance management in connection with leaching regime of irrigation.

### *2 Scientific and technical approach:*

Prevention of soil salinization and land productivity increase by means of territory drainability improvement and salt removal due to groundwater pumping.

### *3 Environment characteristics:*

Climate. Average annual temperature is 12.5-13<sup>0</sup>C. Annual evaporativity is 12-16 th. cu.m./ha. Humidity deficit 9-13 th. cu.m./ha.

Lithology: light and middle loam and sandy loam; cover loam thickness is 15-40 m. Soils are of middle complexity to desalinization: coefficient of overflow from above  $B=150-450$  m/day; resistance  $\Phi = 130-400$  days.

Easy solvable salts are distributed along the soil profile irregularly. There are two maximum: 1.5-2 m and 5-15 m. Beneath these layers soils are desalinized. Salinization type is chloride-sulfate and sulfate.

Water and salt specific yield are:  $\mu= 0.1$ ;  $\alpha=1.2-1.8$

### *4 Parameters of Pilot Projects and Technical Solutions:*

Area of north-west part of Golodnaya Steppe is 174 th.ha. Area of vertical drainage implementation is 15.7 th.ha.

Specific extent of open drainage varied within 8-15 m/ha. Horizontal drainage outflow was only 1.2-1.8 %. Near 1800 wells were constructed with depth 25-50 m. Specific yield is 5-6 l/sec/m. Actual drainage modulus is 0.15-0.28 l/sec/ha.

### *5 Methodology:*

Field observations on moisture, salts movement and all elements of water-salt balance of unsaturated zone, groundwater, cover loam and irrigation area as a whole.

Permanent balance stations were established with area 100-250 ha where regular observations were carried out.

### *6 Results:*

Land development led to groundwater level increase and consequently to soil secondary salinization. Within 1956-1968 open drainage was constructed with specific extent 8-15 m/ha. Insufficient outflow (0.03-0.05 l/sec/ha) did not provide planned soil desalinization rate. Salt balance was positive and salt accumulated within unsaturated zone (3-5 t/ha). In 1965-1966 open drainage was strengthened by vertical drainage system consisting of 654 wells. Total discharge was 2700-3700 cu.m/ha and achieved 36% of water supply. Vertical drainage allowed to decrease groundwater level by rate 3.5-4.0 cm/day and regulate it within acceptable limits 1.5-4.5 m depending on water supply and leaching regime.

Latter permitted to create half-automorphic reclamation regime. Water supply together with precipitation to the field was 8.5-12.5 th. cu.m./ha. Desalinizing discharge of infiltration water was 900-2000 cu.m/ha. Under such regime soil desalinization rate achieved 4.43-10.85 t/ha per year. Along with groundwater level depletion water waste for total evaporation was cut down and it was 5.3-8.6 th. cu.m./ha against 8.5-9.7 th. cu.m./ha which was before vertical drainage construction.

Coefficient of leaching regime  $(B+O)/(E+T)$  was 1.1-1.2; under VDS operation full soil desalinization happened, groundwater salinity decreased from 8-15 to 3-5 g/l.

To the end of 1977 area of non-salinized lands was 85-90 % against 30-35 % at initial stage. Not only unsaturated zone, but all cover loam (20-30 m) was desalinized.

Gradual change of pumped groundwater salinity was observed. Within 1965-1990 it did not exceed 0.5-1.0 g/l and it was mainly 4-4.5 g/l against 3.5-4 g/l at initial stage.

Zone of active salt exchange was 20-50 m, for water exchange it was 70-100 m. Favourable tendency of reclamation processes and water-salt regime provoked cotton yield growth on 0.5-1.1

t/ha and its achievement of 2.8-3.2 t/ha against 1.5-2.0 t/ha at the beginning. Along with land productivity growth water waste for unit production was reduced from 4000-5000 to 1800-2000 cu.m/t.

H	Suggested key-words		
1	Vertical drainage system	4	Water-salt balance
2	Territory drainability	5	Water productivity
3	Pumping regime	6	

I	Most recent publications (maximum 3)			
1	Author(s): N.Reshetkina, Kh.Yakubov			
	Title: Vertical drainage			
	Publication details: Results of field investigations of vertical drainage efficiency on soil desalinization, drainability improvement and water salt regime management are considered. Possibility of water-salt balance and soil water salt regime regulation is proved.			
	Year of publication: 1978	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 checked="" type="checkbox"/>	restricted <input type="checkbox"/>	confidential <input type="checkbox"/>
3	Author(s):			
	Title:			
	Publication details:			
	Year of publication:	free access <input checked="" type="checkbox"/>	restricted <input type="checkbox"/>	confidential <input type="checkbox"/>