REGISTER OF RESEARCH ON IRRIGATION AND DRAINAGE

QUESTIONNAIRE

A	**Project title:**	Study of soil water-salt regime management in South-Golodnostepsky Canal (SGC) command zone in state farm 3A of Golodnaya Steppe.

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

C	**Project location:** SyrDarya province, Mekhnatabadsky district, state farm 3A.

Country: Republic of Uzbekistan	Area: 8218 ha (gross)
Precise details if possible	
Country(ies):	Locality(ies):
City(ies):	Others(s):

D	**Duration of the project:**
Year in which the project was started: 1976	Project completed: 1982 Expected completion date: 1979, 1983

E	**Organizations and technical staff involved**	
1	Supervisor/project coordinator (SURNAME, First name): Serebryannikov Fyodor	60 %
	Organization: Uzgipromeliovodhoz Address: 44, Navoiy strongly, Shaikhantaur district, telephone: 7 (3712) 42-29-96 E-mail: fax: 7 (3712) 42-29-85	Staff resources
	Other counterparts: Organizations (full name or acronym) Surname First name	2)
1	Uzgipromeliovodhoz, Togunov Yury	40 %
2		%
3		%
4		%
	Other collaborators: man-years	

F	Funding agencies	
	Full name or acronym	Percentage of project finance provided
1		%
2		%
3		%

G	Summary of research project (see instruction on page 1)

1 Objective and technical fields:
Study of soil water-salt regime within SGC command zone to assess drainage design efficiency and lands reclamation state during their development.

2 Scientific and technical approach:
Soil salinization prevention and irrigated lands productivity improvement are based on systematic field investigations including observations on water supply, collector-drainage system operation, groundwater regime and salinity, and other indices of land reclamation state.
Importance: Assessment of existing design decisions efficiency and forecast calculations.

3 Environment characteristics:
Climate is typical for steppes.
Annual average air temperature is 13-14 ^{0}C, absolute maximum is 45 ^{0}C (July) and minimum is -36 ^{0}C (December-January). Frost-free period is 210-220 days. Precipitation is 305 mm.
Relative air humidity is 50-70 % (winter), decreasing in summer down to 20-35 %. Average annual value is 50-60 %. Evaporativity is 1200-1500 mm.
Geomorphology: state farm territory is divided into two zones "Б" and "В". The first of them encompasses central and southern part of the farm and is characterized by close groundwater level (0-2 m). This zone is located within the stripe of 1500 m wide along SGC. Groundwater artesian recharge within this zone is 18,3 cu. m/day per ha.
In northern and north-eastern part of the farm on proluvial sediments zone "В" is located, where groundwater level is 5-10 m.
State farm area before development according to groundwater depth was divided Assessment follow: 1-2 m (7 %); 2-3 m (33 %); 3-5 m (47 %); more than 5 m (16 %). Groundwater level change was 1 m in the south, 0,5 m in the central part and 0,1-0,2 m in the north.
Groundwater salinity within 10 m layer varies from 10 g/l (southern part) to 40-60 g/l (northern part) of the farm.
Soils are salinizated. Before development soils were mostly strongly salinized (72,5 %),middle salinized soils were 13,6 %.
Cotton yield at the initial stage of development was 0,7-0,8 t/ha.

4 Parameters of Pilot Projects and Technical Solutions:
Irrigated area is 8128 ha (gross) and 7287 ha (net). Land use efficiency is 0,887. Main crop is cotton - 6620,2 ha (66,7 % of area). Only 11,5 % of area were used for rain-fed crop cultivation and the rest was as fallow.
Water supply was performed from SGC through two on-farm canals (ЮР-12 and ЮР-12-1) with capacity 4,4 cu. m/sec respectively and through reinforced concrete flumes.
Collector network extent is 102 km and specific extent is 13,9 m.ha.
Open collectors parameters are as follow:
b=1,0 m; m=1,75 m; h=4,5-5,0 m.
Close collectors constitute 10,4 % of total extent . Tile drainage network is made of tile and plastic pipes d-63/75 mm. Filters are strewed by sandy-gravel mixture from Ilansaisky quarry.
Drainage total extent is 822 km, specific extent is 12,8 m/ha, depth is 2,5 m, slope- 0,002. Tile

drain length is 380-870 m, plastic drain length is 300-500 m.

5 Methodology:

Field observation during 1976-1979 and 1979-1982 on water supply, drainage-collector system operation, groundwater regime and salinity. Two plots by area 23,4 and 25,9 ha were equipped of water and salts accounting devices.

6 Results:

Land development process was studied in detail by means of field observation in state farm 3A. Water supply for leaching and rice irrigation was 25030 th.cu.m/ha (gross), for cotton irrigation is was 9010 th.cu.m/ha. Within two experimental sites leaching were performed on background of rice growing. Water supply was 19,7 and 17,3 th. cu.m/ha respectively.

Irrigation water salinity was 1,5-2,0 g/l, sulphate. Since the beginning of development (1977) gauging stations were established on collectors for drainage outflow accounting. In 1977 during leaching (over large checks on rice background average drainage modulus was 0,422 l/sec per ha, 14050 cu. m/ha were removed i.e. 58,3 % of water supply: in 1978-0,128 l/sec per ha, 1732 cu. m/ha (17 % of water supply) in total.

Difference is explained by capital leaching prevailing in 1977.

Tile drainage operation was also observed. Sharp groundwater level rise noticed in 1974 fluctuations were as follow: 2-6 m (northern part of the farm); 3-4 m (central part) and 2-3 m (southern part).

In 1978 area under cotton increased at expense of rice, as a result groundwater level decreased down to 2-4 m.

Groundwater salinity was observed on 9 hydrochemical sets of wells along the transects. Under leaching average drainage modulus was 0,35-0,44 l/sec per ha, maximum modulus was 0,55 l/sec per ha.

Within the first experimental plot drainage modulus was 2,5 times less (0,56 and 0,39 l/sec/ha respectively) because of artesian water overflow and seepage losses from SGC. This is proved by ratio between water supply and drainage outflow. On the first site drainage outflow was 40,5 % of water supply - on the second site it was 19,7 % i.e. 2 times less. Average drainage modulus for the farm is 0,19-0,2 l/sec/ha; 12-30 % of water supply are removed by drains.

Tile drainage effluent salinity study showed that under leaching it increased from 10 to 18-20 g/l, chloride-sulphate type (1st site) and 30-50 g/l, sulphate-chloride type (2nd site).

Collector outflow formation greatly depends on surface releases which achieve 20-30 % of total outflow. Collector outflow salinity on average is15-20 g/l, type is sulphate-chloride.

Irrigation provoked ground water level rise all over the farm. In 1981 groundwater depth was 1-3 m over 90,5 % of total area. Simultaneously groundwater salinity was decreasing in its upper part from 10-35 to 9-10 g/l.

Leaching and other reclamation measures promoted soil desalimization that was proved by salinity survey during 1976-1981.

After capital leaching by rate of 12,5 th.cu.m/ha sodium-cation content within 1 m layer was.

1,7mg. ekv/100g of soil; within 2-3 m layer it was 7,4 mg.ekv/100g of soil; deeper than 3 m-12 mg.ekv/100g.

After leaching completion groundwater level was on depth of 0,8 m. Water-salt balance forecast was made for period 1978-1993 (two crops rotations):

Soil and water salinity decrease witnesses about leaching regime of irrigation maintained on the background of drainage .Salt balance for 1976-1981 was as follow (solid residue, t/ha):

- salt brought by irrigation water - 95,3;
- salt stock within 0-1 m layer before development - 393,4;
- salt stock within 0-1 m at the end of development - 228,8;
- salt removed out of 0-1 m layer -259,0;
- salt stock within 1-3 m layer before development -247,4;

-the same at the end of observation -220,1;

- salt removed out of 1,2 layer - 287,2

- salt removed by drainage outflow - 274,3.
Thus during land development negative salt balance has been formed. Better reclamation regime was expessed by groundwater level of 2-3 m over main part of area during growing period. Area of strongly salinizated soils reduced (within 1 m layer) from 72,5 % (before development) to 7,3 % (1981).
Cotton yield was as follow (t/ha): 0,69 (1978); 0,84 (1979); 0,80 (1980); 0,78 (1981).
It could be explained by insufficient soil desalinization and irrigation regime deterioration. Another reason is high gipsum content within upper 1 m layer.
Results of experiment proved effectiveness of design decisions on reclamation measures.

H	**Suggested key-words**		
1	land development	4	drainage outflow
2	reclamation state	5	drainage operation
3	water supply	6	releases

I	**Most recent publications (maximum 3)**			
1	Author(s):			
	Title: Engineering-reclamation ground of economically expedient duration of land development .			
	Publication details: Main results of land development optimal planning are considered.			
	Year of publication: 1983	free access [x]	restricted [ ]	confidential [ ]
2	Author(s):			
	Title:			
	Publication details:			
	Year of publication:	free access [x]	restricted [ ]	confidential [ ]
3	Author(s):			
	Title:			
	Publication details:			
	Year of publication:	free access [x]	restricted [ ]	confidential [ ]