

**REGISTER OF RESEARCH ON IRRIGATION AND DRAINAGE**

**QUESTIONNAIRE**

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| <b>A</b> | <b>Project title:</b><br>Investigations of water-salt regime and irrigation-reclamation network operation in rice irrigation systems. |
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| <b>B</b> | <b>Topic n° : 02</b> | Sub-topic n°: 2       |
| 1)       |                      | Technical field n°: 2 |
| 2)       | Category 01          |                       |

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| <b>C</b> | <b>Project location</b> Karakalpakstan, Chimbay district, state farm "Oktyabr" |                |       |
|          | Country: Republic of Uzbekistan  | Area:          | 45 ha |
|          | <b>Precise details if possible</b>   |                |       |
|          | Country(ies):  | Locality(ies): |       |
|          | City(ies):   | Others(s):     |       |

|          |  |                           |            |
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| <b>D</b> | <b>Duration of the project:</b>            |                           |            |
|          | Year in which the project was started 1971 | Project completed:        | 1975       |
|          |  | Expected completion date: | 1971, 1975 |

|          |  |   |                 |            |
|----------|--|---|-----------------|------------|
| <b>E</b> | <b>Organizations and technical staff involved</b>                  |   |                 |            |
| 1        | Supervisor/project coordinator (SURNAME, First name): Ramazanov A. |   | 100%            |            |
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|          |  | fax:                                    |                 |            |
|          | Other counterparts:  | Organizations<br>(full name or acronym) | Surname         | First name |
| 1        |  |   |                 | %          |
| 2        |  |   |                 | %          |
| 3        |  |   |                 | %          |
| 4        |  |   |                 | %          |
|          | Other collaborators: _____ man-years                               |   |                 |            |

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| <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        |  | %                                      |

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| <b>G</b> | <b>Summary of research project (see instruction on page 1)</b> |
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### *1 Objective and technical fields:*

Management by soil-reclamation processes under long-term rice growing on large schemes.

Water use improvement and soil water-salt regime management, irrigated lands productivity increase within zone of rice sowing in Amu Darya lower reaches.

### *2 Scientific and technical approach:*

Study of soil water-salt regime and irrigation-reclamation network indices. Perfection of rice irrigation-reclamation systems on meadow-alluvial saline soils.

### *3 Environment characteristics:*

Territory is located within the northern part of Amu Darya delta and is represented mainly by meadow-desert soils with strong level of salinization.

Lithology: clay, loam, sandy loam and sand. Climate is sharply continental.

Precipitation (mostly within winter-spring period) is 80-140 mm per year. Average annual temperature is 11-13<sup>0</sup>C, maximum is 43<sup>0</sup>C, minimum – 21-23<sup>0</sup>C. Frost-free period duration is 200 days. Wind is mainly north-east, average velocity is 3-5 m/sec. Before land development groundwaters with salinity 0.3-30 g/l were on depth 3-10 m from land surface. Seasonal amplitude was 0.6-1.2 m.

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

Pilot site area is 45 ha. Specialization is rice growing and cattle breeding. Land use efficiency is 0.71-0.83. Irrigation network consists of mains, distributors and field ditches. Collector-drainage network consists of mains (h=1.5 m), magistral collectors (h=1.8 m) and in-farm collectors (h=2.5-3.1 m). Specific extent of collectors is 44-47 m/ha.

### *5 Methodology:*

Since 1972 gauging stations were installed within the system F-1-23, observation wells and piezometers of different depth were drilled. Observations and measurements were executed according to common accepted methodology.

### *6 Results:*

Rice sowing (sort UzROS-59) was performed at the end of December by mechanized method. Flooding of every check was performed separately from irrigation distributors with shortened regime of rice irrigation. Within irrigation period depending of system's age water supply was from 24.3 to 38.9 th. cu.m./ha, maximum water allowance with initial checks flooding achieved 7-14 l/sec/ha, minimum 0.5-1.0 l/sec/ha. Drainage outflow was 9.4-17.3 th. cu.m./ha including infiltration, ground and released water. Maximum modulus of drainage-release outflow was 2.42-3.22 l/sec/ha, minimum was 0.01-0.06 l/sec/ha 10-15 days after water supply cessation, ground and infiltration water inflow to the drains was 55% of vertical filtration from rice fields.

During irrigation fresh water layer is formed which is confined by open surface and impermeable rocks beneath. After irrigation cessation within 10 days water lowering rate is 6.4-12 cm/day, somewhere 14-31 cm/day. Main income item is water supply 24.3 th. cu.m./ha (first year); 28.0 th. cu.m./ha (fourth year); 27.6 th. cu.m./ha (sixth year). Moisture stock within 0-3 m thickness before checks flooding was: 9.3 th. cu.m./ha (first year), 9.6 th. cu.m./ha (fourth year), 13.2 th. cu.m./ha (sixth year). Expenses are mainly for total evaporation and vertical filtration from rice fields. Total evaporation volume was (th. cu.m./ha): 11.3 (first year), 12.6 (fourth year), 11.7 (sixth year). Vertical filtration volume was 10.4; 11.1 and 14.3 th. cu.m./ha respectively. Last moisture stock within 0-3 m layer was: 10.8; 12.1 and 14.0 th. cu.m./ha. Surface release was 3.6-10.8% of water supply. Discrepancy between income and expense items is 1.9-3.1 %.

Under rice irrigation intensive soil desalinization occurs. By initial salt content in 0-40 cm layer 2.66 % on solid residue and 0.99 % on chlorine-ion they decreased down to 0.63 and 0.03 % respectively. After 4 years of rice irrigation salt content within 0-3 m layer was 0.23-0.42% (solid residues) and 0.02-0.07 % (chlorine). Unsaturated zone salt balance was also negative. Main

income item is salt content within calculated thickness (0-3 m) before rice irrigation which was 510.3 t/ha. Salt brought in by irrigation water is 11.4 t/ha. Within the first year of rice growing salt stock decreased down on 54.1 % and was 235.3 t/ha. By drainage outflow 44.1 t/ha salt were removed outside the system, rest was submerged into deep horizons by infiltration flow.

Within the second year of rice growing salt stock decreased down on 112.8 t/ha or 49.4 % of their initial content. By drainage out-flow 65.3 t/ha salt were removed.

By initial groundwater salinity 18.6-44.6 g/l after 2 years of irrigation it decreased down to 7-22,8 g/l on solid residue.

After 4 years of rice cultivation groundwater salinity was 7.2-11.2 g/l.

Big amount of salts is removed by drainage outflow from rice field. Minimum drainage water salinity (0.76-3.22 g/l) is recorded in time of water release from rice field (June-September). At the end of growing season salt content in drainage effluent increases up to 9.49-11.89 g/l which certifies about its formation at expense of infiltration and saline groundwater.

Moisture content with in 0-40 cm layer before rice sowing was 15.65 % (first year), 14.4 % (fifth year); within 40-100 cm layer: 22.4 and 24.1 % of soil weight respectively. After rice harvesting it was 25.0-23.8 % (0-40 cm layer) and 27.3-24.1 % (40-100 cm layer). Within the 100-150 cm layer soil moisture was 22.8-24 % (spring) and 27.5-26.5 % (autumn).

| <b>H Suggested key-words</b> |                                |   |                                  |
|------------------------------|--------------------------------|---|----------------------------------|
| 1                            | Rice water allowance           | 4 | Water-salt balance               |
| 2                            | Rice check flooding technology | 5 | Soil desalinization              |
| 3                            | Water-salt regime              | 6 | Salt removal by drainage outflow |

| <b>I Most recent publications (maximum 3)</b> |   |   |   |
|---|---|---|---|
| 1   | Author(s): A.Ramazanov, E.Kurbanbayev, H. Yakubov   |   |   |
|   | Title: Reclamation of Amu Darya lower reaches problems.   |   |   |
|   | Publication details: Main results of investigation of ecological-reclamation processes under development of different agricultural crops irrigation are considered.<br>Technical and technological recommendations are given. |   |   |
|   | 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"/> |