this characteristic is secured by a coefficient, calculated with formula:

$$C_f = \left(\frac{\overline{d_e^2}}{bc}\right)^{\alpha}; \ \alpha = 0{,}8, \ \overline{d}_e \text{ according to (4)}, \quad (7)$$

Indexes C_{f1}, and C_{f2} provide an obviously increased coefficient of form. It is linked to the fact that for K_{f4} dependence between fractions is considered linear, and for K_{f1} – according to a square parabola. Their further study shows us that the degree of nonlinearity of hydraulic processes lies between (1) and (2). In (7) it equals 2α = 1,6, in other words, this dependence is described as parabola less than a square one that, obviously, corresponds to the physics of this phenomenon. Really, square parabola naturally considers only the area of diametric direction of a fraction sector flow, and parabola of a less degree considers a fraction's volume as well. Studying these indexes, we can form equations of deposition and washing a separate part of spheric ($Cf = 1$) and non-spheric ($Cf < 1$) form.

Calculating heterogeneity of fractions composition in motion, still and suspended conditions.

We study the very totality of a fraction, when conditions for their motion are placed, flow structure and vertical transition of a fraction (lifting and descending) are formed, fractions are placed in a suspended condition, fraction flow is in turbulence.

Descriptions of fractions are usually based on an assumption that they are formed occasionally, and each size of fraction can be given a provision (weight coefficient). While breaking fractions into definite intervals, for example, via sieving analysis, one can come up with a curve of granulometric composition. This curve is constructed on discreet value of sieving sizes. Besides, there is always a certain function in its form, as we are studying an interval of fraction size. After that we calculate a density and connectivity of fraction flow, speed of free even drop of fractions in a still liquid (water).

Considering these indexes, we have formed equations of deposition and washing of a flow of non-linked fractions of spheric ($Cf = 1$) and non-spheric ($Cf < 1$) form.

Description of fractions' motion in a flow with a suspended condition and constructing diffusion models of dynamics of fraction mixtures with an account of boundary conditions (concentration of suspension at a lower border).

For a stationary case (when concentration of fractions C and coefficient of diffusion Cd do not alter) we have an equation of Frankle type:

$$\omega\frac{\partial C(z)}{\partial z} = \frac{\partial}{\partial z}C_d\frac{\partial C}{\partial z}, \quad (8)$$

where ω is hydraulic size; z is vertical coordinate.

Equation (8) should be supplemented with border conditions at the border $z = 0$, $C(0) = C_0$. In this case its particular solution in terms of constant equality of a substance quality that moves up and down looks as:

$$C = C_0 \exp\left(-\varpi\int_{z_0}^{z}\frac{dz}{K_d}\right). \quad (9)$$

Defining functions C_0 and C_d according to (9), we calculate profile of a substance concentration.

Description of a silt's condition from the point of sanding according to rheological model is represented by integral differential equations of Fredgolm and Volter type of the second order and development of model of identifying cores of creeping and relaxation for a specific silt.

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PROTECTING SLITS FROM DANDING WITH AN ARTIFICIAL FILTER

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Low efficiency of exploitation water-intake slits is linked to deficiencies of their construction and building technology (filers of small diameter, drilling with clay mixture and claying of by-filter area, presence of small-grain sands, insufficient pumping).

In order to establish a required water intake, measures of restoring slits' efficiency are necessary. Decrease in the output of underground water intake can be defined by evacuation of its resources, alteration in parameters of a layer (drying off the most permeable area, an impact of low-permeable rock areas), deterioration of water intake equipment, calmotage, and boil of filter facilities.

All factors, linked to regional impact over the efficiency of water intake slits, are usually established at the stage of hydro-geological research. Changes in efficiency of water intake slits that is linked to their construction features and processes of chemical and biological calmotage are most definitely established during a slit's exploitation. Process of calmotage, boil of by-filter areas is described by a decrease in a filter permeability and porosity of rock in by-filter area, and also by corresponding alteration in coefficient of filtration. A character of change in hydraulic resistance can be revealed according to an analysis of an impact of filter permeability and porosity of rock over a water tributary in a slit. It has been experimentally established that when filter permeability in higher than 20 %, increase in total area of holes impacts a slit consumption insignificantly, and dependence of alteration in filter resistance with an increase in filtration is described by an exponential or display function with a negative exponent. Change in porosity of rock in by-filter area of a slit and in radius of decreased filtration has a similar effect over a slit output [3, 4].

According to the provided information, a prediction of decrease in a slit consumption can be given according to an analysis of legislations of decrease in specific output or increase in generalized slit resistance in time. In all cases a complex analysis of the whole water intake is required in order to reveal a reasonability of reconstructive works on water intake facilities (slits). Most frequently, work of a slit itself is analyzed, and during the first approach on water intake, it is necessary to carry out operation of probating slits in order to evaluate losses in pressure (resistance) of a slit and compare it to the initial data.

Evaluation of a generalized resistance of a slit can be given most reliably with a data on decrease in levels of the very water intake slit, annular piezometer, and pumping output.

In case a water intake slit does not have annular (by-filter) piezometers, short-term stop of water intake slit can be used in order to observe restoration of level in it.

Comparison of resistance values of filter and by-filter areas of slit, received by any of the described methods, with initial ones under equal terms allows us to judge on reasonability of works to regenerate slits.

During exploitation of a slit, works that are linked to restoration or increasing consumption (output) of slit, occupy a special place.

In order to stimulate water intake, mechanic or hydraulic cleaning is carried out for filters that have been exposed to boil and calmotation as well explosions of intake/output, electric hydric pump, acoustic, and other methods of increasing water intake insignificantly. For a more efficient stimulation of water intake from slits with sand water bearing horizon we suggest a facility for constructing gravel filter in a slit that allows one to place an artificial filter during a slit operation. This filter is not worse than its natural analogues, it cuts of small-grain sand from water bearing horizons, located in sand layers.

The facility operates as follows: Water lifting and pneumatic piping are placed simultaneously. At their end hydro-pneumatic pump of ejector type is placed with a distributive-filter mechanism, performed as a membrane with petals. Due to mobile stock, as well as a spring that rests against the flange, the membrane helps to put calibrated pebble so it creates an artificial filter. While pumping off natural sand, petals of the membrane descend, and when the facility goes deep, they lift. Pumping off small-grain sand takes place constantly with a simultaneous loading and consolidation of calibrated pebble. Along the pneumatic pipe air is delivered to hydro-pneumatic pump that creates vacuum when is discharged from the tip. Thus starts absorption of water with sand (dirt) and its delivery to the surface. When the tip and the membrane leave casing tube, pumping water to the surface, the membrane starts to open, filling inter-tube area with pebble. At the same time, selection of small-grain crystals takes place, and artificial filter replaces them by the work of the membrane petals. An efficiency of the filter is defined by an operator according to a situation, until small-grain sand is remover completely.

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