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RESEARCH OF THE PROPERTIES OF OIL WASTE RESERVIOR WITH POLYMERORGANIC SCREEN

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This article is dedicated to the study of the physical and mechanical properties of oil waste sludge pit, where as antifiltration screen is used polymerorganic screen. Polymerorganic screen based on the oil waste as asphalt paraffin resinous deposit and polymer additives with mixture of cement. The research methodologies have been tested for aggressive components for a certain period of time in laboratory installations for strength and water impermeability. As a result of the test it is investigated the water impermeability and pressure of the polymerorganic material. The strength characteristics of the mixture, with an increase in the polymer material from 4 to 5%, the temperature of 20^{0}C increase from 1 MPa to 1.5 MPa. The curves of the mechanical strength of water-saturated samples have the same character and at a temperature of 50 ° C, depending on the content of the organic part of the ARPD in the mixture

Keywords: sludge pit, polymerorganic screen, ARPD, waterproofing, antifiltration screen, oily ground, and oil wastes

During the drilling and operation of oil and gas wells, toxic wastes that contain a large number of chemical elements and compounds are included in the closest geographical areas of the hydrosphere and the lithosphere, where the environment is isolated. Industrial oil wastes will be after oil production and processing technology, transportation, repairs and emergencies. The most affordable way to isolate these wastes is to store them directly in the oil storages outside the drilling site or outside.

As a result of tests at the Akshabulak field, pollution of the atmosphere was caused by the evaporation of hydrocarbon gases. Their size was 3 mg / m^3 from the opposite side to wind direction, 27 mg / m^3 from the wind direction.

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Advantages of the polymerorganic material are: the use of oil waste sludge pit, ease of production, unlimited working time, high water resistance and compression strength, resistance to aggressive components of oil wastes (corrosion resistance), low cost of work and environmental safety of this material. Increase of prospecting-exploration wells, as well as open pit mining operations are closely related to environmental degradation, environmental protection and subsoil protection have national economic importance. High toxicity of drilling waste has been proven by leading research institutes and scientists of the Republic of Kazakhstan.

During the operation of the wells, oil and condensate emissions occur. The entry of these substances into water bodies, soil, and groundwater is environmentally hazardous [1, 3; 2, 4].

During the construction and operation of wells, sludge pits barns are filled with drilling wastewater, drilling mud, formation water, well testing products, materials for preparation and chemical treatment of drilling and oil wells, fuel and lubricants, and the like. But pollutants contained in waste, due to their mobility and high penetrating ability, migrate to groundwater and pollute the environment [3, 2; 4, 3].

In publications [7, 40; 8, 15] drilling fluids, their types, purpose and chemical composition were investigated. Accordingly, these studies have identified the most common chemical components in the formulation of various drilling fluids, and their maximum possible concentration. These are chemicals with a high concentration in the formulations of drilling fluids: caustic soda (NaOH) - 2.8%, soda ash (Na_2CO_3) -4%, potassium chloride (KCl) - 15%. These chemicals are toxic and belong to the III-IV classes of environmental hazards. The samples were divided into four groups of 30 samples and placed in containers with the most aggressive components of drill cuttings and, for comparison, in a container with water:

- I group - water (H_2O);
- II Group - 2.8% caustic soda solution (NaOH);
- III Group - 4% solution of soda ash (Na_2CO_3);
- IV group - 15% potassium chloride solution (KCl).

Tests of oily ground cement samples for water permeability were carried out in the process of aging in aggressive media and water after 30, 90, 180, 270, 360 days by the wet spot method on the UVF-61 unit. Before the test, the samples were kept in the laboratory room for 24 hours. Samples in the cage were installed in the sockets of the installation and reliably fixed. The water pressure was increased in steps of 0.2 MPa for 1 to 5 minutes and held at each stage for 16 hours. The tests were carried out until signs of water filtration in the form of drops or a wet spot appeared on the upper end surface of the sample. The water permeability of each sample is estimated by the maximum water pressure at which it does not yet leak through the sample.

The results of laboratory tests of oily ground cement samples for water permeability are given in Table 1, where the brand values for the waterproofness of soil cement samples are summarized, depending on the time and holding medium.

From the graph (see Fig.1) it can be seen that as the aging time in aggressive chemical solutions increases, the compressive strength of the oily ground cement has increased irrespective of the environment in which hardening of the oily ground cement took place.

This proves the possibility of its use for the construction of an anti-filtration screen of sludge pit. The oily ground-cement anti-filtration screen of the sludge pit provides effective protection of the environment and groundwater from toxic drilling waste and exploitation of oil and gas wells [5,4; 6,10].

Table 1 - Distribution according to groups of samples of soil cement, respectively, the soaking medium and the aging time for the determination of the brand by water permeability

sample retention medium	Specimen holding time, the aging period of sample groups, the number of samples for testing, the brand of a group of oily ground cement samples for water resistance W									
	30 days		90 days		180 days		270 days		360 days	
	№	W	№	W	№	W	№	W	№	W
H_2O	1-6	4	7-12	6	13-18	6	19-24	6	25-30	6
NaOH	31-36	4	37-42	6	43-48	6	49-54	6	55-60	6
Na_2CO_3	61-66	4	67-72	6	73-78	6	79-84	6	85-90	6
KC1	91-96	4	97-102	6	103-108	6	109-114	6	115-120	6

A new design of a sludge pit with an anti-filtration screen made of oily ground cement, where the walls of the trench of the sludge pit are insulated with a vertical anti-filtration screen from oily ground cement, using the technology of making oil and ground-cement elements in drilling-boring technology without excavation, and the bottom of the excavation is isolated by horizontal anti-filtration screen by applying a uniform layer of soil cement on the bottom of the foundation pit is mortar-pumped, which simplifies and reduces the cost of building a sludge pit.

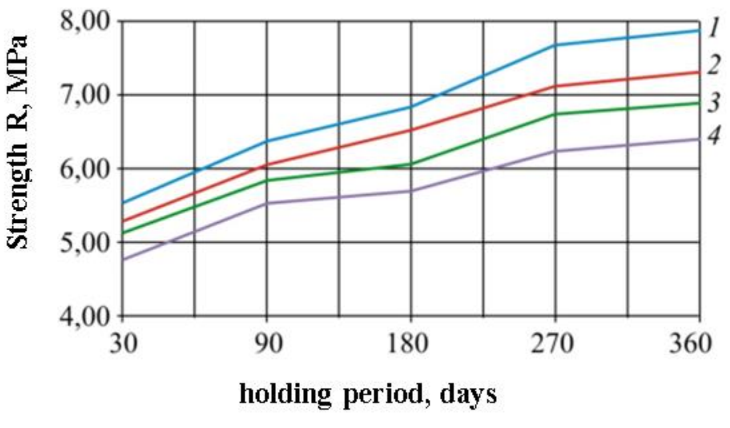

Fig. 1- Graphs of the dependence of the strength of the oily ground cement on the period and the holding medium: 1 - water (H_20); 2 - 2,8% solution of caustic soda NaOH); 3 - 4% solution of soda ash (Na_2C0_3); 4 - 15% solution of potassium chloride (KCl)

Conducted laboratory studies of the impact of aggressive components of drill cuttings on oily ground cement showed that over time the strength of oily ground cement has increased and, accordingly, its water permeability has increased (from W4 to W6), which indicates the stability of the oily ground cement to the drill cuttings.

Results of laboratory studies of physical characteristics of soil: density ρ = *1,64*g / cm^3; the humidity is natural: H = 0, 20; the density of the skeleton of the soil is ρ^s= 1.37 g / cm^3; humidity at the yield point $H^{y.p.}$ = 0.3; the humidity at the rolling edge is $H^{r.e.}$ = 0.17; the plasticity number is N_p = 0.13.

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