

REVIEW

From Overseas research supervisor Wisup Bae

To the PhD thesis of Seiden Assel on the topic «Development of effective technology of deep water treatment from suspended solid particles for formation pressure maintenance at the oil fields» submitted for the requirement of a PhD degree in the speciality of 6D070800-Petroleum Engineering

The extraction of oil and petroleum products intended for use in the medium and late stages of development is characterized by the need to pump water into the formation to maintain reservoir pressure (FPM). It is generally accepted that waterflooding allows not only to increase the rate of selection, but also to reach the maximum hydrocarbon recovery factor in existing water treatment systems with suspended clay particles that clog the bottomhole formation of injection wells and significantly reduce oil recovery, which leads to premature breakthrough of water to producing wells and water cut of produced oil. However, existing technologies do not solve the existing problem. The proposed artificial mesh, woven and membrane filters are short-lived. The use of cascade technology, installation of a bush water discharge, a hydrophobic filter and other water treatment systems have insufficient efficiency and a high price.

Thematic justification of the PhD candidate is conditioned by the requirements for oilfield wastewater as a working agent for waterflooding being imposed on three main indicators: the content of emulsified petroleum (oil) and particles of solid mechanical impurities, its microbiological and chemical compatibility with formation water and reservoir rock. In order to avoid complications when pumping water into the reservoir, the injected water must meet certain quality standards according to ST RK 1662-2007, which for mechanical impurities and petroleum products is not more than 50 mg / l.

The task and the technical result of the work was to create a new technology for the development of oil fields for the water treatment with suspended clay solid particles and its deep purification with a new industrial filter of granular materials with variable particle sizes in the vertical direction. The regularities and the process of formation water treatment without suspended clay particles on the basis of theoretical and experimental studies carried out at a special laboratory facility have been studied. Dependence of formation permeability in the bottomhole zone of injection wells on the size of clay suspended solid particles in injected water has been determined, and rational filter parameters have been established for preparing injected water without suspended clay particles into the formation using granular materials with variable fraction and water supply from the bottom up.

The scientific novelty of the dissertation work is that a method for separating clay suspended particles (on average 40 - 500 microns) from formation water is proposed. Clay suspended particles in the water pumped into the reservoir are commensurate with the size of the pores and cracks in the oil reservoir (0-2 mm and higher), which leads to formation contamination and a low oil recovery factor. It is established that the

recommended filter with a variable fraction of granular material, having a working granular layer thickness in the range of 400-500 mm and particle sizes of 0.2-0.4 mm, completely cleans water from suspended clay particles.

Based on the results of the experimental work carried out in oil and gas research laboratory at KazNITU named after K. Satpayev, we built the hydrodynamic reservoir models on CMG program, the effect of which showed that when water is pumped into the reservoir with suspended clay particles, the pores, channels and cracks are colmatized; decrease in permeability and deterioration of the injectivity of the bottomhole formation zone.

The PhD student carried out a large amount of work on the analysis and literature review on the topic of the dissertation, in conducting theoretical and experimental studies on the regularities and improvement the process of formation water treatment with suspended clay particles in a special laboratory installation, development of practical recommendations.

This research of Seiden Assel meets the requirements for doctoral dissertations and is recommended for protection for conferring the PhD degree in the specialty "6D070800" - "Petroleum Engineering".

Sincerely,



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