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REGULATION RANKS OF ASSOCIATED WATER PRODUCTION DECREASE

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Abstract. *Classification of associated water production decrease regulation levels is discussed in this article. It is separated on two big micro and macro groups. Basic subgroups are classified during these categories overview. Certain reccomendations are suggested.*

Keywords: *development, water production, efficiency, regulation levels, macro and micro technologies*

World oil production volume during last years compel us to think of its cost regulation on the international scene, but also think of cooperation between countries. Such problem, as product high country-wide water cut of development well, arise in every particular country. Let's review statistic material, placed in open official sources of website British Petroleum.

Twenty world countries with the largest daily average coefficients of oil production in barrels per a year are given in Table 1.

Basic oil production is realized from drawn-out reservoirs, that's why the fact that on every produced oil barrel comes 2,5 - 3 water oil is indicated in different sources.

The comparison of the table data and assumed volume of incidentally produced water, clearly shows severity and significancy of this problem. Huge amounts of money are spent on collection, preparation and relief of ballast water, every country, which is given in the table, spend several millions dollars on such operations. About one third of all expenses come on three countries: Russia, Saudi Arabi and USA.

The basic problem, which stands in front of main oil producing companies, become formulization of general conception fluid production decrease with high water content. We will try to derive theory of global problem consideration on water extraction decrease. The question will be divided on macro and micro levels in first approximation (see Fig. 1).

Table 1. The oil production all over the world

Country	Thousand barrels daily	Year of estimation	%, from worldwide production
Russian Federation	10 270	2010	12.51 %
Saudi Arabia	10 007	2010	12.19 %
US	7 513	2010	9.15 %
Iran	4 245	2010	5.17 %
China	4 071	2010	4.96 %
Canada	3 336	2010	4.06 %
Mexico	2 958	2010	3.60 %
United Arab Emirates	2 849	2010	3.47 %
Kuwait	2 508	2010	3.06 %
Venezuela	2 471	2010	3.01 %
Iraq	2 460	2010	3.00 %
Nigeria	2 402	2010	2.93 %
Brazil	2 137	2010	2.60 %
Norway	2 137	2010	2.60 %
European Union	1 951	2010	2.38 %
Angola	1 851	2010	2.26 %
Algeria	1 809	2010	2.20 %
Kazakhstan	1 757	2010	2.14 %
Libya	1 659	2010	2.02 %
Qatar	1 569	2010	1.91 %
The whole world	82 095	2010	

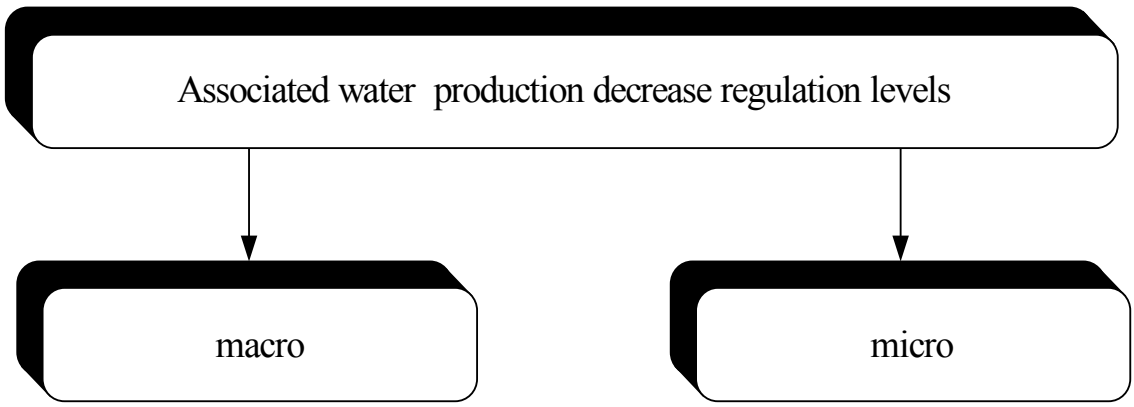

Fig. 1. Water production decrease regulation levels

Macrolevel

Some essential directions are divided in macro scale (see Fig. 2). The first direction is a necessity of involvement principle withdrawal in oil reservoir development, which was earlier in category of unprofitable. In our case the essential reserves of Permian system hydrocarbons. The extraction of such hydrocarbons on the surface is economically inappropriate at this time. Reservoir dual completion method perfection and rework can become one of the solution ways on the modern development stage of equipment and technology. In its turn new and nontraditional problem crucially stays today in front of scientists. The essence of this problem is in practicability of research and preparation of new approach in order to develop reserves, which are difficult to extract. The tendency of operation maintenance clearly appears in absolutely different plane. The search of variants is possible in different fields, which compose a grate number. The use of chemical composition new modifications with the specified properties in order to effect borehole bottom-hole area (in particular heat supply, cooling, structuring, composition vaporization and etc.) or direct application laser, sound, wave, seismic and other technologies. Midget robotics technology use perspectives are even admissible (Last year South Korea has represented robot with a diameter less than 1 mm, which realize microsurgical operations). Engineers, which will optimize developed technologies for oil-and-gas practice must join the process after scientists.

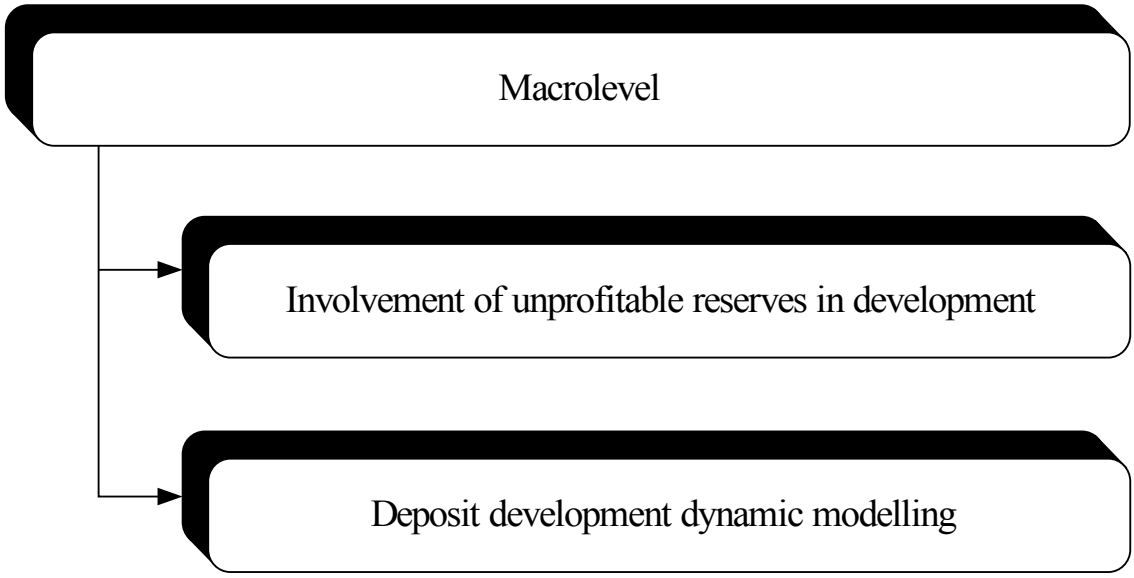

Fig. 2. Macro ranks

The essence of the next macrogroup consists in necessity of complex and rational oil field development in terms of economics and skill. The modern period of oil and gas industry development compels oil producing companies to make a plan, concerning the necessity of field systematic and sequential development. The experience of foreign

countries and information technology contribute the use of up-to-date program package for development efficiency evaluation. Niche for new approaches creation appears during the solution of different problems. One of the directions is field development dynamic (changing in time) maps creation. Their essentiality will be concluded not so many in demonstration of all development history to specialists, which includes the whole complex of performed geological and technical operations, but in a greater degree will provide the possibility of changing behavior model generation. All possibilities of reservoir surface efficiency by influence and, as a consequence, maximum oil recovery meanings. It is necessary to bring as many elements as possible in such software. The first will serve reservoir geological structure modeling (oil-bearing thickness indication, water-saturated and impermeable layer) with the function of anomalous zone revelation possibility (non-saturated displays, zones, not affected by filtration flow, overfaults and etc.). The next element consists in system consideration of planned event, directed on reservoir coverage increase by development. Monitoring of accumulated meanings on fluid production and review of its possible changes due to results of planned operation and other categories of investigated data. The most remarkable thing in matrix of such type is their great potential for different modeling, which can be received in real-time mode. But program product of such type demands interaction of several specialist groups, competent in their fields and initiation of authoritative consultant, which have received wide recognition in developed by them fields. The specialists can be geologists, geoscientists, development engineers, major workover experts, technologists, drillmen, programmers. It is necessary to invite academicians, Doctor of engineering, physico-mathematical, geological-mineralogical science, manager and substituent of oil producing companies as consultants.

Regarding microlevel we are going to classify geological and technical operations, directed on water inflow limitation in separately concerned oil wells.

First of all, we are going to consider separation of repair operations according to procedure prosecution areal. The first source is water, coming into well by the ways of circulation behind the string, that happens in half of cases. In this case it is necessary to block inter-string flows. Production string leak-proofness damage and annular circulation due to leak-proofness absence of casing string contact region with cement rock. The second type is stratum, edge, bottom waters and waters of pressure maintenance system. They are the waters, which appearance in well is unavoidable with the course of time. Properly, the layer begins to water out. There exist several gradations of extraneous water in relation to oil horizonts. They are upper, stratum, bottom, tectonic, intermediate, mixed and etc.

We are going to realize the arrangement of isolation operation technology according to classes, which will represent microlevels (see Fig. 3).

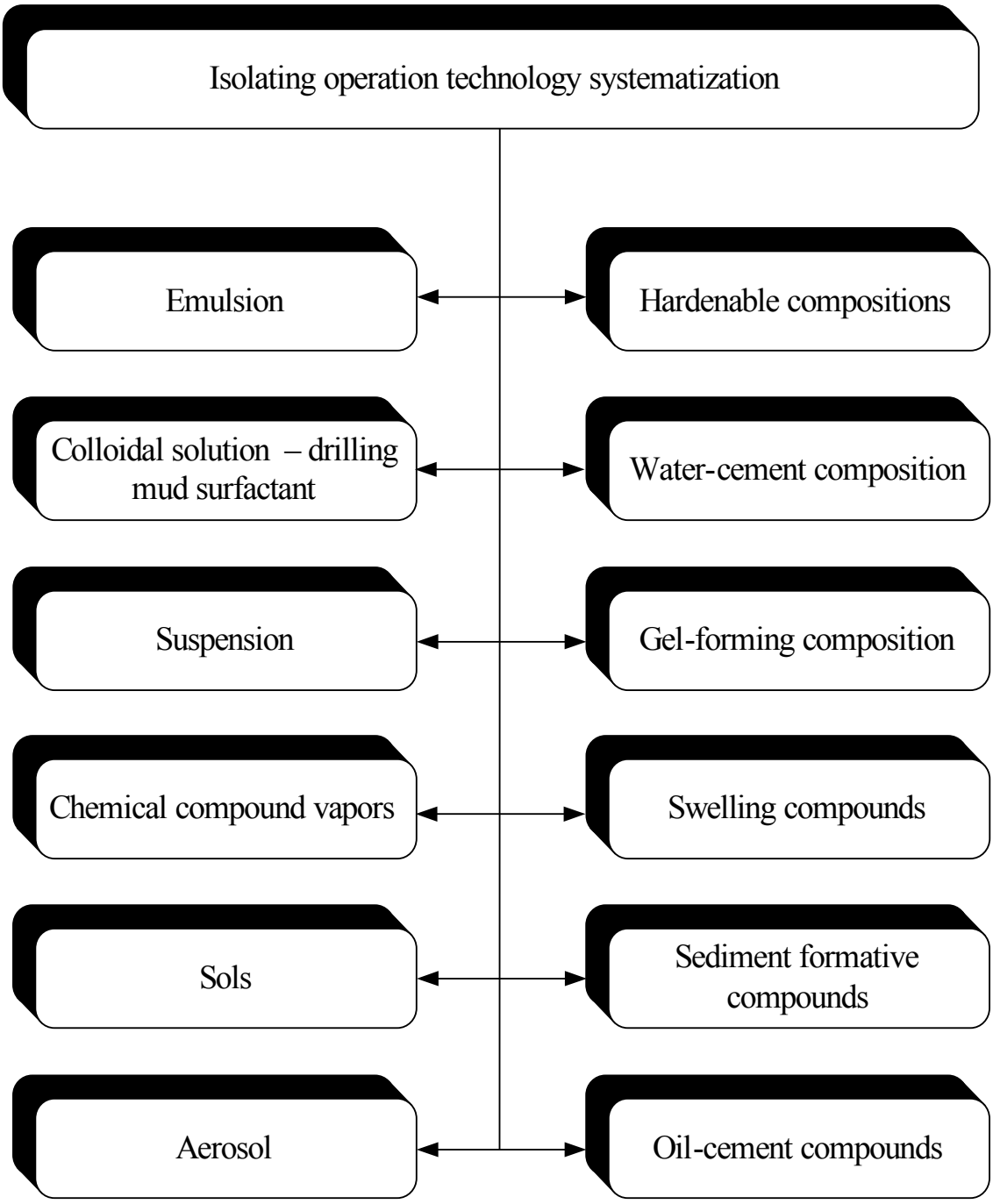

Fig. 3. Micro ranks

Let's consider all subgroups with the examples. Emulsified bitumen and crude oil emulsion are often used in practice. SNPKh-9633 can serve as discussed above. The second type of compositions is colloidal solution, which contain asphalt and bituminous coalescence, that is surfactant species, which change relative permeability of water-saturated layer part. Suspensions can be on water and hydrocarbon basics (rubber crumb, filings, paraffin). Chemical compound steam activity is based on pass from gaseous state (naphthalene) in solid state in rock pores, under influence of layer temperature. Sols are changed into gel, such metamorphosis are appropriate to hydrochloric acid mixture with liquid glass. Sal ammonia in the form of solid substance from smokes, which are settled on pore walls during its filtration, will represent yourself aerosol. Hardenable compositions are represented by large group, here refered synthetic resin, polyurethane and etc. The time of water-cement liquid setting can be reduced by addition of aluminum-chloride or calcium chloride. Gel-forming composition includes sodium silicate, different polymers, such as polyacrylamide and etc. Polymers, which swell from water and thermoelastolayers can be related to the next group. Compounds, which give sediments in pores are hydrolyzed polyacrylonitrile, latexes, polyolefines and etc. Oil-cement slurry filling is realized with subsequent washing excess.

We can make the following withdrawals to what has been discussed above:

1. The ranging according to associated water production decrease regulation levels is performed.

2. In macrolevel there are some recommendations on global solution of the assigned problems with the perspectives of field development elaboration new ways use.

3. Microlevel was build and edited on the base of active chemical agent properties.

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