Some Effects of Trap Intrusions on Oil-Gas Productivity of the Paleozoics of the Lena-Tunguska Province

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Conformable intrusions (sills) of traps (dolerites) play a significant role in the geology of the cover of the Siberian platform. Enormous volumes of magma were intruded in a very short time and this had an effect on reservoir properties and on alteration of organic matter. Differentiated ore-bearing intrusives have the greatest effect on the invaded rocks. More than 90% of the intrusives of the study area are the non-differentiated type.

Porosity in contact zones of the intrusives in most cases is reduced 2-4 times. This effect is felt for a distance of one-half to one-third the thickness. Permeability is reduced to zero in this zone.

Fracturing is associated with these intrusions. Both intrusions and host rock are affected. This fracturing is attributed to a 5-8% reduction in volume of the intrusions during cooling and consolidation. Such fractured rocks may serve as reservoirs.

The thermal effect of trap intrusions is limited to a distance from the intrusion on the order of its thickness. This distance is greater for carbonate rocks. The heat may destroy hydrocarbons, or on the other hand it may generate hydrocarbons from organic matter, depending on its intensity and other factors.

Fig. 1 shows sketch maps of the abundance of conformable dolerite intrusions (sills) for the Lena-Tunguska oil-gas province. These maps can be used in exploration strategies.

CONCLUSIONS

1. In areas of great abundance of dolerite intrusives, shows of naphthids and small pools of oil and gas are possible. Such areas include the belt of S. B. Obruchev, “which consists of the east part of the Turkhano-Noril’sk oil-gas area and the South Tunguska oil-gas region.

2. In areas of medium abundance of dolerites, small and medium pools are possible, These include the Turukhano-Noril’sk oil-gas area and the North and South Tunguska oil-gas regions.

3. The most favorable for the formation of oil and gas fields are the areas with the least dolerites. Thin intrusions have a maximum generating effect for hydrocarbons and minimum negative effects. Such areas are the North Tunguska, Khatanga, Nepa-Botuobinsk, north part of Angara-Lena, and east part of Sayan-Yenisey oil-gas regions.