

THE RESULTS OF VIBRO-IMPACTS ON THE MEDIUM'S STATE

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Abstract

Research of uncontrolled negative influence of industrial activity on the environment led to work out criteria of diagnostics and control of the medium's stress state. It became obvious that

- ecological problems are more complicated than perceived beforehand and any large-scale industrial activity must be controlled to prevent induced disturbance of the natural balance and thereby ecological/economic damage;
- artificial activation of some territory with time will spread further beyond into larger regions.

Achieved results are based on a new approach having view of the medium not as a static object, but a dynamic one with ever changing parameters and properties which diagnostics done through continuous testing using seismic and other geophysical fields revealed the dynamics of their changes under natural or artificial influences.

We present the results of analysis of one industrial activity type being exploitation of oil/gas fields and execution of active experiments to change the stressed state of the territory's medium. The results are based on the study examples of seismicity influence on oil output levels of Starogroznensky oil fields; influence of the off-shore oil fields exploitation on the Caspian basin seismicity, influence of uncontrolled activity on seismicity of Caucasus and Central Asia and other examples.

The results show existing critical levels of pressure changes in oil layers and maximum allowed levels of influences on the medium. Exceeding such levels leads to accumulation of energy in the medium and consequent appearance of negative induced effects: non-linear deformation, increased infrastructure damage, significant increase in seismic and other events.

We developed technology to control and manage the medium condition. Next to increasing oil production and recovery rate we succeeded, using vibro-influences, in correcting large disturbances in the medium caused by previous uncontrolled exploitation, bringing the medium to energetically homogeneous state, keeping the medium condition maximally proximate to natural.