

Environmental monitoring during the construction of main gas pipelines

By Sergey Vlasov & Valery Snakin

Environmental safety during the construction and operation of main gas pipelines is one of the primary focuses of contemporary power engineering, to a greater extent using natural gas as the most environmentally friendly fuel. The pipeline system is becoming more and more complicated and extensive not only in the underpopulated northwestern regions of Russia, but also in densely populated agricultural regions (Fig.1).

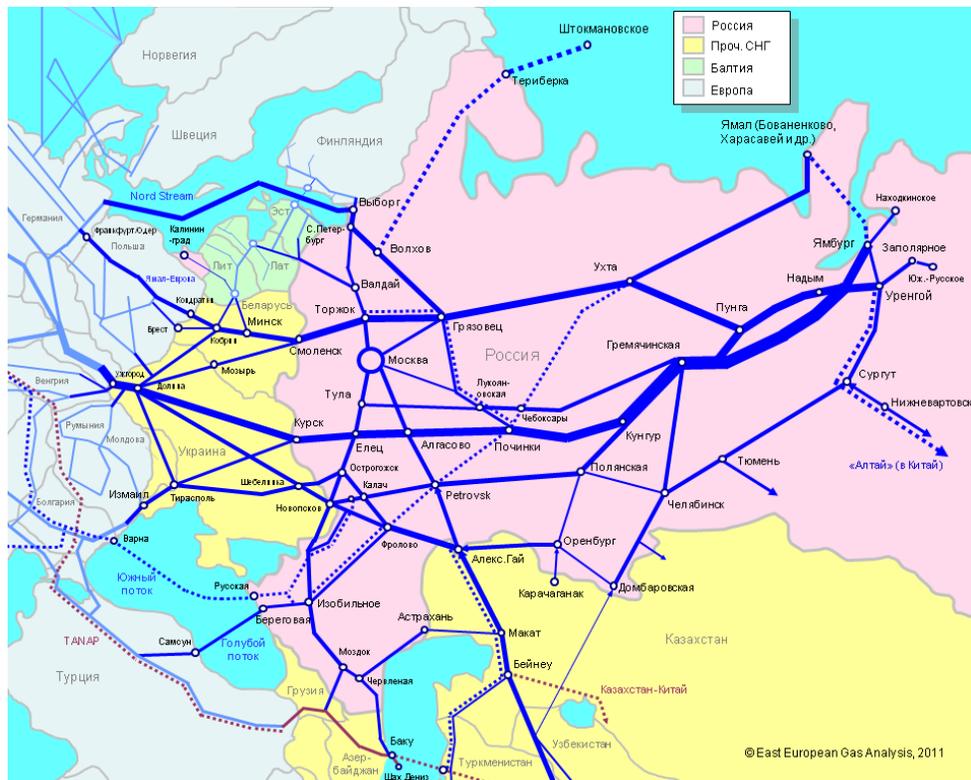


Fig. 1. PJSC "Gazprom" main gas pipelines in the territory of Russia and neighboring states (<http://www.eegas.com/>).

An analysis of emergency events in the Stavropol region found that they occurred mainly in territories with main gas pipelines (Fig. 2). It is unsurprising that the PJSC "Gazprom" environmental protection management system (2000)

states that the “major source of environmental hazards in (the) gas industry is gas pipelines.”

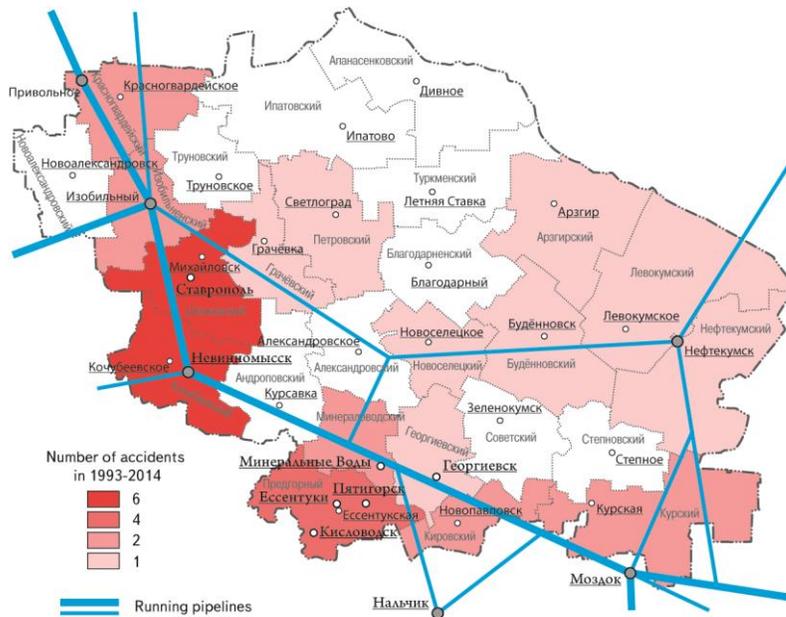


Fig. 2. Gas pipelines and emergency events occurred in the Stavropol Territory in 1993-2014 according to Ministry of Emergency Situations of Russia.

The mission of Energodiagnostika LLC is to provide environmental and operational safety at gas linear facilities including through:

Environmental monitoring and enforcement of environmental legislation, which is an important part of environmental protection during the installation and construction period. Our experience in the Stavropol territory can serve an example, as it is both an agriculturally dense area as well as heavily populated by the gas pipeline system.



Fig. 3. Construction sites of gas pipeline “Izobilny-Nevinnomyssk” (Stavropol Territory

During the construction of the “Izobilny-Nevinnomyssk” pipeline in 2013-2014, Energodiagnostika specialists were in charge of ensuring the project had minimal impact on the environment, including preventing contamination with heavy metals and oil products.

Pipeline construction requires a great deal of construction-site equipment and human, material and technical resources. Any project that deals with repair, reconstruction and major construction work *in situ* could have an impact on the environment, including the air, soil and water sources.

Heavy metals can enter the environment as a result of: corroded pipes that contain quantities of manganese, vanadium, niobium, chrome, nickel, cuprum, molybdenum, titanium and aluminum; welding electrodes containing manganese compounds; hydraulic testing (water pollution) and emissions from construction facilities.

Soil and water monitoring, prevention measures and supervision to ensure compliance with environmental security regulations’ requirements are essential to provide environmental safety.

Thanks to the above mentioned measures, there was no significant presence of heavy metals in the soil. (Fig. 4). Near-maximum permissible levels of heavy metals were detected only in the areas close to the pipelines’ junction with busy highways.

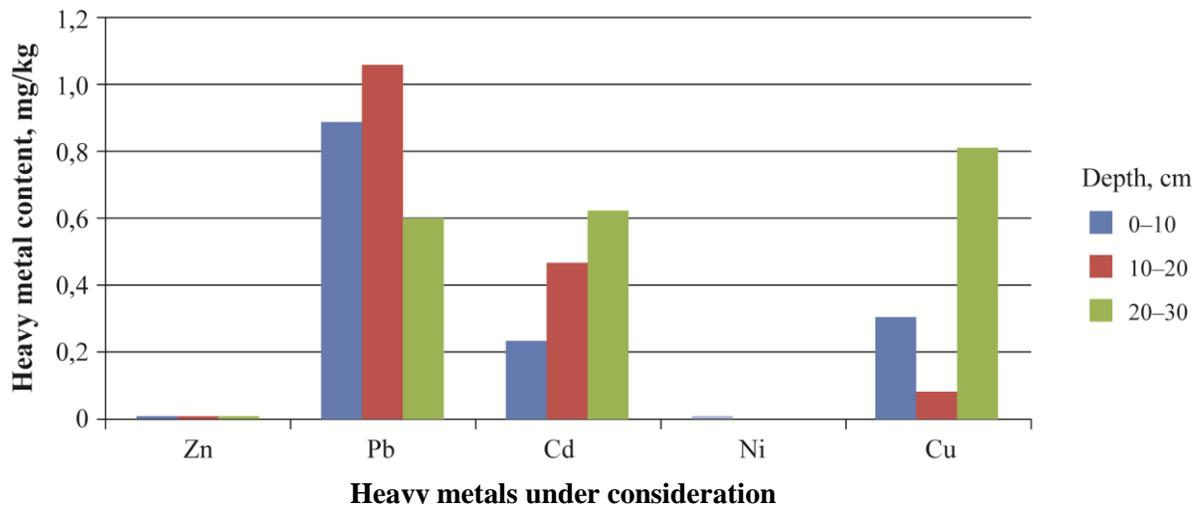


Fig. 4. Distribution of heavy metals' content in the surface soil in the territory of the future horizontal directional drilling under the auto road (75 km of gas pipeline route).

In water bodies (over 40 under consideration), levels did not exceed maximum permissible concentrations (MPC). (In Russia, the standard MPC for oil products in fishery waters is 0.05 mg/dm³). However, some values were within 0.02-0.03 mg/dm³ range, which required continuous monitoring.

Data obtained during the monitoring were transferred to the clients and contractors performing the work to take any necessary required measures. As can be seen from the above, environmental monitoring and environmental legislation enforcement during the installation and construction of gas pipelines allowed for environmental issues to be detected and prevented and significantly decrease environmental risk.