

# Impact of the Construction and Maintenance of the Underwater Gas Main-Line

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The Russia-Turkey main-line is a unique engineering system from the view point of its technical characteristics, being a pioneer in the field of pipe-line construction. Its safe maintenance can be guaranteed only after profound research into the fields of pipe-line strength, reliability and resistivity, ecological safety and risk, impact of geological, geodynamic and seismo-tectonic processes on the system functioning.

The paper presents a list of factors harmful to ecosystems both in the on-land and in the sea sections, as well as the dependence of these factors upon the impact type. Some measures to decrease the negative effect of these factors are also considered.

In the on-land main-line section technogenic effect differ depending on the natural conditions of the 3 regions the main-line runs through, which are the plains of the Western Front-Caucasus, the flood plain of the Kuban river and the Caucasus. This division seems to be reasonable for making optimal ecological discussions.

The plain part of the Front-Caucasus has a lot of river valleys and ravines with the length from 15-25 meters up to 50-70 meters, their slopes being from 30 up to 6-120<sup>1</sup> steep. This region is rich in black earth and highly valuable soils.

The main-line in the flood plain of the Kuban river (265-275m) crosses the rice plots with a highly technogenic relief such as a net of channels, ponds etc.

The Caucasian section of the main-line is characterised by a wide range of altitudes - 0-1000m. The steepness of slopes is mostly 10-120, while in some places it is over 300.

The Caucasus is rich in intensely dislocated rocks of flexural formation of the Jurassic cretaceous age, such as sandstones, slates, clays, conglomerates, lime stones. The mountain range shoulder facing the Black Sea is famous for its unique health resorts and balneological resources. The main ecological danger in the on-land section of the main-line comes from the works dealing with furrowing, assembling, mounting, adjusting, underwater construction, testing and maintenance of the pipeline.

The paper considers different types of technogenic impact that may occurred while constructing and running the on-land section of the gas main-line. These effects can endanger air and

aquatic ecosystems, earth resources and soil, animals and plants, social environment.

The paper gives some recommendations to be followed by constructors under different natural conditions, which ensures optimal ecological control.

The construction and maintenance of the gas main-line sea section is to be done at the depth of 2150 m, which has not been practiced anywhere in the world yet.

The paper also presents the results of the studies of the water and sea-bottom sediments in the area of the supposed main-line track.

The water massif studies defined the availability of oxygen, sulphrated the hydrogen, pH, alkalinity, nitrites, nitrates, ammonium, phosphates, silicon, manganese.

The geochemical study was conducted to define chemical elements of the sediments in the upper two-meter layer.

The paper presents the results of the research in the off-shore zone showing that the Black Sea ecosystem may be greatly impacted by the main-line construction.

The continental slopes of Russia and Turkey are characterized by seismic instability, very active gravitational processes, and fluid expulsion. The choice of the truck is of primary importance for this zone having great sea depth.

The abyssal section of the main-line track seems to be quietest. Ecological measures to be taken at every bottom zone are supplied thus ensuring the greatest ecological safety.

The results also show that the gas main-line construction is not going to cause any appreciable effect on the Black Sea ecosystem.

The ecological and economic assessments of the project are highly positive providing for a complex of measures to be prepared and realized on the way of ensuring its total ecological safety. The project also takes account of the International Regulations and Acts governing in the region of the supposed construction.