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Prospects of Multilevel Use of Geothermal Resources of the Khankala Deposit of the Chechen Republic

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Abstract

The prospects for geothermal energy in the North Caucasus in the context of global trends in this direction are discussed in the article. Favorable conditions for the development of the industry for the Chechen Republic, as a region that is ranked number three in geothermal reserves among Russian regions are marked. The main characteristics of the most promising Khankala geothermal deposit of the Chechen Republic (ChR) are described. A brief overview of the Khankala geothermal circulation system that was firstly implemented in the country in 1981 is made, and the major disadvantages of the project identified by the results of operation are analyzed.

Aggregate data of the results of geochemical studies of thermal waters of the Khankala deposit of the Chechen Republic are discussed. The possibility of multilevel use of the geothermal waters of the Khankala deposit in geothermal energy, to extract useful components and for balneological purposes is considered on the basis of the data presented.

Keywords: geochemistry, geothermal energy, geothermal well, chemical composition.

1. Introduction

The power industry is a basis for the development of key industries in today's world, and the rates of its development outpace that ones of other sectors of economy in many industrialized countries.

At the same time, the power industry is one of the sources of the negative impact on the environment and human beings. The functioning of most power plants is associated with the emission of toxic substances and gases and discharges of contaminated and heated waters, liquid waste, changes in the landscape, etc.

In the context of the item marked, power industry directions using such renewable energy sources as solar, wind and geothermal heat of the Earth are the most promising sources reducing adverse impacts on the environment.

This article discusses the possibility of using geothermal heat of the Earth by extracting energy from the thermal waters. Power production from thermal resources of the Earth is environmentally friendly and does not virtually entail CO_2 emissions (65 g per 1 kW*h) to the atmosphere. At the same time, in burning natural gas CO_2 emission is 453 g per 1 kW*h, for oil it amounts to 906 g per 1 kW*h, and for coal – 1,042 g per 1 kW*h [1-13].

For the time being, geothermal energy is widely used in the United States, the Philippines, Indonesia, France and Mexico – these countries are leaders on the use of geothermal energy in the last 20 years. In 2004-2006, a group of experts at the Massachusetts Institute of Technology, USA, analyzed the situation in the geothermal power industry [Tester et al., 2006]. As a result, the possibility of obtaining 10% of the energy produced in the United States from geothermal sources by 2050 was predicted subject to 1 billion USD of public investments being invested in the sector during 15 years. Geothermal plants have been effectively used in France for more than 30 years exploiting the Dogger reservoir that substantially differs from reservoirs used in the North Caucasus with its injectivity and permeability. The plant in the city of Colomier, where after 30 years of operation, the temperature at the production wellhead and the flow rate didn't change, and are, respectively, 720°C and 230 m^3/h, and that one at the Orly airport, built in 2010 and provides 30% of the demand of the airport in heating and hot water supply in