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Environmental impact and treatment of hydraulic fracturing in shale gas

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Hydraulic fracturing is one of the key technologies to stimulate shale gas production and may have some environmental impacts while enhancing shale gas development. Through the introduction of hydraulic fracturing technology from the design and construction aspects, analysis of its potential adverse environmental impacts in water resource consumption, surface water and groundwater pollution, geological disasters, and other aspects, and based on the existing problems to form targeted solutions.

According to EIA report, during the stimulation process of shale gas fracturing, the amount of water resources is about 10,000m^3, of which 20%-80% can be returned, and the flowback rate of Shale gas in China is 20%-60%, which means that at least 20%-40% polluted water containing various chemical raw materials will be hidden in the formation for a long time. The shale flowback rate in China is significantly lower than that in the United States, not only due to formation conditions, but also due to equipment and technology. In view of this situation, it is necessary to control the whole process from design to construction.

In the design process of hydraulic fracturing of shale gas, real-time control of the fracture range is carried out in conjunction with seismic monitoring and software simulation fitting, so as to reduce the consumption of water resources on the premise of achieving the purpose of increasing production. Especially, to reducing the fracturing program as much as possible in the water-scarce areas, so as to ensure the security of public water resources. Reduce the use of chemical additives to alleviate the pollution of surface water and groundwater. After detection of possible pollution, determine the amount of pollution sources on site and carry out comprehensive pollutant recovery and treatment. Strictly prohibit high-risk pollution sources from entering the fracturing fluid process. At the same time, the fracturing fluid is used to recycled and purified. In terms of geological disasters caused by fracturing, high-risk geological disaster zones should be identified and monitored in advance to prevent large-scale geological activities caused by micro-earthquakes caused by fracturing from causing uncontrollable geological disasters.