

Application of methanotrophs can minimize methane leaks from pipelines and underground gas storage facilities

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Underground gas storage (UGS) is a collection of engineering facilities in the reservoir layers of geological structures, mine workings, salt wells, etc. UGS facilities are designed for gas injection, storage and withdrawal. The facilities include a subsoil area (restricted by mining allotment), wells of various applications, compressor stations, gas-gathering and gas-treatment systems.

Kasimovskaya UGS is pictured below (Fig. 8).



Fig. 8. Kasimov UGS in the Ryazanskaya region is the world's No. 1 gas storage facility in water-bearing formation (4,5 bcm) (<http://www.gazprom.ru/press/reports/2012/milestones/>).

To prevent methane from accumulating in areas of UGS facilities and pipelines where leaks are possible, Energodiagnostika LLC specialists have

proposed using (inoculate) methanotrophic bacteria – natural microorganisms that use methane as their sole carbon and energy source – at PJSC “Gazprom” facilities as well as at the facilities of other gas companies. Energodiagnostika LLC has applied for a patent “Method of providing ecological safety of underground gas storage facilities” (RU 2014108504 A as of 06.03.2014).

The method involves remotely monitoring the methane concentration in areas where methane leakage and accumulation is possible (such as production units, porous strata, permeable rock, surface soil, etc.), as well as in the nearby atmosphere. To control accumulation, special “soil collars” would be created around critical production units and periodically filled with a methanotrophic suspension in a brine solution.

This method would reduce the concentration of methane and thus minimize not only the risk of fire, but also decrease the risk of contaminating the atmosphere with one of the most hazardous greenhouse gases. Development of this method could make a considerable contribution to the goal of the Paris Agreement, the first global climate change agreement, which emerged from the United Nation’s framework convention on climate change in December 2015 (COP21).