



# APPLICATION OF THERMAL METHODS IN INCREASING THE YIELD OF HIGH VISCOSITY OILS

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## Abstract

One of the main conditions for rational work on oil reservoirs with thermal impact is the efficiency of the thermal process. The efficiency of the thermal process is understood as the amount of heat stored in the formation and usefully used to extract oil.

The criterion for the effective use of the thermal impact method is the ability to affect viscous oil deposits and achieve a high oil recovery coefficient with minimal expenditure. Hot water or saturated steam is used as a heat carrier for the formation. When hot water is used, this method is called the hot water method of impact, and when hot steam is used, it is called the steam heat method of impact.

**Keywords:** Saturated steam, heat transfer fluids, heating method, high-viscosity piles, energy consumption, saturation radius, volumetric heat capacity.

## Introduction

Hot water and saturated steam are characterized by a very high heat content and are an environmentally friendly method. It is technically and well-developed in the industry. The indicator of rational use of heat is described by the method of transferring heat energy to the formation, taking into account the minimum heat loss on the way from the steam generator to the bottom of the well and the low loss in the formation.

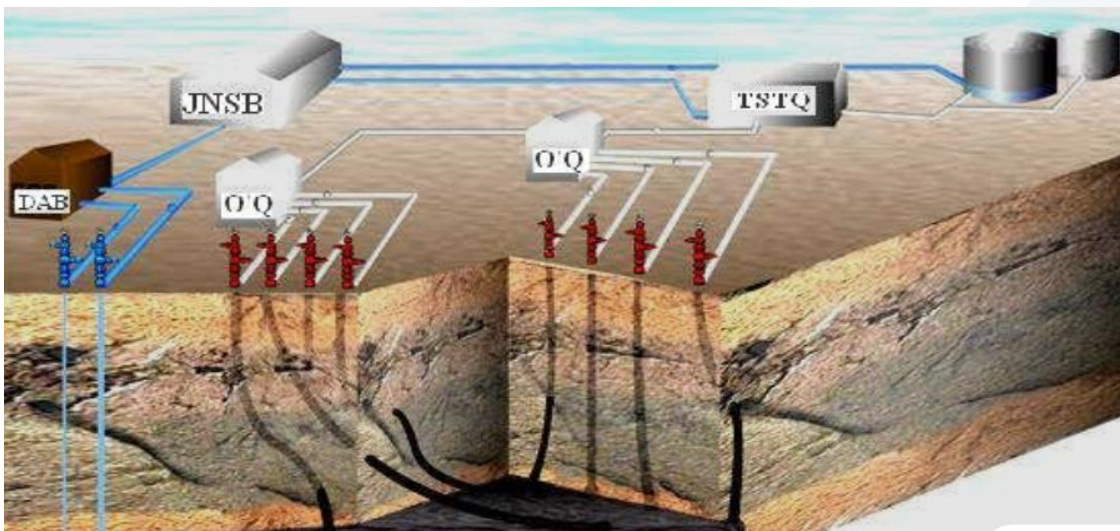
If the coolant is pumped into the well through non-thermally insulated pump-compressor pipes, 50% of the heat can be lost. Low heat loss during the injection of the coolant into the formation, full use of heat in the formation, low heat consumption for the extraction and combustion of one ton of oil, technological improvement and the most favorable energy-saving effect are achieved.

The efficiency of using a particular heat method is assessed by the energy balance costs, which is the difference between the energy received for oil extraction and the energy spent on its extraction.

In any technology for the use of heat from a centralized heat supply, heat loss is inevitable when it is transported through the heat transfer system and the wellbore. The amount of heat loss depends on the length of the heat transfer line, the reliability of heat protection, the quality of the materials used for heat protection, the mode of heat transfer, as well as the type of heat (steam, water) and its classification (temperature, pressure).

When developing high-viscosity deposits by thermal methods, a large amount of energy and capital investment is required. As a result, the cost of extracted oil increases. When developing viscous oil deposits by thermal methods (polymer thermal treatment, hot water), coolants (with a porosity of 60-80%) are pumped into the oil deposits through special pilot wells, then cold water is pumped through the pilot wells, which compresses the heat into the extraction well (usually 2-3 layers to the porosity). In such deposits, 5-6 tons of coolants are pumped to extract 1 ton of oil. The relatively high cost of extracted oil and the low final oil recovery coefficient (0.25÷0.27) are some of the factors that prevent the widespread use of thermal methods. Therefore, improving existing methods and creating more efficient and energy-efficient methods are important issues.

The aim of this new technology is to solve the most important issues in the development of oil fields with difficult-to-recover high-viscosity oil reserves, while achieving high final oil recovery and energy resource efficiency with minimal investment.





The essence of the IDT technology is to create a proportional “effective temperature - Tsam” in the layer based on the calculation of the periodic introduction of heat carriers and cold water into the layer (forming a wave heat front). The heat in the rocks, around the oil layer, and the thermal efficiency of the process largely depends on the temperature difference between the productive layer and the surrounding rock.

The development of the oil industry in the last decade is characterized by the discovery of new fields and the acceleration of the rate of extraction of old fields. Oil and gas specialists and scientists are faced with the problem of using complex structures of oil reservoirs with viscous and highly viscous carbonate reservoirs and finding solutions to them. The geological and physical characteristics of the structure of such reservoirs and the characteristics of their saturation with such fluids make their extraction difficult. The heat in the rocks, around the oil layer, and the thermal efficiency of the process largely depends on the temperature difference between the productive layer and the surrounding rock.

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## **Conclusion**

When developing high-viscosity oil fields using thermal methods, coolants (with a porosity of 60-80%) are pumped into the oil reservoirs through special pilot wells, then cold water is pumped through the pilot wells, which is pumped into the extraction well, and 5-6 tons of coolants are pumped to extract 1 ton of oil in such fields. The relatively high cost of the extracted oil and the low final oil recovery coefficient (0.25-0.27) are one of the factors that prevent the widespread use of thermal methods. Therefore, one of the important issues is to improve existing methods and create more effective methods with minimal energy consumption. One of the most effective methods for extracting high-viscosity oils located in carbonate reservoirs is still acid treatment.



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