

# Graduate Seminar

## *Waterflood Management: How It Can Save Your Money*

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### **Abstract-**

Most oil companies flood their fields using water. Every engineer who works with waterflooding ask themselves: **“What should I do to maximize the efficiency of waterflooding on a given field? What aspects must I consider to minimize CAPEX and OPEX?”**

Good design of the injectors placement and their perforation, optimal injection pressures, rates and volumes can increase sweep efficiency and decrease early water breakthrough, minimize the potential of induced fractures and out-of-zone injection, as well as water quality management can prevent formation damage by fines migration, clay swelling, bacterial growth and salt precipitation. All these efforts are only one piece of the puzzle, on a so-called macro-level. Injected water is the main agent interacting between formation fluids and rock and represents the micro-level. Knowledge of interactions at this level is the key to improving displacement efficiency and pressure maintenance, reducing expenses and increasing profitability of any waterflooding operation.

This presentation gives answers to the questions, based on lessons learned from more than 60 years of the company’s waterflooding history. The presentation has field and pilot examples, coreflood studies, simulation of low and high salinity waterfloods, injection of nanoparticles, comparisons and economical assessment of different problems in waterflooding, from secondary to tertiary recovery methods.

The key takeaway message of this presentation is that every engineer who manages water injection should consider processes occurring at the molecular level; i.e. the so-called micro-level. This can save money and give non-economical projects a new life.

The presentation also has information about Tatneft, founded in 1950. Tatneft is the fifth largest oil company in Russia; it includes both upstream and downstream sectors. Tatneft operates 87 oil fields with total production capacity of 201.2 million bbl of oil annually.

### **Bio-**

Vadim Akhmetgareev is a senior reservoir engineer at the TatNIPIneft research center of Tatneft Oil & Natural Gas Company. Tatneft is a Russian vertically integrated oil and gas company with headquarters in the city of Almeteyvsk in the Republic of Tatarstan. It was founded in 1950 and is the fifth largest oil company in Russia.

He has more than 12 years of industry experience, including roles in reservoir engineering, waterflooding optimization, EOR/IOR, well stimulation, formation damage control, well completion, project management and Research & Development.

Vadim holds a BS in petroleum engineering and a MS in reservoir engineering from the Ufa State Petroleum Technological University (Russia) and a PhD in petroleum engineering from TatNIPIneft (Russia). He is an author of more than 60 patents and has published over 20 technical papers. Vadim is actively involved in the SPE. He has been secretary and chair of the SPE Volga (Russia) section. He is also a 2016 - 2017 SPE Distinguished Lecturer.

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