

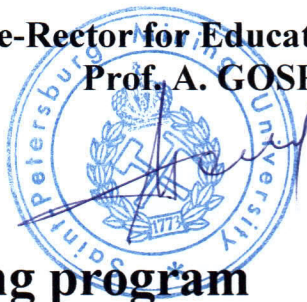
THE FIRST HIGHER TECHNICAL UNIVERSITY IN RUSSIA



MINISTRY OF EDUCATION AND SCIENCE OF THE RUSSIAN FEDERATION
Federal State Budgetary Educational Institution of Higher Education
“Saint-Petersburg Mining University”



Approved by
Vice-Rector for Educational Activity
Prof. A. GOSPODARIKOV



18/12/2017

Professional training program

MODERN PHYSICO-CHEMICAL TECHNOLOGIES FOR ENHANCED OIL RECOVERY

Training Area: 21.03.01 «Oil and Gas Engineering»

**Priority area of modernization and technological development of the
Russian economy: Energy Efficiency and Efficient Use of Resources**

Attendance: full time

Course leader

M.K. Rogatchev, Head of
Department
“Development and
operation of oil and gas
field”, DScTech.,
Professor

Course Developer:

D.S. Tananykhin, PhD of
technical science

SAINT PETERSBURG
2017

1. General Provisions

1.1 Objective of the training programme.

Formation of research-based concepts of modern physicochemical technologies for enhanced oil recovery in accordance with professional standards.

1.2 The competences of subject formation following the training results

The main professional competences of subject formation following the results of training are presented in the table.

No competence	Target groups	Description of professional competences, readiness to implement the labor of action for the type of professional activity.
1.1	Maintenance staff of reservoir engineering and enhanced oil recovery departments of oil companies	– production of candidate wells for carrying out main geological and technological activities;
1.2		– record survey for geological and technical activities and analysis of the effectiveness of geological and technical activities;
1.3		– participation in proposal development for the efficient use of geological and technical programs;
		– development activities for off-stream well reactivation, well with a reduction in flow rate etc. with compilation the program of research and measures to restore flow rates
2.1	Specialists of oil fields development departments, R&D centers, geological survey of production shops, workover departments, enhanced oil recovery and oil and gas fields development departments and contracting organizations specialists	monitor the performance of the sectors of department hydrodynamic investigations and geophysical researches of wells, monitoring wells, development of monitoring and control of deposits in the framework of the functions assigned to them
2.2		ensure the monitoring and analysis of the current state of development of reservoirs
2.3		provide training and formation of scheduled reporting on development of fields
2.4		ensure the preparation of orders and instructions, the organization of meetings related to the tasks of the department
2.5		provide control plan performing geophysical and downhole well test
2.6		provide control of implementation of the plan of work on the methods of enhanced oil recovery
2.7		organize and supervise the timely conclusion of contracts and amendments to contracts for works on methods of enhanced oil recovery
2.8		monitor the implementation of the plan well in changes maintain reservoir pressure and well interventions on the water-injection wells
2.9		to work together with the relevant state bodies, ministries and research institutes in the direction of its activities
2.10		monitor the implementation of the decisions approved design and technological documentation for development of fields

1.3 Requirements for mastering the program results

With a view to achieving the competencies listed in 1.2, a learner in the course of the development of training program should:

Practical experience:

- improve or develop measures to provide oil production;
- selection of the optimal type of artificial lift for wells;
- selection of the optimal configuration of wells and surface facilities, improve the control and operation of the process of production volumes;
- control measures to eliminate the causes of failure to reach the required performance;
- analysis of actual and projected parameters of the system formation - well - submersible pumps - gathering facilities;
- drawing up a set of measures for efficient use of the capacity of the well, maximizing oil production in an economically reasonable limits.

Acquire skill:

- identify ways to optimize the operation of wells, through work on the intensification and enhanced oil recovery;
- identify risk and constraints that determine the operation of the system formation - well equipment - gathering facilities;
- diagnosis abilities on technological parameters of the wells;
- assess the impact on the productivity index different formation damage mechanisms;
- the monitoring of process control.

To gain knowledge:

- advanced domestic and foreign experience in the field of oil production;
- major advantages and disadvantages of different intensification technologies and enhanced oil recovery;
- main types of information needed to make decisions about the corrective and preventive actions;
- effectiveness of control methods works on intensification and enhanced oil recovery;
- requirements of industrial safety, occupational health and environmental safety at work.

1.4. Scope of the program and the types of training

Type of training	Total hours
Total scope of the program	36
Lectures	20
Laboratory and practical classes	16

1.5. The curriculum

№	Module	Total hours	Including		List competencies (according to the list of point 1.2)
			Lectures	Laboratory and practical classes	
1.	Module 1. Geological-physical and physico-chemical basis of the directed choice of stimulation methods on bottom-hole formation zone	16	10	6	1.1, 1.2, 2.1-2.6

2.	Module 2. Advanced physico-chemical methods and technologies of oil production stimulation and enhanced oil recovery methods	20	12	8	1.3, 1.4, 2.7-2.10
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1.6. Form of final examination

Attestation form for program is report.

1.7. Documents confirming qualification improvement of trainees

After training program has been successfully accomplished, the trainees are issued certificates about advanced training in enhanced oil recovery.

1.8. Training process staffing

№	Full name	Education, qualification, Institution graduated	Position, academic degree, academic rank, work experience (years)	The total number of publications
Course Leader				
1	Michail Rogachev	Higher, Ufa oil university, mining engineer on specialty "Development and operation of oil and gas fields"	Head of department "Development and exploitation of oil and gas fields", professor, DScTech, 40 years	More than 200 publications
Lecturers				
2	Dmitry Petrakov	Higher, St.-Petersburg mining institute, mining engineer on specialty "Resource development by underground method"	Dean of oil&gas Faculty, PhD, associate professor, 20 years	More than 50 publications
3	Dmitry Mardashov	Higher, Samara state technical university, engineer on specialty "Development and operation of oil and gas fields"	PhD, associate professor, 12 years	More than 50 publications
4	Dmitry Tananykhin	Higher, Samara state technical university, engineer on specialty "Development and operation of oil and gas fields"	PhD, associate professor, 6 years	More than 40 publications
5	Liliya Shangaraeva	Higher, Almet'evsk state oil institute, engineer on specialty "Development and operation of oil and gas fields"	PhD, associate professor, 6 years	More than 40 publications
6	Pavel Roschin	Higher, Samara state technical university, engineer on specialty "Development and operation of oil and gas fields"	PhD, assistant professor, 4 years	More than 30 publications

1.9 Content of training

Training modules	Content of training material, laboratory works and practical classes, self-studies	Hours
Module 1. Geological-physical and physico-chemical basis of the directed choice of stimulation method		
Topic 1.1. Geological-physical conditions and state of oil fields development of major oil and gas producing regions	Analysis of methods of geological study of oil and gas deposits for systems engineering design and management of production processes. Evaluation of geological and physical factors that determine the conditions for the extraction of hydrocarbons from reservoirs. Geological justification of development systems and management development processes and inventory management. Review of methods of studying deposits from the standpoint of the systemic-structural approach, which developed deposits represented as dynamic systems, changing over time.	6
	Practical classes: introduction to modern instrumentation and research methodology of core materials; familiarization with the equipment and methodology for studies of various chemicals and study the effect on the filtration characteristics of the core materials; familiarization with the appointment rules of ground facilities service of wells used tools, appliances, control and measuring devices.	4
Topic 1.2. The main reasons for the deterioration of the filtration characteristics of the bottom hole formation zone	Physico-chemical basis of the directed choice of stimulation method methods for oil formation. Ways of improving the filtration characteristics of the bottom-hole formation zone.	4
	Practical classes: Familiarization with the equipment and methodology of laboratory research of drilling and air foamed cement slurry.	2
Module 2. Modern methods and technologies of stimulation oil production and enhanced oil recovery		
Topic 2.1. Improvement of physico-chemical stimulation technologies on the bottomhole zone of the oil reservoir.	Development of completion technology of a productive layer with the preservation of its filtration characteristics. Regulation of filtrational characteristics of oil wells bore hole formation zone during operation. The improving technology of plugging oil wells in the conditions of low-permeability reservoirs. Regulation of filtrational characteristics of bottom hole formation zone at a late stage of oil field development.	4

	<p><u>Practical classes:</u> Familiarization with the equipment and research methodology of the cement slurry development for high temperature reservoirs; Familiarization with the equipment and research methodology of the gel-forming compositions development for isolation of water inflow into the borehole; Familiarization with the mixing operation unit US-15-14U.</p>	2
Topic 2.2. Development of effective solvent for asphalt-resin-paraffin deposits.	<p>The causes of formation and methods of asphalt-resin-paraffin deposits removal in the bottom hole formation zone. Characteristics of the solvents components for asphalt-resin-paraffin deposits. Physico-chemical fundamentals of directional selection of solvents for asphalt-resin-paraffin deposits. The development of new chemical compounds – solvents of the paraffin for the treatment of the bottom hole formation zone.</p>	2
	<p><u>Practical classes:</u> familiarization with the equipment and research methodology for the selection of asphalt-resin-paraffin deposits solvents; design of a rotational viscometer and methodology to carry out the rheological studies; determination of rheological parameters of degassed oil on the rotary viscosimeter; removal of the viscosity-temperature characteristics of the degassed oil on the rotary viscometer.</p>	4
Topic 2.3. Improvement of remedial cementing works for high temperature reservoirs.	<p>Review and analysis of remedial cementing technologies for the fields of Western Siberia with a high reservoir temperature. The development of new and improvement of known cementing compositions and remedial cementing technologies for high temperature reservoirs.</p>	4
	<p><u>Practical classes:</u> work of cementing units UNB 125x32Y.</p>	2
Topic 2.4. Modern geophysical and hydrodynamic methods and technologies of control over the development of oil fields and wells	<p>Goals and objectives oversee the development of oil and gas fields. A systematic approach in the control of development. Analysis of control methods over the oil fields development.</p>	2

1.10 Course venue – premises of the Sain-Petersburg mining university

1.11 Basic Literature

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