CATALOGUE OF DRILLING CHEMICALS

DRILLING AND PRODUCTION CHEMICALS

BUSINESS UNIT

MIRRICO

GROUP OF COMPANIES

ABOUT THE COMPANY

Drilling and Production Chemicals Business Unit performs development, customized selection and supply of a wide range of complex chemicals with high engineering component for well construction and oil production.

Main types of services rendered

Trading

Selection and delivery of our proprietary andthird-party chemicals for drilling, well cementing and oil production subject to specific geo-technical requirements of the customer and specific conditions of drilling inRussia and CIS countries.

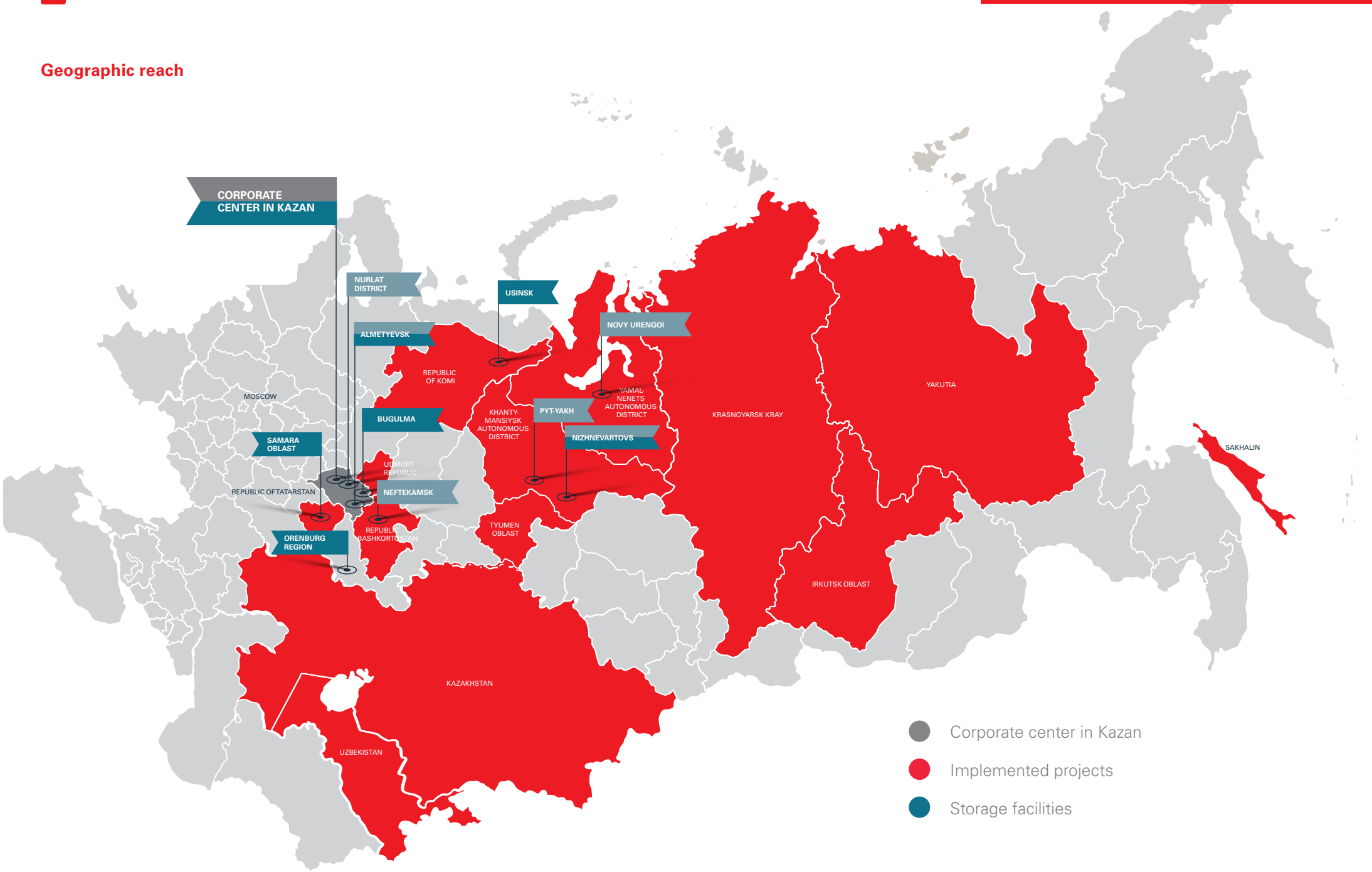
Engineering

Designing and testing drilling fluid systems using modern laboratory equipment, as well as introduction of the developed chemical solutions in the process of well drilling supported by well-trained process engineers.

Drilling and Production Chemicals Business Unit actively develops and successfully introduces both standard drilling fluid systems for the most common geological and technological conditions and unique technologies for solving specific problems arising during drilling.

Participation in multi-disciplinary cooperation of business lines of the Mirrico Group makes it possible to develop, introduce and offer customers specific chemical solutions, as well as to adjust and improve efficiency of the customer's technologies by applying our proprietary chemical solutions. The network of production and storage facilities, constant supply of chemicals result in optimal delivery schemes and timely deliveries.

Geographic reach



Structure

DRILLING AND PRODUCTION REAGENTS BUSINESS UNIT

SALES DEPARTMENT OF CHEMICALS FOR WELL CONSTRUCTION (DRILLING, CEMENTING)	SALES DEPARTMENT OF CHEMICALS FOR OIL PRODUCTION	PROCESSING SERVICE
SCIENTIFIC RESEARCH LABORATORY	CONTRACTS AND PERFORMANCE SUPPORT DEPARTMENT	PRODUCT MARKETING DEPARTMENT

Own production facility and scientific research laboratory

Broad range of chemicals

Modern equipment for relevant research

Quality control according to ISO 9001:2008

Quality management system

Drilling and Production Reagents Business Unit is certified by the quality management system according to requirements of international standard ISO 9001: 2008.

In the near future Drilling and Production Chemicals Business Unit is expected to master international standard ISo 9001: 2015.

Our customers

PAO NK Rosneft

AO Rus-Oil

AO Sibirsk Service Company

Eriell group

OOO PetroAlyans

Halliburton International Inc.

OAO Surgutnegtegas

Shlumberger

CATALOGUE OF DRILLING CHEMICALS

problem:	**Fluid loss control**
solution:	Amilor Osnopac Seurvey FL Atren Thermo A
problem:	**Rheology control**
solution:	Gammaxan Seurvey D1 Osnova-Medium Osno-Desco CA, CB Osno-Desco NC
problem:	**Shale inhibition**
solution:	Atren CI Atren CS-135 Atren PG Atren SL Osnova-GS Algypo DS103
problem:	**Drilling fluid lubricity enhancement**
solution:	Atren FK Biolub LVL Biolub EPL Biolub Green Atren Roll
problem:	**Bridging.** **Lost circulation control**
solution:	Versatile marble composition (VMC) Atren GAP Atren-Ores Atren Renap Colmatantselective KS Osno Plug Osno-Screen

problem:	**Drilling mud weighting**
solution:	Atren SALT Versatile marble composition (VMC)
problem:	**Defoaming**
solution:	Atren-Antifoam A, B, C, P
problem:	**Hydrogen sulfide scavenging**
solution:	Atren-HS Atren-HSL
problem:	**Balling prevention**
solution:	Detergent HS
problem:	**Drilling fluid microbial resistance**
solution:	Atren-bio A Atren-bio B
problem:	**Stuck pipe prevention and release**
solution:	Atren-Antistick
problem:	**Emulsion fluid preparation**
solution:	Oil-based biodegradable fluid (OBF) Cleave FM Osnova Medium E Osnova BR NRP-20M
problem:	**Drill-in**
solution:	Atren SA Alkioks 600

Summary table of problems and solutions for drilling chemicals

PROBLEM: DRILLING FLUID LOSS CONTROL

Amilor Fluid loss control additive

Description: water-soluble modified starch.

Application: used for stabilization and regulation of filtration properties of fresh and specially mineralized drilling fluids used in construction and workover of oil and gas wells. Quickly soluble in cold fresh or mineralized water, does not foam solutions.

The effective concentration of the chemical product is from 0.5 to 3.0 %.

Features:

- An efficient chemical for reducing filtrate volume, effective both in fresh and highly mineralized solutions (including solutions containing Ca and Mg ions) including saturated solutions. The additive efficiently reduces the filtrate volume of solutions weighted by salts of KCl, NaCl, CaCl2.
- Easily hydrolyzed by concentrated mineral acids, without forming an insoluble residue. Therefore, amilor is most effective in case of producing reservoir penetration. It is a biodegradable and environmentally friendly product.
- Ensures stabilization of wellbore walls in case of drill-in and helps to reduce the solid content in drilling fluid.

Physical and chemical properties

Typical Properties	Standard value	
	P-121	P-122
Appearance at 20 °C	Homogeneous free-flowing powder, from light yellow to pale-yellow color	
Moisture content, %, not more than	10	
Relative viscosity, sec., not less than	-	50
Reagent solution filtrate volume (30 g/dm^3) in fresh medium at 6,9 atm., cm^3, max	-	10
Reagent solution filtrate volume (30 g/dm^3) in salt mixture solution, with density 1,15 g/cm^3 at 6,9 atm., max	10	
Reagent solution filtrate volume (30 g/dm^3) in calcium chloride solution, with density 1,15 g/cm^3 at 6,9 atm., max	-	10
pH of 1% reagent water solution, units	7–9	6–11

Osnopac Fluid loss and rheology control additive

Description: highly substituted sodium salt of carboxymethyl cellulose.

Produced in the form of four grades:

- OSNOPAC-NO is a low-viscosity grade of polyanionic cellulose, an effective fluid loss additive.
- OSNOPAC-VO – high-viscosity grade of polyanionic cellulose, controls fluid loss and rheology of drilling fluid.
- OSNOPAC-NT is a low-viscosity technical grade of polyanionic cellulose, it is an effecient fluid loss additive.
- OSNOPAC-VT is a high-viscosity technical grade of polyanionic cellulose, controls fluid loss and rheology of drilling fluid.

Application: used to control fluid loss for both fresh and mineralized drilling fluids. Facilitates forming of a thin, dense, elastic and low-permeability filter cake. The recommended concentration of the chemical product is from 0.15 to 0.5% (1.5 to 5 kg/m^3), depending on type of drilling fluid.
Combined use of high-viscosity and low-viscosity brands enables to efficiently adjust rheological and filtering properties of the drilling fluid depending on drilling conditions.

Features:

- Efficiently reduces the drilling fluid filtration properties depending on the polymerization degree or causes no significant impact on rheological properties of the drilling fluid (low-viscosity brands), or acts as an efficient rheology regulating agent (high-viscosity brands).
- Resistant to bacterial aggression during drilling, does not require use of bactericides. At the same time, it is decomposed in the course of time, without adverse effect on the formation.
- Stable in highly mineralized media (saturated solutions of sodium and potassium chlorides).

Физико-химические свойства

Typical Properties	Standard value			
	NO	VO	NT	VT
Appearance at 20 °C	Powdery, finely grained, containing fibers of a material, which can be from white to cream color			
Moisture content, %, not more than	15			
Presence of non-dissolved particles	N/A			
Hydrogen indicator (pH) of 0,5 % water solution	7–9			
Effective viscosity, cPs	Not more than 40	Not less than 50	Not more than 30	Not less than 30
Filtration value according to API 13A, cm^3, not more than	11	17	16	23

Seurvey FL Fluid loss polymer additive

Description: sodium polyacrylate with a high degree of anionic charge and low molecular weight.

Application: used for efficient fluid loss control for bentonite-based drilling fluids, and for encapsulation of cuttings, strengthening of wellbore walls, rheology control. Seurvey FL must be added to drilling fluid after adding of bentonite. The recommended concentration of the chemical product is from 1.5 to 5 kg/m^3 depending on type of drilling fluid.

Features:

- With a content of 0.5 kg/m3 in the drilling fluid based on bentonite, the filtrate volume can be reduced several times as compared to initial bentonite suspension.
- Due to encapsulation of cuttings, it improves removal of sludge and reduces sticking of sludge particles to the surface of the equipment.
- Reduces thickness of the filter cake and increases its strength, resulting in reduction of interaction area between the drill pipe and wellbore wall and reduction of probability of tool sticking.

Physical and chemical properties

Typical Properties	Standard value
Appearance	Free flowing powder, from white to yellow color
Bulk density, g/cm^3	0,500–0,900
pH of 10 % water solution	8–11
Weight content of the basic substance, %, not less than	93,0
Viscosity of 10 % water solution at Brookfield viscometer, MPa*s	400–1200

Atren Thermo A Fluid loss additive

Description: a compound based on synthetic and modified natural polymers.

Application: used in oil industry in drilling and workover of oil wells in order to reduce filtration of drilling fluid with temperatures ranging from 80 to 180 °C. The principle of operation is based on ability of the chemical to form a low-permeablity filter cake capable of effective fluid loss control. The recommended concentration of the chemical product is from 5 to 30 kg/m^3 depending on properties of the drilling fluid.

Features:

- Ensures low level of filtration.
- Reduces the possibility of drill string sticking.
- Does not increase viscosity of the drilling fluid and improves quality of a filter cake.
- Reduces clay hydration, improves lubricating properties of drilling fluids.
- Stabilizes rheological properties.
- Compatible with a broad range of waterbased drilling fluids.

Physical and chemical properties

Typical Properties	Standard value
Appearance at 20 °C	Powder, which can be from light brown and up to dark brown
Moisture content, %, not more than	16
Potential of hydrogen (pH) of water solution, w/w 1 % units	9–12

PROBLEM: DRILLING FLUID RHEOLOGY CONTROL

Gammaxan Rheology control additive

Description: xanthan biopolymer, characterized by the highest degree of purification.

Application: used as a rheology modifier in fresh and highly mineralized water-based drilling fluids.

Gammaxan is a biodegradable polymer, so in case of long time use or storage of Gammaxan-based fluids, biocide treatment is highly recommended. The recommended concentration of the chemical product is from 0.5 to 5.0 kg/m^3 depending on required viscosity of the solution.

Features:

- It gives thixotropic properties to solutions, which means ability to flow with minimal resistance at high shear rates and form an elastic gel at low flow rates.
- Indispensable as the main component of the rheology modifier in water-based inhibiting drilling solutions for drilling in, especially in case of drilling directional and horizontal wells.
- Controls rheology (plastic viscosity, dynamic shear stress, static shear stress) of drilling fluids, provides high solids-carrying capacity and cuttings-carrying capacity. Continues to be effecient in high mineralized drilling fluids with high «hardness».

Physical and chemical properties

Typical Properties	Standard value
Appearance	Powder, which can be from white to light cream color
Moisture content, %, not more than	15
Relative viscosity according to water based drilling fluid-1, sec., not less than	40
Static shear stress of 0,5 % reagent solution, 10 sec., dPa, not less than	40
Brookfield low-shear-rate viscosity (0,3 rpm, 2 pcs), not less than cPs	32000
Dynamic shear stress of 0,5% reagent solution, dPa, not less than	100

Seurvey D1 Polyacrylimide

Description: high molecular weight acrylamide copolymer.

Application: used for stabilization of water-swellable and dispersible shales and also for drilling fluid viscosity control. It should be used together with low molecular anionic polymers, such as Seurvey FL, to prevent flocculation of the mud laden fluid. The recommended concentration of the chemical product is from 0.2 to 2.0 kg/m^3 depending on the content of the colloid phase of the drilling fluid.

Features:

- Due to encapsulation of cuttings, it improves removal of sludge and reduces balling.
- Reduces thickness of a filter cake, increasing its strength, which reduces interaction area between the drill pipe and wellbore wall, thereby reducing probable sticking.
- Facilitates maintaining stability of the wellbore preventing debris and caving.
- Due to high adsorption capacity on the clay surface, it has lubricating and anti-balling properties.
- Significantly Increases viscosity and strength of the drilling fluid gel, thereby improving the well cleanout.

Physical and chemical properties

Typical Properties		Standard value
Appearance		Free flowing powder of white to light-yellow color
Moisture content, %, not more than		10
Bulk density, g/cm^3		0,6–0,9
Grain composition, w/w of grains with dimensions of	more than 1,25 mm, not more than	10
Filtrate volume according to API 13A, cm^3, not more than	less than 0,1 mm, not more than	3
Dynamic viscosity at Brookfield viscosimeter, mPa*syc of 0,5 % solution in 10 % NaCl solution, not less than		60

Osnova-Medium mud powder

Description: highly efficient montmorillonite or palygorskit mud powder. Rheology modifier for fresh and brine water-based mud systems.

Produced as three marks:

- Osnova-Medium A is a beneficiated mud powder with high-yield of drilling fluid. Complies with the requirements of API-13A standard;
- Osnova-Medium B is a sodium-beneficiated mud powder;
- Osnova-Medium P is a highly efficient palygorskit mud powder.

Application: as base component for mud-laden and polymer-clay drilling fluids based on fresh and low-salinity water (A and B brands) and brine-water based slurries; added into water in specified amounts to obtain clay suspension depending on the required viscosity.

Features:

- Effectively regulates rheological and filtering properties of water-based drilling fluids. Due to broad range of brands, it is easy to select a bentonite powder most suitable for the certain drilling conditions.
- Acts as a density regulator of drilling fluids.

Physical and chemical properties

Typical Properties	Standard value		
	A	B	P
Appearance	Fine powder, which can be from light grey and up to brown		
Drill drilling fluid yield, m^3/t, not less than	19	16	16
Moisture content, %, not more than	13		
Rest on a sieve No. 0, 071 mm, %, not more than	2,5		10
Lost on ignition, %, not less than	-		0

Osno-Desco CA, CB Dispersant

Description: a thinner based on oxidized-substituted lignosulfonate.

Application: used for regulation of structural and mechanical properties of mud-laden drilling fluids: reduces their viscosity, water loss and increases heat resistance. It is heat-stable up to 150 °C, does not require retaining of alkaline pH. The recommended concentration of the chemical product is from from 5–25 kg/m^3.

Features:

- Effectively disperses clay particles contained in drilling fluid, reducing viscosity by reducing interaction between solid phase particles.
- Stabilizes dispersed drilling fluids, retaining their rheology while drilling through reactive argillaceous shales.
- Controls fluid loss in water-based drilling fluids under conditions of salt aggression and high temperatures, while improving thermal stability of other polymers in the slurry.
- Prevents flocculation of bentonite slurries at high temperatures in the pay zone, improves quality of the filter cake, giving it high density and low permeability.

Physical and chemical properties

Typical Properties	Standard value	
	Osno-Desco CA	Osno-Desco CB
Appearance at 20 °C	Powder, which can be from grey and up to dark brown color	
Hygroscopic moisture weight percent, %, not more than	10	
pH of 1 % water solution, units	4–6	4–6
Dilution indicator, %, not less than	40	

Osno-Desco NC Dispersant

Description: polyphenolic sulphomethylated tannin.

Application: used for reduction of viscosity and stabilization in any water-based drilling fluid systems with various degrees of mineralization, heat-stable up to 150 °C, does not require retaining of alkaline pH. The recommended concentration of the chemical product is from 0.1 to 0.3 % (1–3 kg/m^3).

Features:

- It is an effective dispersant in all water-based drilling fluid systems of various degree of mineralization and solid content, which does facilitate foam formation and density reduction.
- Increases heat resistance of fresh and mineralized drilling fluids, compatible with all components of drilling fluids.
- Lignosulfonate diluents are more effective in similar concentrations.
- Environmentally safe, does not contain chromium compounds.

Physical and chemical properties

Typical Properties	Standard value
Appearance at 20 °C	Red and brown powder
Hygroscopic moisture weight percent, %, not more than	10
pH of 1 % water solution, units	5–9
Dilution indicator, %, not less than	40

PROBLEM: SHALE INHIBITION

Atren CI Borosilicate reagent

Description: water solution of silicates, borates and humates of alkali metals.

Application: reduces the rate of clay hydration, showing inhibition property, provides stabilization of rheology of dispersed drilling fluid systems. It is easily mixed with drilling fluids, therefore special equipment is not required to disperse the additive in the system. The recommended concentration of the chemical product is from 5 to 30 kg/m^3.

Features:

- Reduces viscosity of drilling fluid dispersed systems containing suspended clay particles.
- Controls fluid loss and rheology of dispersed drilling fluid systems.
- Stabilizes unstable clay deposits, reducing probable complications during drilling.

Physical and chemical properties

Typical Properties	Standard value
Appearance at 20 °C	Dark brown liquid
Solid content, %, not less than	19
Potential of hydrogen (pH), within limits of	10–12
Dilution indicator, %, not less than	45

Atren CS-135 Shale stabilizer

Description: shale stabilizer based on choline chloride.

Application: used for shale stabilization in processing fluids used in drilling, development, workover and well stimulation operations. The recommended concentration of chemical is from 1.0 to 2.0 l/m^3, depending on the type of processing fluid.

And conditions of use. In some cases, higher concentrations (up to 5 l / m^3) may be required.

Features:

- Compatible with most reagents used in processing fluids for drilling, workover operations and well stimulation.
- Effective inhibition of hydration of active shales, stabilizing wellbore walls and preventing slurry dispersion of (during drilling).
- Effective in mineralized environments.

Physical and chemical properties

Typical Properties	Standard value
Appearance at 20+2 °C	Transparent colorless liquid (opalescence is possible)
Density at 20+2 °C, kg/m^3	0,99–1,19
Potential of hydrogen (pH), units	6–8

Atren PG Clay inhibitor

Description: water solution of a mixture of low-molecular glycols and their esters.

Application: used to inhibit unstable clay deposits. Inhibits effectively processes of hydration and swelling of clay particles. Atren PG is easily mixed with drilling fluids, therefore, no special equipment is required to disperse the reagent in the system. The recommended concentration of the chemical product is from 10 to 60 kg/m^3.

Features:

- Causes electrostatic neutralization of clay particles. Facilitates coagulation of sludge particles during its separation at the purification system by reducing the amount of clay in the solution.
- Reduces potential balling and differential sticking. It has good lubricating properties.
- Stabilizes filtration and rheological properties of drilling fluids.

Physical and chemical properties

Typical Properties	Standard value
Appearance at 20 °C	Dark liquid without mechanical impurities
Density at 20+2 °C, kg/m^3	1,00–1,20
Pour point, °C, not above	-10

Atren SL Clay inhibitor

Description: sodium salt of sulfonated bitumen.

Application: inhibits clays and shales, improves efficiency of cleaning of flushing liquid from cuttings by reducing the rate of its dispersion. The reagent is added directly to the circulating drilling fluid either as a powder or in water solution. The recommended concentration of the chemical product is from 5 to 15 kg/m^3.

Features:

- Reduces clay hydration due to interaction with polar particles of the wellbore wall and formation of a thin hydrophobic layer on its surface. There is also physical crack arrest and strengthening of walls.
- Provides reduction in friction coefficient.
- Effective control of flushing liquid loss.
- Provides stabilization of rheology of dispersed drilling fluid systems.

Physical and chemical properties

Typical Properties	Standard value
Appearance at 20 °C	Powder, which can be from dark brown and up to black
Moisture content, %, not more than	15
Hydrogen indicator pH of 2 % water solution, units	8,0–11,0
Water-soluble substance content, %, not less than	60

Osnova-GS
Waterproofing fluid

Description: a composition based on organosilicon compounds.

Application: as a waterproofing agent, shale stabilizer. The wetting agent is added to drilling fluid directly during mixing to stabilize properties and provide inhibition properties or during circulation while drilling to prevent complications. The recommended concentration of the chemical product is from 0.1 to 3 kg/m^3 depending on type of mud and drilling conditions.

Features:

- Wets clay surface of cuttings and wellbore walls. Prevents dispersion of sludge, stabilizes unstable rocks.
- Controls fluid loss and rheology of drilling fluid, including conditions of salt action.
- Helps to recover properties of drilling fluid after salting or as a result of drilling through reactive shales.
- Due to wetting of shales and cuttings, causes positive effect on drilling mud properties: inhibits growth of viscosity and density of drilling fluid in case of drilling through shaly deposits; prevents drill pipe packing, complications while tripping; stabilizes the borehole walls.

Physical and chemical properties

Typical Properties	Standard value
Appearance	Liquid, which can be from colorless and up to light grey
Reagent density at 20 °C, g/cm^3	1,15–1,40
Hydrogen indicator of 50 % water solution, (pH)	13,0–14,0
Dry residue, %, not less than	25

Algypo DS103 Inhibition additive

Description: a composition of minerals with an inhibitory effect on drilled clay rocks.

Application: to stabilize unstable shaly deposits during drilling. It is a part of inhibited biopolymer clay-free drilling fluids, particulartly – in Algypo mud system. The recommended concentration of the chemical product is from 1 to 10 kg/m^3.

Features:

- Effective clay inhibition, thereby stabilizing wellbore walls and preventing transfer of drilled clay rock into drilling fluid.
- In combination with other functional additives of Algypo system, creates an optimal media for operation of polymer reagents.
- Does not generate a negative impact on rheology of drilling fluid and fluid loss.
- Does not impair fluid loss control properties of a drilled-in formation.

Physical and chemical properties

Typical Properties	Standard value
Appearance at 20 °C	A fine-grained powder that does not contain lumps, large crystals, and foreign inclusions
Weight percent of aluminium oxide, %, not less than	10

PROBLEM: DRILLING FLUID LUBRICITY ENHANCEMENT

Atren-FK Lubricant

Description: a lubricant based on natural modified components.

Application: for treatment of drilling fluids in order to reduce downhole frictional force, reduce stickiness of the filter cake. Prevents balling of the bottom hole assembly. Atren-FK is added directly to drilling fluid during circulation while drilling. The recommended concentration of the chemical product is from 5 to 30 kg/m^3.

Features:

- Reduces friction coefficient in case of contact of metal to metal and stickiness of the filter cake, thereby reducing the probability of sticking of a drilling tool during turbine drilling and tool torque during rotary drilling.
- Reduces balling of the bottom hole assembly and equipment of drilling fluid primary cleaning system, reduces wear of moving elements of the circulation system. Reduces energy costs by reducing friction in the hydraulic part of drilling pumps.
- Does not change rheology of drilling fluids, environmentally safe and technologically efficient, and that makes it possible to use it as major alternative to spotting fluid pills.

Physical and chemical properties

Typical Properties	Standard value	
	Atren FK A	Atren FK D
Appearance at 20 °C	Liquid, which can be from brown and up to black	
Relative decrease of friction coefficient, not less than	55	20
Density at 20 °C, g/cm^3	0,89±0,10	

Biolub LVL Lubricant

Description: a composition with vegetable compounds and various additives.

Application: for treatment of water-based drilling fluids in order to reduce downhole frictional force while drilling vertical and directional wells. Prevents balling. Ilt is effective not only in fresh, but also in mineralized circulation systems. The recommended concentration of the chemical product is from 2 to 20 kg/m^3. The optimal concentration is 5 kg/m^3. If lubricant additive concentration is 0.3 %, reduction of metal/metal friction coefficient in mud laden fluid medium can reach 90 %.

Features:

- Reduces friction coefficient in case of metal-tometal contact and stickiness of the filter cake, thereby reducing the probability of the drilling tool sticking during turbine drilling and tool torque during rotary drilling.
- In case of adsorption on the surface of a drilling tool creates water repellent layer, which significantly reduces the risk of balling.
- Easily dispersible in fresh and mineralized media, does not cause foaming and negative impact on filtering properties and rheology of drilling fluids; chemically inert to components of drilling fluids.
- Inhibits shales swelling, reduces probability of sticking of the drilling structures.

Physical and chemical properties

Typical Properties	Standard value
Appearance at 20 °C	Liquid, which can be from brown and up to black
Density at 20 °C, g/cm^3	0,9±0,1
Relative decrease of friction coefficient PBR-1, %, not less than	50±1,5

Biolub EPL Lubricant for severe conditions

Description: a lubricant additive based on natural and modified compounds.

Application: for treatment of drilling fluids to reduce downhole friction force. Biolub EPL is especially recommended for application in wells with a complex profile, long horizontal section. The additive is effective not only in fresh, but also in mineralized drilling fluids (including before saturation). The recommended concentration of the chemical product is 1–10 kg/m^3. The optimal concentration is 0.3 %.

Features:

- Molecules of Biolub EPL active base are characterized by a positive charge resulting in the fact that the chemical has an increased adsorption to the drill pipe metal as well as at high temperatures.
- It has strong pipe-freeing properties even at low concentrations (from 0.3 %).
- Shows properties of corrosion inhibitor.
- Increases service life of drilling fluid pumps and drill bits.

Physical and chemical properties

Typical Properties	Standard value
Appearance	Liquid, which can be from brown and up to dark brown
Density	0,86–1,2
Friction coefficient of clay mortar (according to OFITE), with 0,5 % addition of lubricant, not more than	0,1

Biolub Green Ecofriendly lubricant

Description: a composition based on vegetable oils and fatty acid derivatives.

Application: for treatment of water-based drilling fluids to reduce downhole friction force, prevents stuck pipe situations while drilling vertical and directional wells. Prevents balling. The recommended concentration of the chemical product is from 0.3 to 3% (3–30 kg/m^3) in case of primary treatment and 0.1 to 0.5% (1–5 kg/m^3) in case of secondary treatments.

Features:

- Consists of natural, environmentally friendly raw materials.
- Stable at temperatures up to 160 ° C and pH values up to 10.
- Can be used in concentrated form to release stuck pipes.
- Effective in fresh and mineralized drilling fluids. Does not harm rheological, filtration and other properties of drilling fluid.
- Compatible with all reagents used to treat drilling fluids.
- The use of drilling fluids with Biolub Green helps to solve most of the problems associated with traditional technologies of preparation of drilling fluids.
- The uniqueness of the lubricant is in its ecological safety and new lubricating base, the efficiency of which is 1.5-2 times higher than that of previously used bases. The lubricant can be also used at high temperatures.

Physical and chemical properties

Typical Properties	Standard value
Appearance	Liquid, which can be from light brown and up to dark brown
Density at 20 °C, g/cm^3	0,80–1,0
Relative decrease of friction coefficient of drilling fluid, %, not less than	30

Atren Roll Drag reducing agent

Description: solid spherules, used as a mechanical lubricant in water-based, mineral and synthetic slurries.

Application: for oil industry in case of drilling and workover of oil wells in order to reduce downhole friction force. Ensures rotation or linear movement of a drill string with the least resistance. Recommended concentration of the chemical product to reduce friction and torque is 5 to 20 kg/m^3. In case of drilling with a coring tool and during casing running operations, the recommended concentration of a chemical product is 20–35 kg/m^3. Atren Roll agent is injected through a hydraulic funnel into the mud tank.

Features:

- Effective in all types of drilling fluids.
- Inert, non-abrasive material.
- Reduces the drag force and torque levels.
- Practially does not affect the drilling fluid rheology.
- Reduces wear of casing and drill pipes during drilling of the further intervals.
- Thermostable up to 220°C.
- Withstands crushing resistance up to 41 MPa.
- Safe for humans and the environment.
- Enables to solve problems of deep wells and extended reach drilling. These factors result in increased drag force and torque on the drill stem, necessity to ensure long-term stability of a deviated hole, problems with cuttings removal and other issues.
- Efficiently used to ensure casing running to designed depths.

Physical and chemical properties

Typical Properties	Standard value	
	A	B
Appearance at 20 °C	Grains, can be from grey and to brown color	Grains, can be from white and to grey color
Bulk density at 20 °C, g/cm^3	Not more than 1,75	0,55–0,75
Base grain weight percent, %, not less than	90,0	
Crushing resistance (torn grain weight percent), %, not more than	25	

PROBLEM: BRIDGING. LOST CIRCULATION CONTROL

Versatile Marble Composition (VMC)

Description: calcium carbonate.

Application: as a highly effective acid-soluble bridging agent, which minimizes penetration of the drilling fluid filtrate into permeable reservoirs. VMC is used as a density regulator, that is a weighting agent for mud-laden and clayless drilling fluids. The necessary concentration of VMC in drilling fluid and fractional composition are selected based on the producing formation properties.

Features:

- In case of acid treatment of a formation, VMC is fully degrades forming water and carbon dioxide gas.

Physical and chemical properties

Typical Properties	Standard value
Summary weight percent of calcium and magnesium carbonates, %, not less than	95
Weight percent of water-soluble salts, %, not more than	0,3
Weight percent of moisture (volatile substances), %, not more than	1,5
pH of 10 % water suspension	8–11
Fractional composition: upon request, mkm	50–450

Atren Gap Selective bridging agent

Description: acid-soluble bridging agent of various fractions, produced by fractionation of ground shells.

Application: in drilling fluids of various concentrations, depending on intensity of loss. It is used for preparation of high-viscosity pills and balanced plugs. Effective for lost circulation control, including massive circulation loss cases.

Features:

- Compatible with all types of water-based and oil-based drilling fluids, causes little effect on rheology and technological properties of base drilling fluid.
- Environmentally safe. All the necessary documents for use in oil and gas industry are available.

Physical and chemical properties

Typical Properties	Standard value		
	A (fraction not more than 3 mm)	B (fraction not more than 5 mm)	C (fraction not more than 5 mm)
Appearance at 20 °C	Ground or unground shells		
Weight percent of moisture, %, not more than	10,0		
Weight percent of calcium carbonate and carbonate of magnesium, %, not less than	51,0		
Weight percent of particles not soluble in 12 % HCl, %, not more than	10,0		
Base fraction weight percent, %, not less than	98,0	70,0	70,0

Atren-Ores
Bridging reagent

Description: nutshell, obtained from crushed shells of hazelnuts (Siberian, European and Korean cedar).

Application: for effective lost circulation control in various drilling fluids. It is used in drilling fluids in various concentrations depending on intensity of loss for preparation of high-viscosity pills and balanced plugs.

Features:

- Compatible with all types of drilling fluids, has little effect on rheology and technological properties of base drilling fluid.
- Environmentally safe, effective in case of pH wide range and temperature.

Physical and chemical properties

Typical Properties	Standard value	
	A (Fraction 4-10 mm)	B (Fraction not more than 15 mm)
Appearance	Grains, which can be from light brown and up to dark brown	
Moisture content, %, not more than	20,0	
Base fraction weight percent, not more than 10 mm, %, not less than	70	-
Base fraction weight percent, not more than 15 mm, %, not less than	-	70

Atren Renap Bridging agent

Description: a product of mechanical grinding of rubber waste based on butadiene-methylstyrene rubber.

Application: for use as a bridging additive to processing fluids.

Features:

- Used for creation of bridging mixtures in case of preparation of balanced plugs, and also as bridging additives in drilling fluids for lost circulation control.
- It is an inert filler compatible with various drilling fluids.
- It does not show enzymatic decomposition, stable at a wide range of pH and temperature values.

Physical and chemical properties

Typical Properties	Standard value
Appearance	Black grains
Water weight percent, %, not more than	3
Base fraction weight percent 1,0-5,0 mm of rubber granules, %, not less than	0,1

Selective bridging agent (KC)

Description: a composition based on environmentally friendly waste of wood industry.

Application: in drilling fluids of various concentrations, depending on intensity of loss for preparation of high-viscosity pills and balanced plugs. As agreed with the customer KC-1 can be used during drilling as a part of circulating drilling fluid.

Features:

- Due to a broad range of particle sizes, it is possible to effectively plug pores of various sizes.

Physical and chemical properties

Typical Properties		Standard value		
		KC-1	KC-3	KC-10
Appearance at 20 °C		Dry mixture, which can be fawn-colored, light grey or grey and brown		
Grain composition, %	Weight percent of the product poured through sieve No. 1,0, not less than	80		
	Weight percent of the product poured through sieve No. 3,0, not less than		80	
	Weight percent of the product poured through sieve No.10,0, not less than			80

Osno Plug Lost circulation control system

Description: a system consisting of water-soluble polymer and crosslinking reagent.

Application: for oil industry during drilling and workover operations on oil wells, in lost circulation control technologies, in a wide range of loss volumes. The function is based on the ability of a composition to form strong gel during interaction of water solution of mixture components at the end of set time after mixing. The slurry preparation process consists of dissolving of Osno Plug BS gelling agent in the concentration of 5–15 kg/m^3 in fresh or mineralized water using a standard storage tank. further, Osno Plug CL agent is added to the prepared viscous solution in a concentration of 5–15 kg/m^3, after this high-viscosity pill is injected into the loss zone of the well. The concentration of agents depends on nature of loss.

The Osno Plug system makes it possible to add various bridging agents to the composition and that makes the Osno Plug system more versatile. It is possible to set hardening time of the composition from 30 minutes to 6 hours by changing concentrations of the system components. At present, there is practical experience of use of this technology in the temperature range from 35 to 65 °C. Laboratory tests show the possibility of injecting Osno Plug in the range of 20 to 95 °C.

Features:

- Adjustment of thickening time of the system.
- Ability to include bridging additives.
- Easy to prepare working slurry.
- Ability to inject the system in a wide range of temperatures.
- Ability to control viscosity of base working slurry.

Physical and chemical properties

Typical Properties	Standard value	
Osno Plug BS	5–15	-
Osno Plug CL	5–15	70

Osno-Screen Lost circulation control additive

Description: a compound based on polymer material and modifying additives.

Application: in oil industry while drilling and workover operations on oil wells, in lost circulation control technologies, in a wide range of loss volumes. The function of Osno-Screen is based on the ability of the chemical to form a non-flowing compound in case of interaction with formation water, which can effectively plug the fluid loss zone. Osno-Screen additive is used in the pure state or diluted in 1-to-1 ratio with diesel fuel, which significantly reduces viscosity and increases setting time of the chemical from 2 to 2.5–3 hours. In case of interaction of 1 ton of Osno-Screen with formation water, up to 10 m^3 of highly elastic polymer material is obtained.

Features:

- Easy adjustment of the setting time.
- Easy preparation of active fluid.
- Ability to adjust viscosity of base active fluid.
- No thickening effect upon contact with oil.
- Filling and arrest of cracks in thirsty formation.
- In case of interaction with water, Osno-Screen reagent is hydrated, and viscosity is significantly increased by balanced plug. In case of interaction with mineralized formation water, the polymer is cross-linked with polyvalent cations, that significantly strengthens the structure of the product obtained.

Physical and chemical properties

Typical Properties	Standard value
Appearance at 20 °C	Cloudy liquid, which can be from white and up to grey
Density, g/cm^3	1,02–1,12
Potential of hydrogen (pH) of water solution, w/w 1 % units	6–9,5
Pour point, °C, not above	-15

PROBLEM: DRILLING MUD WEIGHTING

Atren SALT

Description: dry saline water-soluble compound based on calcium salts. Contains additives that lower the corrosive effect of the process fluids and prevent scaling.

Application: to prepare heavy muds free from solids. It can be used for well killing, perforation, and plug and abandonment operations. The chemical dissolves in water fast, forming a true solution without solids. The consumption and exact composition of the chemical is adjusted for the required range of mud density. The chemical is designed to prepare muds of 1.3 –1.9 g/cm³ densities.

Features:

- Due to absence of solids and high concentration of electrolytes in the Atren SALT based muds the negative impact on reservoir properties is reduced, thus enabling to improve production performance compared to other types of densifiers.
- It dissolves easily thus making it possible to prepare muds using traditional equipment right on the well site and to control the mud system properties easily.
- The compounds based on Atren SALT can be re-used if they are properly recycled and treated to fit the required properties. It enables to reduce the total costs significantly.

Physical and chemical properties

Typical Properties	Standard value
Appearance at 20 °C	Powder or granules of white to grey color
Density of water solution in 1 kg/l ratio at 20°, g/cm³	1,4–1,8
pH factor of the solution in 1:10 ratio	3–8

PROBLEM: DEFOAMING

Atren-antifoam A Defoamer

Description: a defoamer based on a mixture of polypropylene glycols and polymethylsiloxanes.

Application: for use in cement slurries and all types of water-based drilling fluids in order to remove effectively volume and surface foam in them. Atren-antifoam A defoamer can be used as a defoaming additive to foam-forming chemicals. The optimal concentration of Atren-antifoam A defoamer is from 0.05 to 0.2% (1-2 kg/m^3).

Features:

- Used for both fresh and highly mineralized solutions, compatible with all reagents used for chemical treatment of drilling fluids.
- An effective additive to processing fluids of perforation, well-killing and conservation. Does not freeze at low temperatures.

Physical and chemical properties

Typical Properties	Standard value
Appearance	Transparent liquid, which can be colorless and up to light yellow
Potential of hydrogen of 1% solution	9,0–13,0
Defoaming efficiency indicator, %, not less than	70

Atren-antifoam B Defoamer

Description: a defoamer based on water solution of organosilicon oligomers with addition of surfactants.

Application: to remove surface and volume foam in all types of water-based drilling fluids. The greatest effect of defoaming is achieved in clayless biopolymer inhibition systems of drilling fluids and in mud-laden drilling fluids with high mineralization.

The optimal concentration of Atren-Antifoam B reagent is from 0.005 to 0.2% (0.05-2 kg/m3). For better distribution in fluid it is recommended to use it in the form of 1:1 water solution.

Features:

- Environmentally safe, chemically inert, compatible with all types of chemicals. The processes of freezing and melting do not affect stability and performance of Atren-Antifoam.
- Does not harm the rheology of drilling fluids, enhances their lubricity.
- Does not degrade in a wide pH range.

Physical and chemical properties

Typical Properties	Standard value
Appearance	Thick liquid, which can be from light yellow and up to light grey
Potential of hydrogen of 1 % solution	9,0–13,0
Defoaming efficiency indicator, %, not less than	80

Atren-antifoam C Defoamer

Description: a defoamer based on polyol mixture.

Application: for effective removal and prevention of forming of volume and surface foam in all types of water-based drilling fluids. The optimal concentration of Atren-Antifoam C reagent is from 0.01 to 0.05 %.

Features:

- Effective additive to processing fluids of perforation, well-killing, conservation and cementing.
- Can be used as a defoaming additive to foaming chemicals.
- Does not cause any negative impact on filtering properties and rheology of drilling fluids.
- Does not degrade in case of multiple cycles of freezing/defrosting.
- Causes positive impact on a drilled-in formation.

Physical and chemical properties

Typical Properties	Standard value
Appearance at 20 °C	Transparent liquid, which can be colorless and up to light yellow
Density at 25 °C, g/cm^3	0,95–1,05
Hydrogen indicator, pH	5,0–10,0
Defoaming efficiency indicator, %, not less than	80

Atren-antifoam P Defoamer

Description: a defoamer based on a mixture of organosilicon substances fixed on an inorganic carrier.

Application: to prevent foaming in various processing fluids. Dry mixing method is recommended in case of use in balanced cement slurries. It is possible to dissolve in water before use in case of other processing fluids. The optimal concentration of Atren-antifoam P reagent is from 0.1 to 1.5 %.

Features:

- Effective additive to processing fluids of perforation, well-killing, conservation and cementing.
- Can be used as a defoaming additive to bulk foaming chemicals.
- Compatible with all classes of cements and most of the reagents contained in drilling fluid.
- Due to the bulk form, Atren-antifoam P can be used at low temperatures. Effective in a wide pH range.

Physical and chemical properties

Typical Properties	Standard value
Appearance at 20 °C	White powdery substance
Bulk density, g/cm^3	0,7–0,8
Defoaming efficiency indicator, %, not less than	80

PROBLEM: HYDROGEN SULFIDE SCAVENGING

Atren-HS Hydrogen sulfide scavenger

Description: hydrogen sulfide scavenger based on manganese dioxide.

Application: to scavenge hydrogen sulfide gas penetrating all drilling fluid systems. Compatible with all reagents used in drilling fluid systems. The optimal concentration of Atren-HS reagent is from 0.1 to 1.0% (1–10 kg/m^3).

Features:

- Results in efficient scavenging of hydrogen sulfide, thereby reducing a negative impact of gas on drilling fluid, drilling equipment, health of service personnel and environment.
- In case of interaction with hydrogen sulfide Atren-HS forms an inert compound that does not affect properties of drilling fluid. Effective in a wide pH range of the medium.

Physical and chemical properties

Typical Properties	Standard value
Appearance	Powder, which can be black and up to dark red
Potential of hydrogen of 1% solution	5,0–9,0
Weight percent of manganese oxide (MnO_2), not less than	70

Atren-HS-L Hydrogen sulfide scavenger

Description: liquid hydrogen sulfide scavenger based on nitrogen compounds.

Application: to scavenge hydrogen sulfide gas penetrating all drilling fluid systems. Compatible with all reagents used in drilling fluid systems. The optimal concentration of Atren-HS-L reagent is from 0.05 to 0.5% (0.5-5.0 kg/m^3). Can be injected in any part of the circulation system to the drilling fluid flow.

Features:

- Non-reversible interaction with hydrogen sulfide, resulting in an inert compound, which does not have an impact on properties of drilling fluid.
- Effective in case of wide range of pH values of the medium.
- Due to liquid form, it can be easily injected, does not require special equipment for adding to the fluid.

Physical and chemical properties

Typical Properties	Standard value
Appearance at 20 °C	Homogenous liquid, which can be colorless and up to light yellow
Density	1,03–1,15
Potential of hydrogen of 1 % solution	9,0–12,0
Pour point, °C, not above	-20

PROBLEM: BALLING PREVENTION

Detergent-HS
Drilling detergent

Description: water solution of a mixture of surfactants with triethylene glycols.

Application: to prevent balling and for cleaning the tool from balling. Detergent-HS is effective in all water- based systems of drilling fluids. The optimal concentration of Detergent-HS is from 0.1 to 0.3% (1–3 kg/m^3).

Features:

- Creates anti-adhesive film on the metal-mortar boundary, preventing balling. Ensures good flushing effect.
- The use of a reagent reduces probability of a piston effect due to balling.
- Effective reduction of friction coefficient due to lubricity.

Physical and chemical properties

Typical Properties	Standard value
Appearance	Transparent low viscosity liquid, which can be colorless or light blue
Potential of hydrogen of 1% solution	6–9
Cloud point of water solution, 1 % w/w, °C	65–80
Density at 20 °C, g/cm^3	1,03–1,08

PROBLEM: DRILLING FLUID MICROBIAL RESISTANCE

Atren-Bio A Multifunctional bactericide

Description: water solution of a complex of active substances with bactericidal and bacteriostatic effect.

Application: to prevent bacterial decomposition of organic components of water-based drilling fluids, such as polysaccharides and biopolymers. In addition, the reagent inhibits growth of sulfate-reducing bacteria, causing microbiological and chemical corrosion of equipment. Atren-Bio A inhibits vital activity of most microorganisms: aerobic, and anaerobic bacteria, fungi. The bactericide is added to the biopolymer solution during preparation. In drilling operations, it is used for regular treatment of biopolymer drilling fluid.

The recommended concentration of Atren-Bio A reagent is from 0.1 to 0.3 %. If starch is used in solution, sufficient initial concentration of Atren-Bio is up to 0.1%.

Features:

- Due to multicomponent composition does not cause addiction in microorganisms. Effective in a wide pH range. Scavenges hydrogen sulfide.
- It has low viscosity, water-soluble in any concentration. Does not degrade in case of multiple cycles of freezing/defrosting.
- Does not contain formaldehyde, organochloride substances.
- Does not cause any negative impact on the drilling fluid properties.

Physical and chemical properties

Typical Properties	Standard value
Appearance at 20 °C	Liquid, which can be from light yellow and up to dark brown without visible mechanical impurities
Density at 20 °C, g/cm^3	1,0–1,1
Potential of hydrogen, pH	3,0–7,0

Atren-Bio B
Multifunctional bactericide

Description: water solution of a complex of nitrogen-containing active substances of bactericidal and bacteriostatic effect.

Application: to prevent bacterial contamination of water-based drilling fluids containing biopolymers. For the best effect, it is recommended to add Atren-Bio B to water before preparing biopolymer drilling fluid. In case of drilling, it is used by regular treatment of drilling biopolymer drilling fluid. The recommended concentration of Atren-Bio B reagent is from 0.1 to 0.3 %. Water solutions of bactericide can be used to wash drilling fluid tanks.

Features:

- A broad-spectrum bactericide suffocating vital activity of most microorganisms.
- It scavenges hydrogen sulfide, which generates a negative impact on drilling fluids and equipment.
- Convenient use, does not cause any negative impact on technological properties of drilling fluid.

Physical and chemical properties

Typical Properties	Standard value
Appearance at 20 °C	Homogenous liquid, which can be from yellow and up to red (slight opalescence is allowed)
Density at 20° C, g/cm^3	1,07–1,1
Potential of hydrogen, pH	9,0–10,0
Pour point, °C	from -15

PROBLEM: STUCK PIPE PREVENTION AND RELEASE

Atren-Antistick
Pipe-freeing agent

Description: a composition of surfactants with an organic solvent.

Application: for release of stuck pipes. The recommended concentration in the liquid of spotting fluid pills is from 8 to 10%.

Features:

- Due to surfactant complex Atren-Antistick can crumb filter cake at the stuck point, facilitates release of the tool.
- Packed into new hermetic steel or polypropylene drums with a capacity of 100 and 200 liters. Supplied by truck or railway.

Physical and chemical properties

Typical Properties	Standard value
Appearance at 20 °C	Oily liquid, which can be from yellow and up to brown. Sediment is allowed.
Density at 20 °C, g/cm^3, within the range	0,835–0,855
Kinematic viscosity at 20 °C, cPs	5–20
Water solubility	Not soluble

PROBLEM: EMULSION FLUID PREPARATION

Oil-based biodegradable fluid

Description: a composition based on mineral oil and special additives.

Application: as a dispersion medium for emulsion-based drilling fluids. The recommended concentration of the chemical product is from 55 to 90% (550-900 kg/m3), depending on formulation of drilling fluid; in case of preparation of drilling fluid, emulsifiers and organic bentonite are added to oil-based biodegradable fluid according to the formulation, then the required amount of the dispersed phase (water solution) is added.

Features:

- Characterized by minimal toxicity.
- High biodegradability under aerobic and anaerobic conditions.
- The oil-based biodegradable fluid is compatible with a wide range of reagents for preparation of emulsion-based drilling fluids.
- Physical properties of the oil-based biodegradable fluid facilitate the use of the reagent in a wide range of environmental conditions.

Physical and chemical properties

Typical Properties	Standard value
Appearance at 20 °C	Liquid, which can be colorless and up to yellow
Density at 20 °C, g/cm^3, within the range	0,85–0,87
Pour point, °C, not above	-55
Kinematic viscosity at 50 °C, cSt, not less than	3,5

Cleave FM Emulsifier

Description: a composition of surfactants.

Application: as a primary emulsifier of oil-based emulsion fluids for drilling of oil wells. Cleave FM is applied by direct injection with a concentration of 1-3% (10-30 kg/m^3) as the basis for oil-based emulsion fluids at the preparation stage.

Features:

- Forms emulsions, which are stable in a wide range of conditions (temperature, pressure, salinity of the dispersed phase).
- Well compatible with various bases (diesel fuel, synthetic oils) and auxiliary reagents for oil-based emulsion fluids.
- It can emulsify water entering drilling fluid during drilling.

Physical and chemical properties

Typical Properties	Standard value
Appearance at 20 °C	Liquid, which can be from yellow and up to brown
Density at 20 °C, g/cm^3, within the range	0,85–0,9
Pour point, °C, not above	-5
Kinematic viscosity at 50 °C, cSt, not less than	7

Osnova-Medium E Organic bentonite

Description: chemically modified organophilic bentonite.

Application: to increase rheology of the oil phase of the emulsion solution. In case of initial preparation of Osnova-Medium E emulsion fluid, oil, diesel fuel, mineral or synthetic oil is added to the carbon-hydrogen phase of the solution at the rate of 5-35 kg/m^3, depending on selected solution formulation and required process properties.

Features:

- An effective rheology modifier, significantly increasing rheology of emulsion fluid and that results in a positive effect on cleaning of a well from cuttings and creates conditions for keeping weighting reagents in suspended state. Besides that, Osnova-Medium E improves properties of the filter cake.
- Compatible with a wide range of bases (oil, diesel, mineral and synthetic oils) and auxiliary reagents for oil-based emulsion fluids.

Physical and chemical properties

Typical Properties	Standard value
Appearance	Fine powder, which can be from light grey and up to brown
Water weight percent, %, not more than	4
Lost on ignition, %, not more than	35
Base fraction weight percent: less than 0,08 mm, %, not less than	84

Osnova BR-4
Wetting agent

Description: oil-based wetting agent.

Application: in oil industry in construction and work over of oil wells as a drilling fluid modifier to give the fluid water repellent properties. Osnova BR-4 is injected with a concentration 1-4% directly to the fluid during preparation, circulation.

Features:

- Helps to significantly stabilize emulsion fluids.
- Prevents dispersing of cuttings and facilitates the cleanout systems.

Physical and chemical properties

Typical Properties	Standard value
Appearance at 20 °C	Oily liquid, which can be from light brown and up to brown
Emulsion stability	Should satisfy a test
Base substance weight percent, %, w/w, not less than	40
Pour point, °C, not above	-20
Acid index, mg potassium hydroxide/g of the product, not more than	10
Amine index, mg HC1/g, within the range	4/40

NRP-20M Emulsion fluid loss additive

Description: a composition based on a polymeric material dispersed in a hydrocarbon solvent.

Application: used as a stabilizer, controls fluid loss and rheology of emulsion fluid while drilling oil and gas wells. Can be used as a part of special nonwater based fluids for well killing. NRP-20M is injected in a concentration of 1–4 % directly to the slurry at the stage of mud mixing and circulation.

Features:

- Addition of NRP-20M makes it possible to obtain solutions with zero filtration and increased viscosity of the filtrate.
- Helps to increase viscous and structural properties without high shear deformations.
- Helps to prepare high viscosity pills of active fluids.
- Helps to reduce volatility of the dispersion medium at high temperature of returning drilling fluid.
- Helps to reduce the content of expensive organophilic rheology modifiers in the formulation.
- NRP-20M has high heat resistance (up to 200 °C), non-toxic and resistant to salts and acid gases.

Physical and chemical properties

Typical Properties	Standard value
Appearance at 20 °C	Viscous pastelike liquid, which can be from light brown and up to dark brown
Polyisobutylene weight percent, %, not less than	20
* Kinematic viscosity at 100 °C, $mm^2/sec.$, not more than	5000
* Open-cup flash-point, °C, not below	140
* Thickening property, $mm^2/sec.$, not less than	10
Weight percent of mechanical impurities, %, not more than	0,1
Exemplary emulsion filtration, $cm^3/30$ min, not above	3,0

* Показатель факультативный. Определяется по требованию заказчика.

PROBLEM: DRILL-IN

Atren SA

Description: a composition of non-ionic surfactants and stabilizing additives. Produced as two marks:

- Atren SA-1 - for low-temperature conditions;
- Atren SA-2 - for normal conditions of use.

Application: as a component of processing fluids for primary and secondary drill-in. Atren SA functions in a broad range of formation conditions, including resistance to polymineral attack. The recommended concentration of a chemical is determined according to results of laboratory and industrial tests, but it is from 0.5 to 2 kg/m^3 on the average.

Features:

- Effectively reduces the surface tension at the phase interfaces, has a good flushing effect.
- Helps to increase improved oil recovery factor.
- Compatible with a broad range of formation conditions and formulations for drill-in.

Physical and chemical properties

Typical Properties	Standard value	
	SA-1	SA-2
Appearance	Transparent colorless liquid	
Density at 20°C	1,06–1,11	
Pour point, °C , not above	-30	-15
Hydrogen indicator, pH	6–10	
Cloud point, °C	80–89	
Kinematic viscosity at 20 °C, mm^2/sec.	36–47	

Alkioks 600 Polyether

Description: a composition of ethers of polyalkylene glycols.

Application: used in water-based drilling fluids in order to retain filtration properties of reservoirs. The reagent is injected directly to drilling fluid during initial drill-in. It can be also used in processing fluids for well-killing and perforation. The working concentration of the reagent is from 0.5% to 2.0%, depending on conditions of use.

Features:

- Effectively reduces surface tension of drilling fluid filtrate and helps to retain filtration properties of productive formations.
- Increases inhibition properties of drilling fluid by inhibition of swelling processes of clay particles.
- Does not cause foaming. Adsorption of reagent molecules on a drilling tool prevents balling and increases lubricity of drilling fluid.

Physical and chemical properties

Typical Properties	Standard value
Appearance	Viscous transparent liquid, which can be colorless and up to light yellow, without mechanical impurities
Water weight percent, %, within the range	3–8
Relative viscosity at 20 °C within the range	50–85
Hydrogen indicator, pH, within the range	6,5–9,0

Commercial chemicals

Typical Properties	Description
Calcium chloride	Weighting agent, clay inhibitor
Calcium chloride	Weighting agent, clay inhibitor
Chalk-stone	Weighting agent
Baryte KB-3	Baryte weighting agent
Aminotris (methylenephosphonic acid)	Dispersant, cement retarder
Sodium tripoly phosphate	Dispersant
Formalin	Biocide, cement additive
Formiates	Cement additive
Fluohydric acid	Acid pill reagent
Chlorohydric acid	Acid pill reagent
Sulphonol	Surfactant
Aluminum sulfate	Coagulant
Caustic soda	pH control additive
Soda ash	Hardening control additive
Citric acid	pH control additive, hardening control additive
Evaporated sulphite waste liquor	Dispersant
Cordage fiber	Lost circulation control filler
Rubber crumb	Lost circulation control filler
Bentonite PBMA, PBMB etc.	Bentonite clay powders
Carbonate of potash	pH and hardening control additive
Calcium sulphate dihydrate (gyp)	Weighting agent, clay inhibitor
Magnesium oxide	Weighting agent, clay inhibitor
Aluminum potassium sulphate	Shale inhibitor

Matrix of drilling products and solutions

Name of well construction reagent	Groups of reagents for the purpose intended																			
	Rheology modifier	Fluid loss additive	Viscosifier	Shale encapsulator	Lubricant	Weighting agent	Clay and shale inhibitor	Wetting agent	Bactericide	Defoamer	Dispersant	Bridging agent	pH control additive	Hardening control additive	Acid pill reagents	Surfactants	Coagulant	Hydrogen sulfide scavenger	Drilling detergent	Pipe-freeing agent	Premix for drilling fluid preparation
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Osnopak		+																			
Osnopak-VO		+	+																		
Qolicel LV		+																			
Qolicel MV		+	+																		
Qolicel HV			+																		
Gammaxan	+																				
Polyxan	+																				
Polydis DM																					+
Atren-FK					+																
Biolub LVL					+																
Reglid pow					+																
Amilor		+																			
Seurvey FL		+																			
Seurvey D1			+	+																	
Osnova Medium	+																				
PBMA	+																				
PBMV	+																				
Atren SL							+														
Atren Cl							+														
Atren PG							+														
Atren Bio									+												
Atren-antifoam A, B, C, P										+											
Osno-Desco											+										
Osnova-GS							+	+													

Name of well construction reagent	Groups of reagents for the purpose intended																				
	Rheology modifier	Fluid loss additive	Viscosifier	Shale encapsulator	Lubricant	Weighting agent	Clay and shale inhibitor	Wetting agent	Bactericide	Defoamer	Dispersant	Bridging agent	pH control additive	Hardening control additive	Acid pill reagents	Surfactants	Coagulant	Hydrogen sulfide scavenger	Drilling detergent	Pipe-freeing agent	Premix for drilling fluid preparation
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Versatile marble composition						+															
Aluminium sulphate																	+				
Carbonate of potash													+	+							
Calcium sulphate dihydrate (gyp)						+	+														
Magnesium oxide						+	+														
Aluminum potassium sulphate							+														
Calcium carbonate						+															
Potash chloride						+	+														
Baryte KB-3						+															
Aminotris (methylene-phosphonic acid)											+										
Sodium tripoly phosphate											+										
Formalin									+												
Fluohydric acid															+						
Chlorohydric acid															+						
Sulphonol	+															+					
Caustic soda	+												+								
Soda ash	+													+							
Citric acid													+	+							
Evaporated sulphite waste liquor											+										
Atren GAP												+									
Atren Ores												+									
Cordage fiber												+									
Atren Renap												+									
KC-1, KC-3, KC-10												+									
Detergent HS																			+		
Atren HS																		+			
Atren-antistick					+																

ABOUT MIRRICO GROUP OF COMPANIES

Mirrico Group of Companies is a Russian group of production-service companies in the field of chemical solutions for industrial markets.

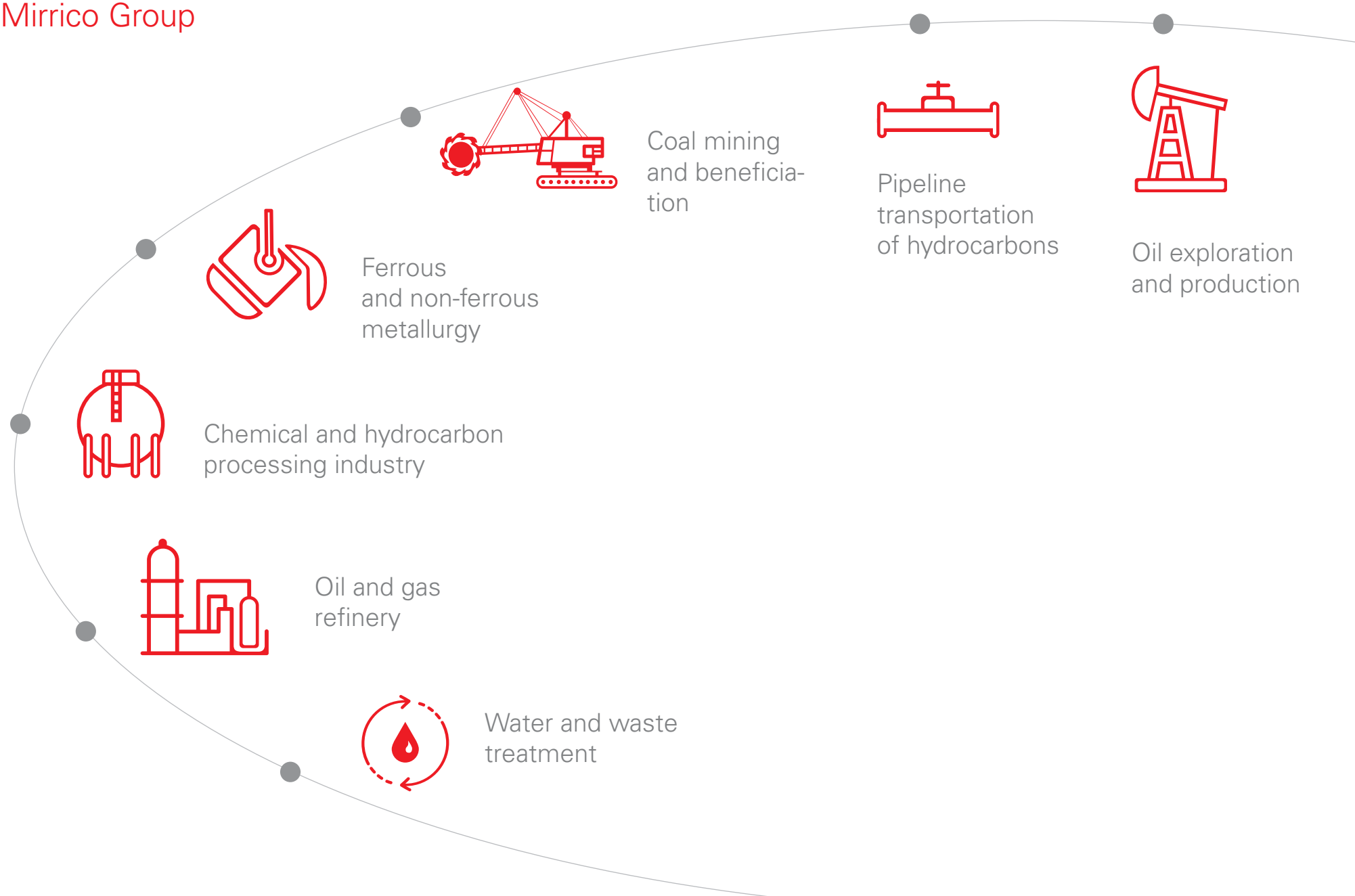
Main types of activity:

- **Development, manufacture and supply of chemicals**
- **Backup of chemical solutions**

The Mirrico Group of Companies creates unique products and technologies, which outperform their market analogues due to serious investments in research and development. Today the Mirrico Group focuses on offering the consumers the best solutions at the lowest prices.

ISO 9001:2008 quality management system, which is implemented and is in effect in all subsidiaries of Mirrico Group of Companies, confirms stability and guarantees high quality of the products.

Business Domains of The Mirrico Group



MIRRICO
GROUP OF COMPANIES

Contact information

www.mirrico.ru

ul. Ostrovskogo, 84, Kazan
phone: +7 (843) 537-23-93
fax: +7 (843) 537-23-94
info@mirrico.com