

Summaries

UDC 550.42:552.11

Turkin Yu.A., Novoselov K.L.

PETROLOGICAL AND GEOCHEMICAL FEATURES OF DEVONIAN GRANITOIDS IN NORTH-WEST PART OF RUDNY ALTAI

The article introduces new data on geological structure and granitoid magmatism in north-west Russian part of Rudny Altai. For the first time Novonikolaevsk, Aleysk and Ustyansk granitoid massifs are selected in composition of the polyphase aleysk-zmeinogorsk complex as a result of geological observations, petrological and geochemical researches from the position of lithosphere plate tectonics. This complex has been formed from a single magmatic center of activated continental margin in Middle and Late Devonian age.

UDC 552.11:552:551:550.42

Korobeynikov A.F., Gusev A.I., Krasova A.S. THE REDUCED INTRUSIVE-HYDROTHERMAL-METASOMATIC GOLD SYSTEMS

The reduced intrusive-hydrothermal-metasomatic gold systems are connected to small-size felsic massifs and often conducted by lamprophyre dyke complex. Gold-generating granitoids refer to three types: strongly contaminated and reduced, shoshonit (SH) and adakite (AD). These systems form the deposits of scarn, gold-black-shale, vein gold-quartz-sulfide types. The reduced environment is the same over the whole evolution period of such systems from magmatogene to hydrothermal stages.

UDC 553.411.071.242.4+550.4

Kucherenko I.V., Gavrilov R.Yu., Martynenko V.G., Verkhozin A.V. PETROLOGICAL AND GEOCHEMICAL FEATURES OF WALLROCK METASOMATISM IN VERNINSKOJE GOLD DEPOSIT (LENSK REGION)

The authors have introduced and discussed the materials revealing mineral composition and zoning of apo-black-shale wallrock (ore-hosting) metasomatic halo of Verninskoje deposit. The metasomatic halo belonging to beresite metasomatic formation is substantiated. Au, Ag, Hg distribution is governed by mineral zoning of metasomatic halo. The structure of metasomatic and geochemical deposit haloes fits well into typical universal diagram of mineralogic-geochemical zoning of wallrock haloes in mesothermal gold deposits applicable to black-shale and non-shale ore-hosting substrate. This is the real-valued expression of geologic-genetic deposits homogeneity in this or that system.

UDC 553.411.071.242.4+550.4

Kucherenko I.V., Gavrilov R.Yu., Martynenko V.G., Verkhozin A.V. PETROLOGICAL AND GEOCHEMICAL FEATURES OF WALL-ROCK METASOMATISM IN SUKHOI LOG GOLD DEPOSIT (LENSK REGION). P. 3. GOLD AND SILVER GEOCHEMISTRY

The article introduces the data on statistic parameters of distribution of geochemical and metallogenic pathfinder elements in mineral zones of ore-hosting apo-black-shale metasomatic halo of beresite-

propylitic profile in western part of Sukhoi Log deposit (Lensk region). Average Au content on the level of the first mg/t and Ag content on the level of tens mg/t and their distribution dispersion (standard coefficient, standard deviation) are minimum in metasomatites accessible for studying of intermediate chloritic and more back albite zones containing no sulfides. The mentioned distribution parameters and Au/Ag-ratio grow considerably in metasomatites sulphidized at ore-formation in both zones. The results are discussed in comparison with the same data in the other gold deposits formed in black-shale and crystal substrates.

UDC 553.45:550.84

Potseluev A.A., Peregudov V.V., Babkin D.I., Ananyev Yu.S. GOLD IN ORES OF SYRYMBET RARE METAL DEPOSIT (NORTH KAZAKHSTAN)

The authors have studied gold occurrence forms and character of distribution in ores of Syrymbet rare metal deposit (North Kazakhstan fold area). High gold concentrations to 0,2 g/t are discovered in primary ores located both in sharyk suite rocks and in granites as well. Two forms of gold according to its size: fine dust gold (<200 mesh) and coarse mainly 0,3..0,5 to 1 mm are singled out. Maximum gold concentrations (41,3 g/t) are in dark-grey carbon shale developed clays. Gold is discovered by mineralogical researches in stanniferous gravity concentrates. The factors determining occurrence of noble metal high concentrations are ascertained.

UDC 550.42:553.411

Voroshilov V.G. VORTEX NATURE OF ORE-GENIC GEOCHEMICAL FIELDS

The author proposes the model of forming the structure of ore-genic geochemical field and substantiates its relation with mineralization scale. The article demonstrates the vortex structure of anomalous geochemical fields of different hierarchical levels by the example of hydrothermal gold deposits. The structure is conditioned by convective-vortex character of hydrothermal fluid flow, contingency of their upward and down flows, leaching and redeposition of chemical elements. The author determines space relation of geochemical anomalies with ring structures identified on satellite images.

UDC 549.623.7

Lupak E.M. CHLORITE GENETIC PROPERTIES OF SUKHARINSK ORE FIELD

The author has studied chlorites of ores and metasomatites of scarnified-magnetite Sukharinsk ore field (Gornaya Shoria) with superposed gold-sulphide mineralization. Two types of chlorites: metasomatic and vein are singled out. The article introduces the data on their genetic properties; the dependence of metasomatic chlorite iron content on replaced mineral composition is determined. The author determines iron content increase in all types of chlorites while moving away from Telbessk granitoid massif that indicates the paragenetic correlation of hydrothermal mineralization with granitoid magmatism.

UDC 553.411(57):546.65

Ananyev Yu.S.
**RARE-EARTH ELEMENTS IN METASOMATIC ROCKS
 AND ORES OF GOLD DEPOSITS IN WESTERN KALBA**

The author has studied the features of distributing rare-earth elements in metasomatic rocks and ores of gold deposits in Western Kalba (Eastern Kazakhstan). It is ascertained that all metasomatic processes occurred at the change of these elements balance. The article demonstrates vertical differentiation of rare-earth elements in ore-bearing metasomatic rocks providing quartz-vein and vein-disseminated gold mineralization. The author singles out three types of lanthanide distribution in metasomatic rocks. The common nature of ore-bearing beresites is defined.

UDC 553.411(571.53)

Vagina E.A.
**MINERAL ORE COMPLEXES AND GENESIS OF CHERTOVO
 KORYTO GOLD DEPOSIT (PATOM UPLAND)**

The author has studied mineral complexes and conditions of forming Chertovo Koryto gold deposit (North Tran Baikal). It is ascertained that ores are accumulated by five mineral complexes. Early complexes (the first and the second) are formed in the temperature range >400...360 °C from light-salted solutions (6...15 mass equivalent % NaCl) of sodium specialization in pressure range 150...300 MPa. The producing complexes (the third, the fourth) are formed at active participation of carbon dioxide, methane and partly nitrogen in temperature range 350...180 °C from water-salt solutions containing (Na, Mg) with saltiness to 12,5...21 mass equivalent % NaCl. Pressure changes in the system within the range of 60...200 MPa. The fifth complex has been crystallized from light-salted solutions (5...8 mass equivalent % NaCl) of sodium specialization at temperatures not higher than 130 °C in pressure range 40...50 MPa. The results obtained are compared to the data on Irokindinskoye and Berikulskoe deposits located in crystal substrate and to Sukholozhskoe deposit occurred in black-shale strata. The conclusion is made on material-genetic homogeneity of gold deposits in both systems.

UDC 552.321.6:553.08

Yurichev A.N., Chernyshov A.I.
**ORE MINERALIZATION OF THE IDARSKY
 DUNITE-HARZBURGITE COMPLEX
 (NORTHWEST OF EASTERN SAYAN)**

The authors studied the features of ore mineralization of dunites and harzburgites in the Idarsky restitic complex of the Kansk block located in northwestern part of Eastern Sayan. Typomorphism, mineral and chemical structure of minerals are shown. The resulted data allowed establishing the evolutionary direction in the change of chromspinelide chemical composition and associated sulphides which is determined by the conditions of their depletion in upper mantle and subsequent metamorphic transformations when moving and consolidating in crust.

UDC 550.831.01

Pyatakov Yu.V., Isaev V.I., Kosygin V.Yu.
**THE POTENTIAL THEORY METHODS AT SOLUTION
 OF DIRECT GRAVITY AND GEODYNAMICS PROBLEMS
 OF THREE-DIMENSIONAL HETEROGENEOUS MEDIA**

The article introduces the algorithms for solving the problems of determining gravity and geodynamic field components for three-dimensional heterogeneous media. Typical elements –vertical triangular prisms with arbitrary upper and low base are used for approximation of densities and medium rheological structure. The authors have obtained a new analytical solution for the direct gravity problem for typical element with the density changing linearly at depth. The mathematical statement has been carried out. The article introduces the general solution of the problem for determining voltages and instantaneous drift velocities of heterogeneous viscous medium under earth's gravitational field. The solution is determined using hydrodynamic potentials of volume, simple and double layers. It is shown that the theory and typical method of solving direct problems of gravity

potential are ideally to be used for numerical calculation of such potentials. Stability, accuracy and response time of the developed algorithms are illustrated by test example calculation.

UDC 517.958:532.546+556.332.52+556.334+517.551+517.584

Zavedy T.Yu., Erofeev L.Ya.
**ANALYTICAL DESCRIPTION OF STEADY WAVE HYDROGEO-
 DYNAMIC PROCESS IN CONFINED AQUIFER WITH LEAKAGE**

The authors have carried out practical approximation of the modified Bessel function of the second type of zero order (McDonald function) and extended functions with complex input values derived from it in connection with the case of solving the wave hydrogeodynamics problem on steady harmonic oscillations of the ground water level in the infinite strike confined aquifer with leakage. The article demonstrates the possibility in principle of simplifying the complex solution with leakage and its reducing to solution of simpler similar problem for the isolated bed.

UDC 552.52(571.9)

Arbuzov S.I., Volostnov A.V., Ilyenok S.S., Rybalko V.I.
**THE NATURE OF TONSTEINS IN AZEISK DEPOSIT
 OF IRKUTSK COAL BASIN**

The article considers mineralogical and geochemical features of kaolinite interlayers (tonsteins) in Azeisk deposit of Irkutsk coal basin. The authors have determined rare-metal geochemical specialization of tonsteins in the deposit in REE, Y, Zr, Hf, U, Th, Ta, Sn, Ga, Cu, Pb, Se, Te and carried out complex analysis of possible sources of accumulating tonstein primary substance. The article introduces the substantiation of aerogenic mechanism of accumulating kaolinite interlayer primary material. The volcanic model of their formation owing to felsic pyroclastic substance has been substantiated.

UDC 553.313/.495

Ershov V.V., Rikhvanov L.P., Pshenichkin A.Ya., Arbuzov S.I.
**URANIUM AND THORIUM IN ORES
 OF BAKCHAR IRON ORE DEPOSIT**

The article introduces the data on uranium and thorium accumulation levels in different mineralogical ore types and rocks of Bakchar iron ore deposit (Western Siberia). The authors have analyzed uranium and thorium bonds with the other microelements. The supposition on rock composition in alimentation zone has been made.

UDC 553.982

Yashchenko I.G.
HEAVY VANADIUM BEARING OILS OF RUSSIA

The article considers the resource potential of heavy vanadium bearing oils of the Russian Federation. The main part of resources of heavy and vanadium bearing oils in Russia coincides with the deposits of Volga-Urals, Western-Siberian and Timan-Pechora oil-and-gas bearing basins. The significant potential of heavy oil is not sufficiently developed in the country. The possibility of recovering valuable associated components such as vanadium is neglected but it is the current issue at necessary transition to the large-scale development of heavy oil resources. It is known that vanadium production and recovery from heavy oils and its application in different manufactures is the promising direction of oil production and refining and it could give significant profit for oil producing companies.

UDC 552.56.550.832(571.16)

Ezhova A.V.
**ALUMINOUS AND FERRIFEROUS ROCKS OF THE PRODUC-
 TIVE STRATA IN THE SOUTH-EAST OF WESTERN SIBERIAN
 OIL-AND-GAS PROVINCE (TOMSK REGION)**

The author has studied the features of the structure of aluminous and ferriferous rocks coincide with the Paleozoic basement upper part and Jurassic sediments in the south-east of Western Siberian Plate, carried out their typing and determined their mineralogical composition, sedimentation conditions and secondary transformations. The

main criteria for determining these rocks at well logs: high values of electric conductivity and radioactivity, increase of well diameter at propagation of bauxite and oxide ferrous rocks; high values on the neuron logging curves (for siderites) were determined. The results obtained allow distinguishing these rocks in sections with limited core sampling and using these data at correlation of sections in the Paleozoic and the Mesozoic aureole as well as at paleogeographic researches.

UDC 553.982:553.041:552.578:550.836

Lobova G.A.
THE GENERATION CENTERS AND PRIMARY-ACCUMULATED RESOURCES OF BAZHENOV OILS IN THE UST-TYM MEGADEPRESSION

The author has estimated the petroleum potential of Upper Jurassic-Cretaceous deposits in the Ust-Tym megadepression and its framing (Western Siberia) based on paleotectonic reconstructions and paleotemperature modeling, mapping the generation centers and relative density of initial geological resources of Bazhenov oils. The article introduces the recommendation on priority of objects for exploration work organization.

UDC 550.8.05

Ostanin V.A., Peshkov V.E., Krokhaliev I.V., Parovinchak K.M., Syrchina N.V., Tikhomirova N.O.
SUBSTANTIATION OF RATIONAL COMPLEX OF AQUIFER HYDRODYNAMIC RESEARCHES

The article describes the algorithm of designing hydrodynamic parameters by the results of drillhole testing. The authors substantiate the reliability of determining edge water reserves by the researches carried out in single drillhole that reduces the exploration work labor intensity in comparison with observation well testing.

UDC 553.984:552.54

Koveshnikov A.E.
RESERVOIR ROCKS FORMATION IN PRE-JURASSIC CARBONATE DEPOSITS OF WESTERN SIBERIAN GEOSINECLISE

Hydrocarbons migrate into Paleozoic carbonate deposits of south-east part of Western Siberian geosineclise from north from the main oil-and-gas formation areas in settling down Bazhenov group and from east from oil-parent Pre-Cambrian deposits in Eastern Siberia. The hydrocarbons form in imbedded horizons of pre-Jurassic rocks the extensive crack metasomatic oil and gas reservoirs connected with oil-and-gas deposits in the Paleozoic carbonate sediments by the feeding crack system. The reservoir rocks in Silurian-Upper-Devonian carbonate sediments in the Western Siberian geosineclise were formed in the secondary-catagenetic stage of rock transformation in the form of crack-metasomatic areas. Long continental region stand in Permo-Triassic has not almost affected on reservoir rock formation in carbonate rocks. Diagenetic and primary-catagenetic dolomitization with the secondary-catagenetic dolomitization and secondary-catagenetic lixiviation formed the current outlook of rock voids.

UDC 553.984:552.54:551.253

Koveshnikov A.E.
RESERVOIR ROCKS OF PRE-JURASSIC CARBONATE-SILICATE-CLAY DEPOSITS OF THE WESTERN SIBERIAN GEOSINECLISE

Silicon-carbonate and silicon-clay formations in the south-east part of the Western Siberian geosineclise namely Nyurolsk structural-facial zone are formed in the areas of sedimentation basins of Late Devonian and early Carbonic age. Along with biogenic silicon accumulation in sediments it was redistributed in diagenesis and early catagenesis while forming micro-quartzitic rocks at the Upper Devonian limestone. These rocks were subject to supergene leaching at the stage of continental region stand and formation of weathering crusts at the outputs to the pre-Jurassic surface of the Paleozoic deposits. In the period of secondary catagenetic transformation of rocks the crack type reservoir rocks of hydrothermal-metasomatic nature were

formed in them both as a result of kaolinization with sideritization and hydrothermal leaching.

UDC 549:552(571.16)

Zhilina E.N.
MATERIAL-STRUCTURAL FEATURES OF MIDDLE-UPPER-JURASSIC DEPOSITS IN LUGINETSK FIELD (TOMSK REGION)

Based on the results of the detailed mineral-petrographic research the author introduces the comparative characteristic of material-structural features of the productive Calloway-Oxford deposits of J-I horizon in Luginetsk gas-condensate-oil field (Tomsk region).

UDC 622.276.6

Ivanov E.N., Kononov Yu.M.
THE SELECTION OF ENHANCED OIL RECOVERY METHODS BASED ON ANALYTICAL ESTIMATION OF GEOLOGICAL PHYSICAL DATA

The article considers optimization in selecting the enhanced oil recovery methods based on the author electronic program – « Applicability matrix » for analytical estimation of geological physical data. The program contains the criteria on multiple enhanced oil recovery methods and there is a possibility of the methods screening and ranking. The article introduces the analysis of oil fields for determining the applicability of enhanced oil recovery methods.

UDC 550.42:577.4(571.1)

Savichev O.G., Bernatonis P.V., Bernatonis V.K.
HYDROLOGICAL SUBSTANTIATION OF ECONOMIC DEVELOPMENT OF MARSHES (BY THE EXAMPLE OF THE KLUCH RIVER BASIN, WESTERN SIBERIA)

The mathematical model of water runoff formation is developed and approved by the example of the Kluch river in northeast part of the Vasuganskoe bog. The elements of annual and monthly water balance of the river basin are estimated. The authors have elaborated recommendations on hydrological substantiation of economic development of marches and offered parameters which should be determined in prospecting works and engineering researches: the areas of intra-marsh, forest and field ecosystems with various proaccuracy, the extent of water inflow and outflow contours out of ecosystems, annual and monthly values of water balance elements in the river basin; a longitudinal structure of water runoff change at water movement from basin border up to channel networks.

UDC 556.314

Guseva N.V., Kopylova Yu.G., Khvashchevskaya A.A., Smetanina I.V.
CHEMICAL COMPOSITION OF SALT LAKES IN SEVERO-MINUSINSK DEPRESSION, KHAKASIYA

The article considers the chemical composition of salt lakes in Severo-Minusinsk depression, Khakasiya. The dependence of the lake ion composition on mineralization is shown. The authors have determined brine types by the classification of M.G. Valyashko and calculated water salt composition. The influence of evaporation concentration on formation of the lake ion composition is characterized.

UDC 550.46:556.314

Tokarenko O.G.
GROUND WATERS OF KUZBAS CENTRAL PART: CHEMICAL COMPOSITION WITHIN VARIOUS LANDSCAPE REGIONS

The author has considered chemical composition of ground waters in active water exchange zone of Kuzbas. The article demonstrates the dependences between the content of macro- and micro-components and water salinity as well as their composition change in the profile of decreasing relief elevation points when passing from foothill to steppe. The author has determined the main geochemical processes typical for steppe landscapes and the reasons for concentrating some components in the ground waters.

UDC 622.233.63

Fedin D.V., Shadrina A.V., Saruev L.A.
**THE EXPERIMENTAL INVESTIGATIONS OF FLUID PULSE
 FORMATION MECHANISM FOR ROCK DESTRUCTION WHEN
 DRILLING**

The article introduces the researches of hydroimpulsive mechanism used in rotative-impact units for drilling intensification. The author has determined the dependences of amplitude and energy of force pulse changing on length and diameter of high pressure hose as well as on the change of inertia mass and stress of hydroimpulsive mechanism pneumo-feeder.

UDC 622.277:622.234.5

Gorshenin N.E.
**SLURRY TRANSFER ORGANIZATION IN FLOODED STOPE
 AT HYDRAULIC BOREHOLE MINING**

The article introduces the results of the experiments on slurry transfer organization by water jets. The author proposes the technique for calculating water jets to prevent heavy fraction redeposition in a stope.

UDC 551.510.535:551.501.8

**Vukolov A.V., Ippolitov I.I., Karataev V.D., Nagorsky P.M.,
 Smirnov S.V., Firstov P.P., Yakovleva V.S.**
**VARIATION OF RADIATION BACKGROUND COMPONENTS
 IN SEISMICALLY ACTIVE AND QUIET REGIONS
 (PRELIMINARY RESULTS)**

The article introduces the preliminary results of coordinate experiments on studying the interconnection between the components of natural radiation background and meteorological values in seismically active and passive regions. The authors have determined the fundamental differences in consistency of α -, β -radiation variations on time intervals from synoptic to annual in seismically quiet and active regions.

UDC 534.6.08

Bocharov A.A., Kolesnik A.G., Solovyev A.V.
**ACOUSTIC NOISES OF THE URBAN LANDS
 BY THE EXAMPLE OF TOMSK**

The article proposes the technique for designing the noise map of the city by spectral characteristics of acoustic noises. The authors have constructed the acoustic noise maps with sound and infrasound frequency range as well as the maps of recession indicator space distribution by the measurement data in Tomsk.

UDC 504.064:537.612

Semenov A.V.
**SUBSTANTIATION OF UTMOST ALLOWABLE STANDARDS
 FOR MAGNETIC INDUCTION WITH INDUSTRIAL FREQUENCY
 FOR A MAN**

The author has considered the influence of low frequency magnetic fields including geomagnetic storms on human health. The conclusions were made on illegality of introduction in Russia the existing utmost allowable standards for magnetic induction with industrial frequency 50 Hz as these standards are suitable only for sinusoidal magnetic fields. The conclusions were made based on the research of time characteristics of magnetic field of electric power transmission lines with industrial frequency which are connected and disconnected to different active, reactive and nonlinear loads; based on studying nonlinear properties of human body structures high-sensitive to alternating magnetic fields including biological membranes as well as on the basis of long-term investigations of the magnetic induction with industrial frequency effect on human health carried out in Sweden and Russia. The authors substantiated the change of the existing utmost allowable standards for magnetic induction with industrial frequency and proposed a number of administrative and technical measures for decreasing negative effect of these fields on a person.

UDC 550.46:556.314

Kiryukhin V.A., Norova L.P.
HYDROGEOCHEMISTRY OF URBAN AGLOMERATIONS

The article considers the main premises and current situation on pollution of various natural environments such as atmosphere, aeration zone, ground waters and the others effecting greatly on health and sound life of megacity population. The authors have carried out the survey and analysis of natural environment hydrogeochemistry which allow carrying out typing of hydrogeochemical situation in the cities.

UDC 622.276+553.98+530.1

Zapivalov N.P.
THE DYNAMIC OF OIL FIELD LIFE

The author has determined the threshold of critical state for fluid-dynamic system. The article demonstrates the necessity of rehabilitation cycles and low impact methods (techniques) of reservoir stimulation. The conclusion on possibility of long-term and effective development of oil-and-gas fields with high coefficient of final oil recovery is made. The author has developed physico-mathematical model of field dynamics and proposed fundamentally new science and technology paradigm of developing, saving and recovering oil and gas resources.