Geologisk Rapport avseende tillgången i Tomsk

7 september 2018

Den geologiska rapport som det lokala geovetenskapsteamet i Tomsk har arbetat med är nu färdigställd. Rapporten går igenom vilka arbeten som har gjorts och vilka slutsatser som kan dras hittills i prospekteringsarbetet samt gör också en egen, intern, uppskattning av de utvinningsbara reserverna givet nu tillgänglig information.

Den geologiska rapporten över fält 71-1, Ellej-Igajskoje i Tomsk, är upprättad enligt gängse standard av det interna teamet hos dotterbolaget OOO Bakcharneftegaz ("BNG") och utgör således inte en oberoende tredjepartsutvärdering. Rapporten är baserad på såväl den historiska informationen från arbetena på sovjettiden som de arbeten som gjorts hittills av BNG. Det senare handlar främst om genomgången av brunn 4, omtolkning av data från brunn 2 samt tidigare tolkningar av seismiska undersökningar. Vidare prospekteringsarbeten kan komma att såväl öka som minska de angivna uppskattningarna.

De av det lokala teamet angivna uppskattade utvinningsbara reservberäkningarna är (tabell 6 ur rapporten):

Proved (**P90**) MM tons	Probable (**P50**) MM tons	Possible (**P10**) MM tons
3.422 (IV) + 0.861 (J15)+1.488 (J5) + 0,524 (J1)	0.429(I) + 3.920 (IV)	6.153 (II)+ 4.565 (III) + 1.245 (IV)
6.296	4.350	11.963
TOTAL (P90+P50+P10): 22.608 million tons		

Vid användande av en omräkningskoefficient om 7,5 fat per ton motsvarar totalen cirka 170 miljoner fat flytande kolväten.

I tabell 7 nämns också mineraltillgången, dvs bedömningen av den totala mängden på fältet ("in place"), klart att skilja från den bedömt utvinningsbara mängden. Denna bedömdes vara 111.689 miljoner ton, som vid användning av en omräkningskoefficient om 7,5 motsvarar cirka 830 miljoner fat kolväten, vilket då är de geologiska resurserna och inte ska förväxlas med de bedömt utvinningsbara reserverna.

Angående de mängder gas som visats vid testerna har de i huvudsak inte medräknats. Teamets bedömning baserat på erhållna resultat och analyser är att det är ett fält med flytande kolväten och för att kunna visa på kommersiella mängder gas behövs mer information än som finns för närvarande och är inte prioriterat.

Detta dokument kommer nu att användas som en viktig del av det underlag som Bolaget presenterar för externa parter. Dokumentet bifogas i engelsk översättning.

Stockholm som ovan.

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Styrelsen

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Denna information är insiderinformation som Nickel Mountain Resources AB är skyldig att offentliggöra enligt EU:s marknadsmissbruksförordning. Informationen lämnades genom ovanstående kontaktpersons försorg, för offentliggörande den 7 september 2018.

Aktsamhetsuppmaning: Uttalanden och antaganden gjorda i bolagets informationsgivning med avseende på Nickel Mountain Resources ABs ("NMR") nuvarande planer, prognoser, strategier, tankar och övriga uttalanden som ej utgör historiska fakta är bedömningar eller s k "forward looking statements" om NMRs framtida verksamhet. Sådana bedömningar av framtiden inbegriper men är ej begränsade till uttalanden omfattande ord som "kan komma", "avser", "planerar", "förväntar", "uppskattar", "tror", "bedömer", "prognostiserar" och liknande uttryck. Sådana uttalanden reflekterar företagsledningens för NMR förväntningar och antaganden mot bakgrund av vid varje tillfälle tillgänglig information. Dessa uttalanden och förväntningar är föremål för ett stort antal risker och osäkerheter. Dessa, i sin tur, inbegriper men är ej begränsade till i) förändringar i den ekonomiska, legala och politiska miljön i de länder vari NMR har verksamhet, ii) förändringar i den geologiska informationen som finns tillgänglig vad avser av bolaget drivna projekt, iii) NMRs förmåga att kontinuerligt säkerställa tillräcklig finansiering för att bedriva sin verksamhet som en "going concern", iv) framgången vad avser koncernens deltagande, om överhuvudtaget, i olika intressebolag, joint ventures eller andra allianser, v) förändringar i råvarupriser, i synnerhet vad gäller nickel, olja eller gas. Mot bakgrund av de många risker och osäkerheter som existerar i varje mineralprojekt på ett tidigt stadium, kan den faktiska framtida utvecklingen för NMR komma att väsentligt avvika från den i bolagets informationsgivning förväntade. NMR påtar sig ingen ovillkorlig skyldighet att omedelbart uppdatera sådana framtidsbedömningar.

Limited Liability Company "Bakcharneftegaz"
OOO Bakcharneftegaz

APPROVED by
General Director
OOO Bakcharneftegaz

_____ M. Yu. Malyarenko
« » August 2018

Resp. Executor Geologist I.M. Skvortsov

Summary report on the results of geological exploration for hydrocarbons performed by Limited Liability Company "Bakcharneftegaz" in Yelley-Igaiskiy license block 71-1

Geologist I.M. Skvortsov

Tomsk, 2018

REPORT TEAM LIST

Name	Signature	Report Section
I.M. Skvortsov, Geologist		Abstract, introduction, sections 1,2,3, conclusions based on testing results, graphical appendices, formatting

I.M. SKVORTSOV (responsible executor) * **Summary report on the results of geological exploration for hydrocarbons performed by Limited Liability Company "Bakcharneftegaz" in Yelley-Igaiskiy license block 71-1** *31 pages, 3 pictures, 6 tables, 3 text appendices *OOO Bakcharneftegaz, Tomsk, pr. Frunze, 111 *July 2018. *Owner of the report: OOO Bakcharneftegaz.

Abstract. Yelley-Igaiskaya prospect of Yelley-Igaiskiy license block is confined to the local uplift of the same name complicating Lavrovskiy inclined arch in the south part of Nyurolskaya megadepression of West Siberia Plate and forms a part of Mezhovskiy petroleum region of Vasyuganskaya petroleum area of West Siberian petroleum province.

In 2014 "Project of prospecting for oil and gas fields (reservoirs) in Yelley-Igaiskaya prospect of Yelley-Igaiskiy license block of Tomsk Oblast" was prepared and approved that was awarded a positive expert evaluation in the expert review №074-02-08/2014 dated 28.08.2014 issued by Siberian Branch of Federal State-Funded Institution "Rosgeolexpertise".

Rehabilitation of parametric well 4 of Yelley-Igaiskaya prospect was performed. The rehabilitation works were carried out according to the project of rehabilitation of well 4 of Yelley-Igaiskaya prospect of Yelley-Igaiskiy license block dated 2014 that had a positive expert evaluation in the Industrial safety expert review № 014/12-12-PD/NG/657, Reg № 60-ID-62299-2012.

Well surveys were performed in the well to study well integrity and determine fluid content of potential pays.

In 2014-2018 OOO Bakcharneftegaz perforated the well casing and tested 11 targets. Testing included fluid stimulation techniques (chemical treatment of the near wellbore zone).

As a result of testing, gas presence of core Paleozoic (noncommercial gas inflows) was identified, a commercial inflow of gas, condensate and oil mixture from Paleozoic weathered crust (2990-3000 m) was received, hydrocarbon saturation of J_{15} was identified, a commercial natural inflow of gas and condensate mixture was received. In addition to that, light oil was identified in J5, J1(2-3-4) formations.

KEY WORDS: testing, oil and gas presence, geological exploration, reservoir, formation, oil, gas, condensate, well.

Prepared by: I.M. Skvortsov

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LIST OF FIGURES

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CONTENT OF COMPUTER-READABLE VERSION OF THE REPORT

1CD-R – Text of the Report with figures, tables.

CD – 1; list of computer-readable records in 1 p.

INTRODUCTION

OOO Bakcharneftegaz holds the license for the right to use subsurface mineral resources TOM № 01559 NR with the purpose of geological survey, exploration and production of crude hydrocarbons at Yelley-Igaiskiy license block 71-1 in Kargasok region of Tomsk Oblast since October 07, 2010. The license is valid until September 30, 2035.

On March 15, 2016 Department of Subsoil Use for the Central Siberian Region resolved to update the license agreement for the right to use subsurface mineral resources TOM 01559 NR.

Administratively, the license block 71-1 (Yelley-Igaiskiy) is located in Kargasok region of Tomsk Oblast, its area amounts to 34.5 km^2.

The prospected territory is represented by a flat, forested, swampy plain. The terrain relief is plain. Absolute marks vary from ~125 m to 143 m within the operations area and neighboring license blocks. Local differences in elevation make about 18 m.

The nearest populated area is Kedrovy town which has an airport equipped with concrete airport runway, communication center, digital relay, hospital, post office, and other institutions. Kedrovy is located 90 km East of license block 71-1. The distance to the nearest developed fields (Urmanskoye, Archinskoye) makes about 30 km.

15 km North of the license block there are: oil pipeline Igolskoye-Luginetskoye-Parabel, electric power line.

The closest all weather road connecting Igolskoye field with Pionerny-Strezhevoy is located beyond the area of the license block, 85 km to the West. There are no roads at the area of the block. Moving and transporting of loads is done using helicopter aviation, off-road vehicles, tractors, snow vehicles.

In 2014 a scope of works was performed on re-entry to well 4 of Yelley-Igaiskiy license block. In the rehabilitated well, a set of geophysical survey was carried out, promising oil saturated intervals were identified in Jurassic, Cretaceous, as well as core Paleozoic deposits.

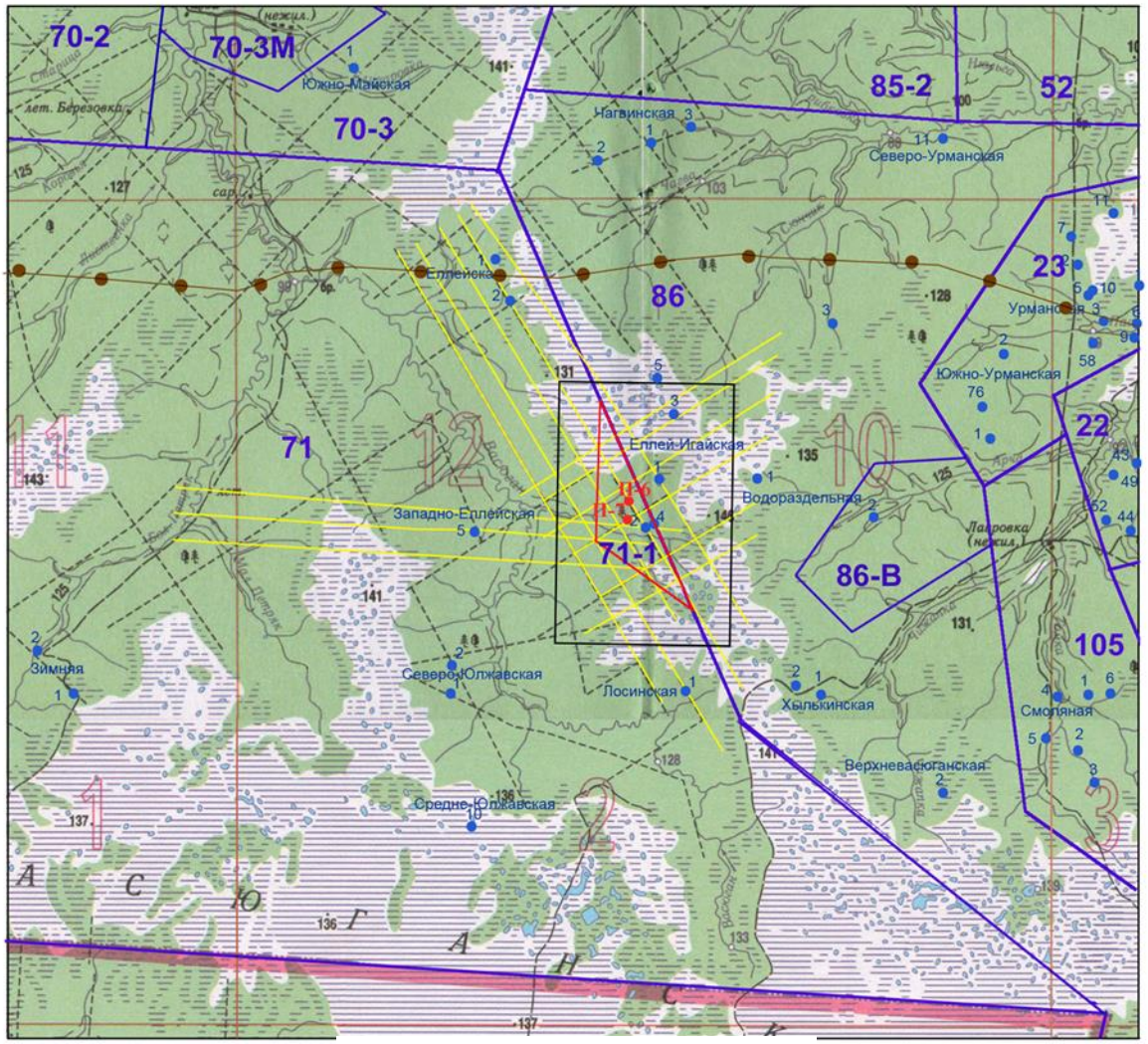
The tested intervals f core Paleozoic revealed gas saturation along of the cross-section, they are good targets for future development involving stimulation techniques.

When Paleozoic weathered crust was tested (interval of 2990-3000 m), a commercial inflow of hydrocarbon mixture was obtained (gas, condensate, oil).

When Jurassic deposits were tested, the following inflows of hydrocarbons were obtained: formation J15 (interval of 2975-2987 m) – inflow of gas, condensate and oil. Formation J5 (interval of 2764-2772 m) and formation J1 (intervals of 2641-2643 m, 2656-2659 m, 2661-2664 m) – oil inflows.

AS of beginning of 2018, 11 objects were tested in well 4. The testing was completed, the well performed its tasks and was abandoned on 22.02.2018.

As a result of works performed, a multi-layered field of hydrocarbons was found. The location map is presented in Fig. 1.



MAP SYMBOLS:

Зимняя 2 — *Drilled wells, their number and name of the prospect*

Hydrographic features

- *rivers, lakes*
- *bogs*

Topography. Elevation markers in meters, bergstrichs

License blocks boundaries, their number

22 – Archinskoye
23 – Urmanskoye
52 – Yuzhno-Tambayevsky
70-2 – Yuzhno-Festivalny - 1
70-3 - Yuzhno-Festivalny - 3
70-3M – Mayskoye
71 – Yelleysky
71-1 – Yelley-Igaiskiy
85-2 – Verkhne-Nyurolsky – 2
86 – Yuzhno-Urmansky
86-B – Vodorazdelnoye
105 – unallocated reserve fund

field roads, forest roads, winter roads (snow roads, driftways)

foot paths

Dominant wood species (coniferous, deciduous)

2D seismic profiles reprocessed in 2012

Oil pipeline

Reporting boundaries of the prospect

License block 71-1 boundaries

П-6 — *Wells recommended to be drilled, their number*

Fig. 1. Location map.

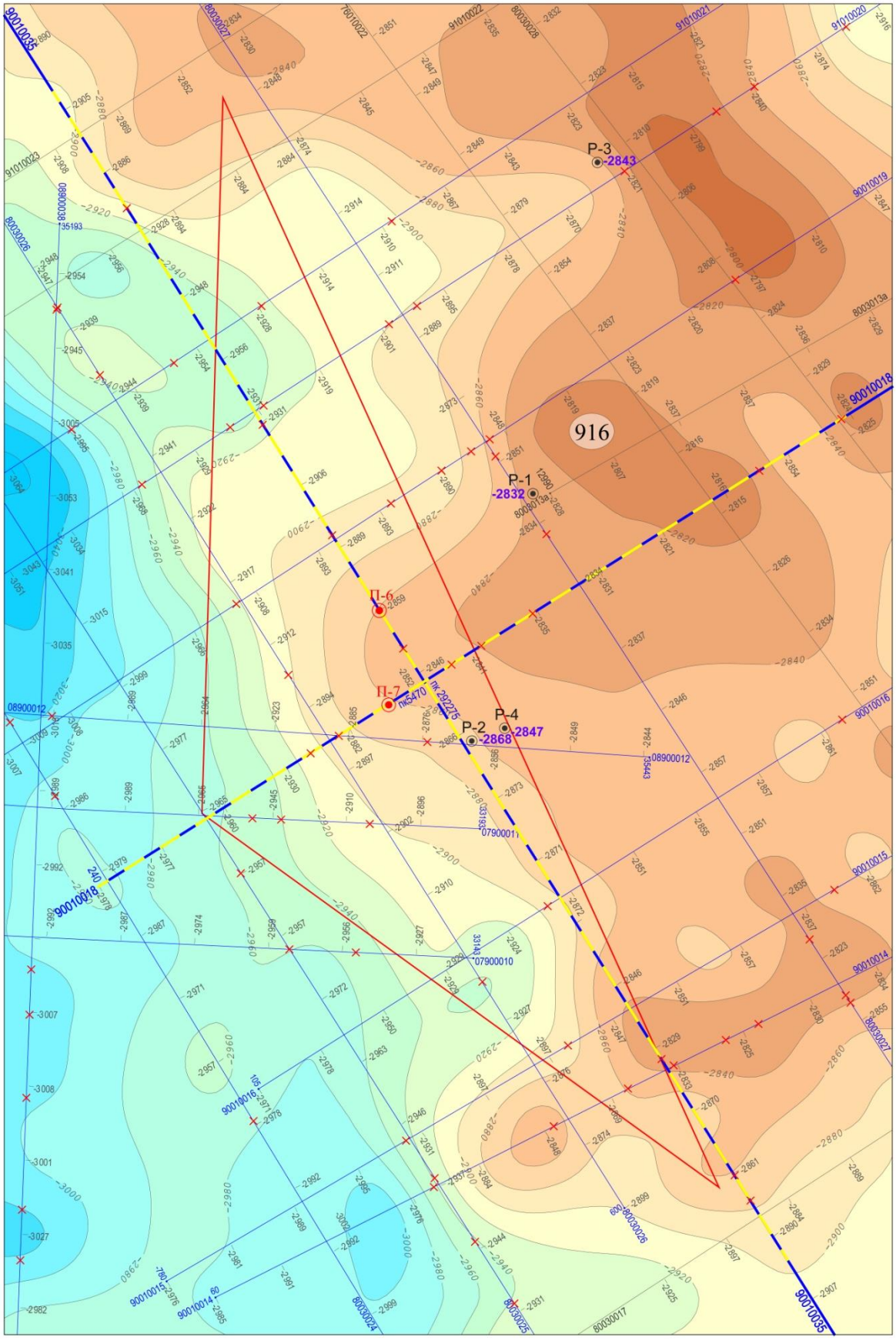
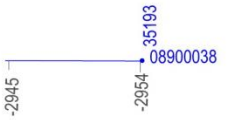


Fig. 2. Structural map of the reflecting horizon F2 (bottom of Jurassic).

MAP SYMBOLS



2D seismic profiles reprocessed in 2012 (08 – year of seismic data acquisition, 90 – serial number, 0038 – profile number, 35193 – stake) with TVD to the reflecting horizon F_2 (bottom of Jurassic), m

2D seismic profiles reprocessed in 2012 (80 – year of seismic data acquisition, 03 – serial number, 013a – profile number, 12990 – stake)

Structural contours of the reflecting horizon F_2 (bottom of Jurassic), m

Deep wells (drilled), their number with TVD of the bottom of Jurassic, m

Unrouted tectonic faults

Recommended wells

Boundaries of the license block 71-1 (Yelley-Igaiskiy)

Profiles for which time section fragments are provided

TERTIARY STRUCTURES

916 *Yelley-Igaiskaya*

1. PRECONDITIONS FOR PERFORMING GEOLOGICAL EXPLORATION AT YELLEY-IGAISKAYA PROSPACT

Oil and gas presence at Yelley-Igaiskaya prospect was initially confirmed by data of two stratigraphic wells (wells 2 and 4, depths of 4502 m and 4100 m correspondingly). These wells were drilled within the period of time from 1979 to 1992 with the purpose of studying of geological structure of South-West part of Yelley-Igaiskoye uplift stretching though the central part of the license block.
In these wells, a standard complex of works was carried out, namely: coring and further core analysis (done only for Paleozoic deposits), a range of geophysical surveys, testing of individual prospective intervals in open and cased holes.

The wells are characterized by presence of oil and gas showings. In well 2, oil inflow at depths of 4020 m, 3850-3950 m was obtained from intervals of core Paleozoic rocks, the results of oil analysis are available. There was a gas kick (interval of 2990-3000 m) in well 4 while drilling through interval of weathered crust.

During exploration of 71-1 license block, BNG specialists analyzed all input information: logs, core data, oil samples analyses, MOGT-2D seismic exploration reports, etc. Also, information from several fields situated in the immediate vicinity of 71-1 was analyzed, geological structure and flow properties of rocks that are similar to individual objects (Paleozoic weathered crust deposits, fissured-cavernous formations of core Paleozoic carbonate rock mass) of 71-1.

Prospecting indicators and assumptions made based on the results of work done, made it possible to draw conclusions about presence of oil and gas bearing formations in the territory of license block 71-1 situated in Jurassic and Paleozoic deposits (namely, a large gas/condensate/oil field). The decision was made to purchase the license for the right to use subsurface mineral resources of Yelley-Igaiskiy license block 71-1.

2. TYPES AND RESULTS OF GEOLOGICAL EXPLORATION AT YELLEY-IGAISKAYA PROSPECT

Over the period of the Company operations, a significant amount of geological exploration has been completed in the territory of Yelley-Igaiskiy license block.

2.1. WELL REHABILITATION

Well 4 rehabilitation according to the project of rehabilitation of parametric well №4 of Yelley-Igaiskiy license block was performed (positive review of industrial safety expert № 014/12-12-PD/NG/657, Reg. № 60-ID-62299-2012, OOO "Tomskiy ITC"). Artificial bottom hole of 4006.5 m was reached, the well depth was 4100.0 m, which was considered to be a sufficient depth for testing most of potentially hydrocarbon bearing targets. During well 4 re-entry, geophysical surveys were done in order to identify the quality of cement (cement bond log).

Artificial bottom hole of 4006.5 m was reached. Estimated oil and gas bearing interval correlating with productive deposits in well 2 was not reached due to technical reasons.

2.2. FLUID CONTENT AND WELL INTEGRITY

Geophysical well logging was carried out in the well in order to study well integrity, identify fluid content of promising intervals. To solve tasks related to integrity study, characteristics of lithological rock properties and identification of the current saturation of reservoirs, scanning magnetic pulse detection and spectral radioactive logging techniques were applied.

The scanning magnetic pulse detection made it possible to identify and specify the following:

- structural parts of the well (casing shoes, collared joints, perforation intervals);
- corrosion areas, various casing defects: fractures and other integrity damages.

In order to identify lithological composition, flow properties of rocks, saturation coefficient, neutron spectrometry techniques using complex well logging equipment TsSP-3INGKS-73 and KSPRK-Sh-90 were applied.

As a result of interpretation of newly acquired geophysical data, the presence of potentially hydrocarbon saturated intervals was confirmed, their boundaries were specified and new promising intervals in Cretaceous and core Paleozoic deposits were identified.

2.3. TESTING OF PALEOZOIC DEPOSITS

Testing of potentially oil and gas bearing intervals in Paleozoic deposits penetrated by well 4 of Yelley-Igaiskaya prospect was carried out. According to the developed testing plans, 7 objects were tested by perforation with well stimulation by chemical treatment of near wellbore zone.

During the acid treatment job, gas showings were observed in all of the tested objects. Gas showings were directly proportional to the volume of the chemical agent pumped into the well. During testing of core Paleozoic, the pressure increased to 50 and 20 ATM, after producing the well to the pit, the pressure went down. Apparently, when the well was drilled, most fractured and permeable intervals absorbed big amounts of drilling mud which, in turn, reduced many-fold or even destroyed flow capacity of oil and gas saturated zones. It is difficult to evaluate the depth of drilling mud invasion. In order to reduce the drilling mud effect (in essence, to reduce the skin effect), as well as increase communication of reservoirs, hydraulic fracturing can be performed.

When object 6 was testing that included 2 promising intervals (3028-3060 m, 3090-3093 m), the well started overflowing with technical water after perforation and level reduction to the depth of 600 m by swabbing, the well started cleaning up. Due to closeness to hazardous object (Paleozoic weathered crust), the decision was made to identify the injection rate within the perforated interval in order to

understand the possibility of killing the well in case the wellhead pressures increased to abnormally high levels (300-350 ATM).

According to on-the-spot field survey information, two gas producing intervals were identified (3028-3060 m, 3090-3093 m), as well as one absorbing interval (3040-3046 m), characterized by extremely high reservoir properties. Injectivity of absorbing interval according to the results of well logging made about 230 m3/day. In such a way, for the first time since testing started, a reservoir in Paleozoic deposits with high reservoir properties was found in the tested well.

A commercial inflow of crude hydrocarbons was received during testing the 7^{th} object from Paleozoic weathered crust (perforation interval 2990-3000 m), the gas condensate mixture flowrate made 114 thousand m^3/day when the well was producing through a 24 mm choke.

When the well was producing through a diaphragm gauge of critical flow and through 12-16 mm chokes in order to flush the bottomhole completely from solids, intense carry-over of solids was observed, presumably, reservoir rock debris from the bottomhole zone of the reservoir, which allows to draw conclusion about the presence of a reservoir characterized by an absolute permeability of more than 100 mD (0,1 micron2), which is also confirmed by absence of core extracted on surface during drilling.

After killing of the well, about 60 litres of rock cuttings were carried out of the well from the bottomhole zone as a result of back flushing of the well (rounded cuttings of rocks making up weathered crust, cutting of the cement rocks, etc., making up to 28 mm in size). This fact can serve as evidence of the presence of highly permeable reservoir. The rock cuttings were sent for laboratory analysis in order to identify the age and mineral composition of the cuttings.

Well testing with trial of 4 well operation modes at chokes of different diameters, pressure build-up curves were recorded, gas, stable condensate, and associate water samples were taken. Laboratory research was done for associated water, gas, liquid hydrocarbons, and rock cuttings carried to the surface out of the well.

Federal state unitary enterprise Siberian Research Institute of Geology, Geophysics and Mineral Resources made a detailed lithological and bitumological research of contact zone productive deposits of well 4 according to collection of rock cuttings carried out of the well during the first testing cycle.

Well survey results allow to draw several conclusions of crucial importance, namely:

- Productive thickness is comprised by rocks with high reservoir properties;
- Most part of rock cuttings that were carried out of the well were filled with oil having the density of more than 0.8 g/cm^3;
- Among the cuttings there are tight rocks which could serve as impermeable seal of low thickness covering Paleozoic weathered crust deposits that were destroyed during drilling and testing processes;
- There were no samples found saturated with gas during bitumological analysis, that can serve as a proof that gas cap of the reservoir is located higher than the tested zone.

Qualitative chemical analysis of two samples of condensate and an oil sample taken at various testing jobs of Paleozoic weathering crust was carried out by the Laboratory of geochemistry and reservoir oils of OAO TomskNIPIneft.

Visual comparative analysis of condensate samples showed that the second sample is significantly darker than the first one that directly points at presence of oil within the darker sample.

Comparative analysis of laboratory data showed density increase in the second sample, significant difference of kinematic viscosity, sulphur, etc. Overall, this result allows to make a conclusion on the increase of oil presence in composition of the second condensate sample making about 10% from the total volume.

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Table 1. Comparison of the results of qualitative chemical analyses of condensate samples.

Results of qualitative chemical analysis of the first condensate sample, taken on 16.02.2015, protocol No.156

Parameter Identified	Measuring unit	Result of analysis	Regulatory Document for Testing Method	Absolute uncertain
Density at 20°C	kg/m3	708.3	GOST 3900-85	±1.1
Kinematic viscosity at 20°C	mm2/s	0.7162	GOST 33-2000	±0.0122
Kinematic viscosity at 30°C	mm2/s	0.5962	GOST 33-2000	±0.0101
Mass fraction of total Sulphur	mass percent	⊟0.015	GOST R 51947-2002	
Mass fraction of water	mass percent	⊟0.03	GOST 2477-65	
Mass fraction of solids	mass percent	⊟0.005	GOST 6370-83	
Concentration of chlorine salts	mg/dm3	⊟10.0	GOST 21534-76 (Method B)	
Pressure of saturated vapours	kPa	79.0	GOST 1756-2000	±3.5
Mass fraction of asphaltenes*	mass percent	⊟0.1	VNIINP Institute methodology	
Mass fraction of silica-gel tars*	mass percent	0.14	VNIINP Institute methodology	±0.02
Mass fraction of paraffine	mass percent	⊟0.2	GOST 11851-85	
Molecular weight*		114.1	OST 153-39.2-048-2003	±4.9
Freezing temperature	°C	Lower than minus 60.0	GOST 20287-91	
Fractional composition	°C	Initial boiling point – 35.0 5.0 % – 57 10.0 % – 68 20.0 %– 87 30.0 %– 101 40.0 %– 112 50.0 %– 123 60.0 %– 140 70.0 %– 157 80.0 %– 178 90.0 %– 227	GOST 2177-99 (Method A)	±4.5 ±3

Results of qualitative chemical analysis of the first condensate sample, taken on 02.04.2015, protocol No.351

Parameter Identified	Measuring unit	Result of analysis	Regulatory Document for Testing Method	Absolute uncertainty
Density at 20°C	kg/m3	719.9	GOST 3900-85	±1.1
Kinematic viscosity at 20°C	mm2/s	0.8336	GOST 33-2000	±0.0142
Kinematic viscosity at 30°C	mm2/s	0.7589	GOST 33-2000	±0.0129
Mass fraction of total Sulphur	mass percent	0.0212	GOST R 51947-2002	±0.0066
Mass fraction of water	mass percent	<0.03	GOST 2477-65	
Mass fraction of solids	mass percent	0.014	GOST 6370-83	±0.007
Concentration of chlorine salts	mg/dm3	14.1	GOST 21534-76 (Method B)	±4.2
Mass fraction of asphaltenes*	mass percent	0.26	VNIINP Institute methodology	±0.07
Mass fraction of silica-gel tars*	mass percent	2.3	VNIINP Institute methodology	±0.3
Mass fraction of paraffine	mass percent	<0.2	GOST 11851-85	
Molecular weight*		110.3	OST 153-39.2-048-2003	±4.7
Freezing temperature	°C	Lower than 60.0 below zero	GOST 20287-91	
Fractional composition	°C	Initial boiling point – 36.0 5.0 % – 56 10.0 % – 67 20.0 %– 86 30.0 %– 97 40.0 %– 111 50.0 %– 125 60.0 %– 138 70.0 %– 154 80.0 %– 175 90.0 %– 230	GOST 2177-99 (Method A)	±4.5 ±3

The fact of oil presence in the second sample confirms the statement of SNIIGiMS (Federal state unitary enterprise Siberian Research Institute of Geology, Geophysics and Mineral Resources) that Paleozoic weathering crust is oil saturated. This is explained by the fact that after the well was killed and then stimulated again, multiphase flow was produced from the well. During the further well testing, amount of oil in the fluid is expected to increase.

Appendix 1. Protocol №430 of qualitative chemical analysis.

JSC TomskNIPIneft
Laboratory of Geochemistry and Crude Oil
634027, 70 Mira ave., Tomsk
Fax (3822) 611990 tel. 611835
Certificate of accreditation № ROSS RU.0001.512150
Issued October 13, 2015

PROTOCOL No. 430
Of qualitative chemical analysis
Dated 21.10.16
Copy No.1

Customer name and address: OOO Bakcharneftegaz, 634021, 111 Frunze Ave., Tomsk
Sampling date: 02.04.15
Date of analysis start: 21.09.16
Date of analysis completion: 17.10.16
Analysis object: oil sample, laboratory code R161034
Sampling area: Yelley-Igaiskiy license block (71-1), well 4, Paleozoic weathered crust, perforation interval: 2990-3000 m.
Sampling conditions: separator, 12 mm choke, tubing pressure=20 ATM, annulus pressure=14 ATM, separator pressure=20 ATM, sampling temperature=13.9°C.

Parameter Identified	**Measuring unit**	**Result of analysis**	**Regulatory Document for Testing Method**	**Absolute uncertainty**
Density at 20˚C	kg/m3	724.2	GOST 3900	±1.1
Mass fraction of total sulphur	mass percent	<0.015	GOST R 51947	
Mass fraction of paraffine	mass percent	<0.2	GOST 11851	
Freezing temperature	˚C	Lower than 60.0 below zero	GOST 20287	
Fractional composition	˚C	Initial boiling point – 44.0 Up to 100°C – 25.0 Up to 150°C – 61.0 Up to 200°C – 82.5 Up to 250°C – 89.5	GOST 2177-99 (Method B)	±5.0 ±1.4

Head of laboratory: (signature) I.V. Goncharov
(Stamp: TomskNIPIneft Research Institute for Oil and Gas)

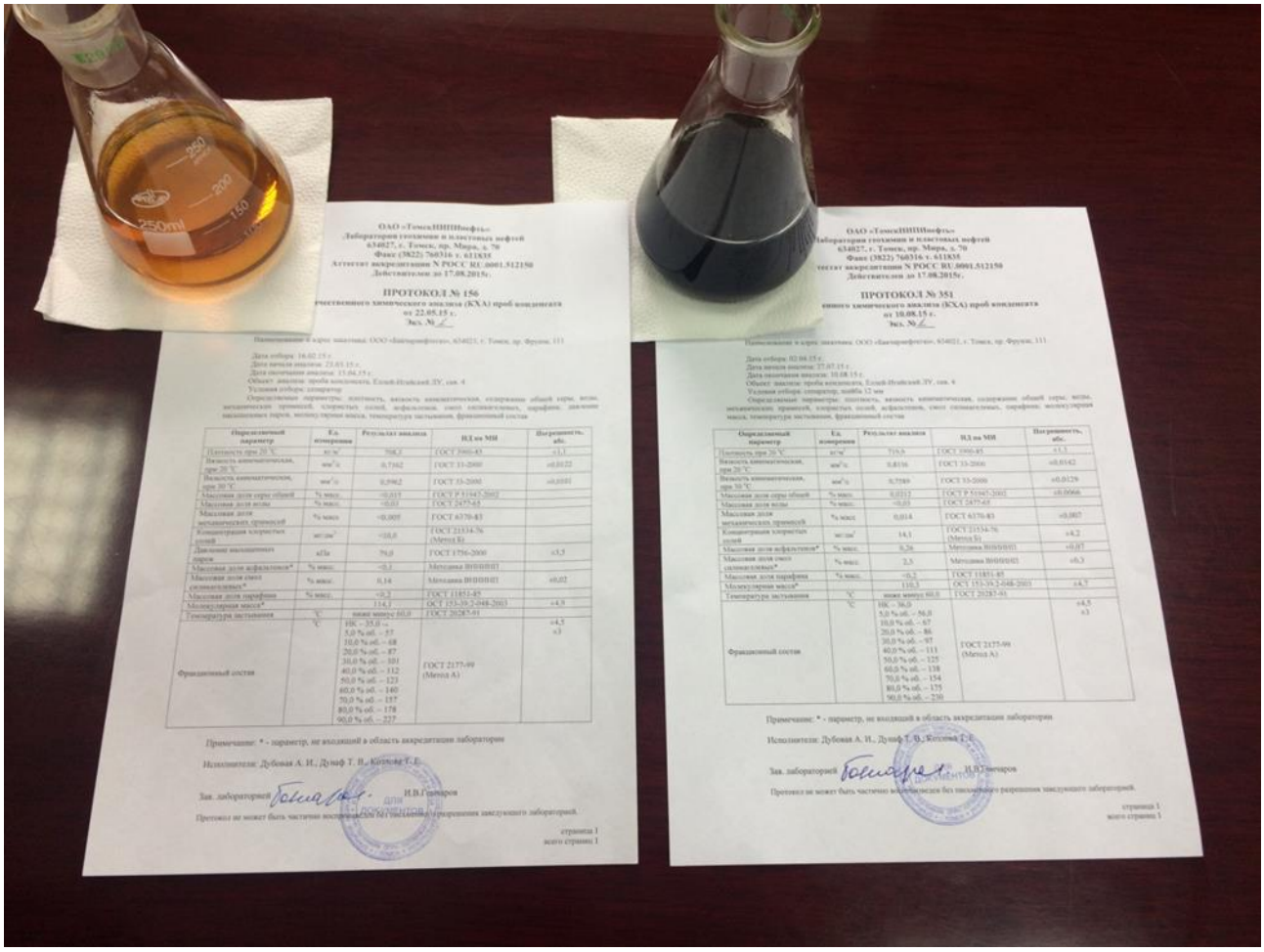

Fig. 3 Reservoir fluid samples taken from Paleozoic weathered crust (well 4).

Based on the results of chromatographic analysis, the first sample corresponds to condensates of lower-Jurassic deposits (connected by their origin to Togurskaya suite deposits). The second sample includes mixture of Paleozoic oil (similar to oils produced at Gerasimovskoye, Kazanskoye fields).

2.4. TESTING OF JURASSIC AND CRETACEOUS DEPOSITS

A commercial inflow of hydrocarbons was obtained during testing of object 8 from deposits of J15 formation (perforation interval of 2975-2987 m). The flow rate of gas, condensate and oil mixture made 40.7 thsd m^3/day. An oil sample was taken and laboratory analysis was performed, the analysis protocol was issued.

Oil inflow was obtained from deposits of J5 formation (perforation interval of 2764.0-2772.0 m), J1 (perforation intervals of 2641-2643 m, 2656-2659 m, 2661-2664 m). The study of the wellhead samples of oil taken in 2018 during testing of J5 and J1(2-3-4) formation in well 4 of Yelley-Igaiskaya prospect performed by OAO TomskNIPIneft contains the following findings:

- oil samples differ from each other and from samples submitted for analysis from this prospect (in 2015 and 2016),
- oil from J5 formation is substantially lighter, it is characterized by low content of sulphur, paraffines, tars compared to oil from J1 (see Protocols № 120 and № 121 dated 14.06.2018),
- oil from J5 formation is predominantly of Paleozoic origin,
- oil from J1(2-3-4) formation is of Bazhenov and Paleozoic origin.

Bazhenov formation is the most common source of organic matter for fields of West Siberia oil and gas bearing province (occurrence depth: ~2500 m), less often – Togura suite (occurrence depth: >3000 m) and Paleozoic deposits (deeper than Togura suite).

As a result of work performed in 2017-2018, 2 different types of oils were obtained that genetically refer to different oil source horizons (oil from J1 formation is younger than oil from J5 formation).

These represent two separate development targets in addition to reservoirs previously discovered in Paleozoic weathered crust and J15 formation.

Cretaceous deposits in well 4 are characterized by a background noncommercial saturation. A1 formation lies in Alymskaya suite of Cretaceous deposits. Gas presence in this horizon is of a background character for our area of Tomsk Oblast.

Appendix 2. Protocol of testing results №120.

OAO TomskNIPIneft
Laboratory of geochemistry and crude oil

Accreditation certificate No. ROSS RU.0001.512150
634027, Tomsk, pr. Mira, 70
Date of issue: 13 October 2015
Tel.: (3822) 611800 ext. 2190, fax (3822) 611880

PROTOCOL OF TESTING RESULTS No. 120
Date: 14.06.2018
Copy number: 1

Customer's name and address: OOO Bakcharneftegaz, 634021, Tomsk, pr. Frunze, 111

Test item:	Oil
Date of receipt of test item:	17.04.2018
Sampling date:	10.01.2018
Testing period:	18.04.2018 – 08.06.2018
Sample code:	P180192
Sampling location and zone	Yelley-Igaiskoye field, well 4, zone 9
Sampling conditions:	Formation J_5, perforation interval: 2764-2772 m

Parameter identified	Measuring unit	Regulatory document for testing method	Testing results	Precision, ±Δ	Comment
Density	kg/m^3	GOST 3900-85 i.1	781.3	1.1	at 20°C
Kinematic viscosity	mm^2/s	GOST 33-2000	2.106	0.036	at 20°C
Kinematic viscosity	mm^2/s	GOST 33-2000	1.326	0.023	at 50°C
Mass fraction of sulfur	%	GOST R 51947-2002	0.0762	0.0113	-
Mass fraction of paraffin	%	GOST 11851-85 (method A)	0.4	0.2	-
Mass fraction of water	%	GOST 2477-2014	1.0	0.1	-
Mass fraction of solids	%	GOST 6370-83	0.26	0.14	-
Fractional composition: - distillation yield	°C % vol.	GOST 2177-99 (method B)	Initial boiling point – 70.0 up to 100°C – 1.0 up to 150°C – 21.0 up to 200°C – 48.0 up to 250°C – 67.0 up to 300°C – 81.0		
Freezing temperature	°C	GOST 20287-91 (method B)	minus 21.0	6.0	-

/Head of the laboratory (stamp, signature) V.V. Samoilenko/Acting head of the laboratory: Veklich M.A.)

Appendix 3. Protocol of testing results №121.

OAO TomskNIPIneft
Laboratory of geochemistry and crude oil

Accreditation certificate No. ROSS RU.0001.512150
Date of issue: 13 October 2015
634027, Tomsk, pr. Mira, 70
Tel.: (3822) 611800 ext. 2190, fax (3822) 611880

PROTOCOL OF TESTING RESULTS No. 121
Date: 14.06.2018
Copy number: 1

Customer's name and address: OOO Bakcharneftegaz, 634021, Tomsk, pr. Frunze, 111

Test item: Oil
Date of receipt of test item: 17.04.2018
Sampling date: 25.01.2018
Testing period: 18.04.2018 – 08.06.2018
Sample code: P180193
Sampling location and zone: Yelley-Igaiskoye field, well 4, zone 10
Sampling conditions: Formation J1(2-3-4), perforation interval: 2661-2664 m, 2656-2659 m, 2641-2643 m

Parameter identified	Measuring unit	Regulatory document for testing method	Testing results	Precision, ±Δ	Comment
Density	kg/m^3	GOST 3900-85 i.1	826.1	1.1	at 20°C
Kinematic viscosity	mm^2/s	GOST 33-2000	4.640	0.079	at 20°C
Kinematic viscosity	mm^2/s	GOST 33-2000	2.472	0.042	at 50°C
Mass fraction of sulfur	%	GOST R 51947-2002	0.325	0.033	-
Mass fraction of paraffin	%	GOST 11851-85 (method A)	0.9	0.4	-
Mass fraction of solids	%	GOST 6370-83	3.30	0.14	-
Fractional composition: - distillation yield	°C % vol.	GOST 2177-99 (method B)	Initial boiling point – 63.0 up to 100°C – 2.0 up to 150°C – 11.0 up to 200°C – 25.0 up to 250°C – 43.0 up to 300°C – 64.0		
Freezing temperature	°C	GOST 20287-91 (method B)	minus 20.0	6.0	-

/Head of the laboratory (stamp, signature) V.V. Samoilenko/Acting head of the laboratory: Veklich M.A.)

The testing results are applicable only to the testing item that undergone tests.
The sample was taken by the Customer. The laboratory shall not be held liable for sampling.

Table 2. Results of testing objects in production casing of well 4 of Yelley-Igaiskaya prospect

Testing Object	Period	Suite	Forma-tion	Top, m	Bottom, m	Thickness, m	Result of work	Geological and geophysical characteristics
1	Paleozoic	Gerasimovskaya (Eifel)		3998,3	4002,6	4,3	Tested	According to the core (3995-4000 m, 70% recovered), the interval is represented by limestone of grey to brownish-grey colour, finely grained, tight, hard, fissured. The fissures vary in width from 1 to 10 mm in predominantly vertical and diagonal direction, cured with white calcite. According to logs – non-reservoir. Porosity according to AL 1.54-2.86%, porosity according to NL 0.6-2.3% . W/o shows of HC. Based on spectral radioactive logging, Ko based on pulsed NGL: far zone 17%, porosity - 2%.
2				3974,1	3978,2	4,1	Tested	Based on spectral radioactive logging, oil and gas saturated, Ko based on pulsed NGL: far zone 12%, porosity-2%. For lower part of the interval 3974.1-3978.2 m no core available. According to well logging, the object is characterized as follows: GRL=3γ, induced GRL=3,68 c.u., ΔT=165.5 μs/m. Based on spectral radioactive logging, oil and gas saturated, Ko based on pulsed NGL: far zone 22%, porosity-4%.
				3950,1	3970,0	19,9	Tested	According to the core, the interval (3950-3969 m) is represented by limestone of grey with brownish tinge, fissured, in the upper part of the interval there is a weak, quickly escaping odour of oil along the fissures. Based on logging data, the object is characterized as follows: GRL=5γ, induced GRL=3,92 c.u., ΔT=167 μs/m, apparent resistivity 17 ohm, SP anomaly up to 25 mV. According to spectral radioactive logging, Ko based on pulsed NGL: far zone 12%, porosity-2%.
3	Paleozoic	Gerasimovskaya (Eifel)		3912,0	3920,0	8	Tested	No core available. Core sampled above and below the interval are represented by limestones, fissured, the fissures are of different orientation, are cured with calcite, a quickly escaping odour of hydrocarbons is observed along the fissures. According to well logging – non-reservoir, high-resistivity rock, the diameter is close to nominal.
				3886,0	3900,0	14	Tested	The interval is cored (50% recovered), it is represented by limestones, fissured, at the beginning of the interval – with quickly escaping odour of hydrocarbons. According to well logging – non-reservoir, high-resistivity rock, has a fluted stem. The interval is correlated in a similar way with the interval 3914-3915 m of well 2 Yelley-Igaiskaya prospect (from which gas was obtained with possible oil admixture).
				3876,0	3878,0	2	Tested	According to well logging – non-reservoir; based on NGL, induced NGL – average oil and gas saturation factor -12 - 40%. Fluid content – weakly oil saturated, oil and gas saturated.
				3873,0	3875,0	2	Tested	According to well logging – non-reservoir; based on NGL, induced NGL – average oil and gas saturation factor -12 - 40%. Fluid content – weakly oil saturated, oil and gas saturated.
				3868,0	3870,0	2	Tested	According to well logging – non-reservoir; based on NGL, induced NGL – average oil and gas saturation factor -12 - 40%. Fluid content – weakly oil saturated, oil and gas saturated.
				3858,5	3862,3	3,8	Tested	According to well logging – non-reservoir; porosity based on AL 0,6-1,4%, porosity based on GRL 1,4-2.2% . W/o shows of HC. Based on spectral radioactive logging oil and gas saturated, Ko based on pulsed NGL: far zone 40%, porosity-3%.

Testing Object	Period	Suite	Forma-tion	Top, m	Bottom, m	Thickness, m	Result of work	Geological and geophysical characteristics
4				3830,0	3847,0	17	Tested	According to core (70% recovered) the interval is represented by limestones, horizontally fissured, along individual fissures a quickly escaping odor of HC is observed. According to well logging – possibly reservoir of porous-fractured type, porosity-1.5-3.2%.
				3810,0	3830,0	20	Tested	Core is not available. Below the bottom of the interval the core is represented by limestone of grey colour with a brownish tinge, fissured, along individual fissures a quickly escaping odour of HC is observed. According to well logging – possibly reservoir of porous-fractured type, porosity AL 1,7-3,4%, porosity NGL 3,2-4,6%. Within the interval 3813.0-3829.7 m based on spectral radioactive logging is oil and gas saturated, Ko based on pulsed NGL: far zone up to 62%, porosity-5%.
				3793,0	3804,0	11	Tested	According to core (up to 50% of recovery) is represented by limestones, finely-crystallitic, weakly fractured. According to log data, the limestone is of a porous-fractured-cavernous type. Porosity varies from 2.0 to 3.7%. The core has no shows of HC.
5				3768,0	3779,0	11	Tested	Core is not available. Porosity AL 3.2-4.8%, porosity NGL 0-2.7% . Based on spectral radioactive logging is oil and gas saturated, Ko based on pulsed NGL: far zone 36%, porosity-3%.
				3740,0	3764,0	24	Tested	Core is not available. According to well logging – reservoir of porous-fractured type, porosity NL 2.8-3.5%, porosity AL 3.5-4.3%. Above the top of the interval according to core a quickly escaping odour of HC is observed along the fissures.
				3715,0	3732,0	17	Tested	Based on the core is represented by recrystallized limestones (up to 30% of recovery), in the beginning of the interval there is a 15 cm fissured interlayer with a quickly escaping odour of HC. According to well logging – reservoir of porous-fractured type, porosity AL up to 6.6%, porosity NL- 1.4-4.7%.
	Paleozoic	Gerasimovskaya (Eifel)		3670,0	3682,0	12	Testing not performed due to upset tubing loss	Is partially represented by core – limestones, without shows of HC. The interval was chosen based of well logging – low readings on NGL at average natural radioactivity (GR).
				3620,0	3628,0	8		Is partially represented by core – limestones, without shows of HC. The interval was chosen based of well logging – low readings on NGL at average natural radioactivity (GR).
				3597,0	3604,0	7		Is partially represented by core – limestones, without shows of HC. The interval was chosen based of well logging – low readings on NGL at average natural radioactivity (GR).
				3536,0	3556,0	20		According to core, is represented by limestones fissured, the fissures are oriented in different directions, at the end of the interval there are brecciated limestones. No shows of HC. Porosity NL 0-15.6%, porosity AL 0-1.6%. Based on spectral radioactive logging is weakly oil saturated, Ko based on pulsed NGL: far zone 16%, porosity-5%.
				3520,0	3526,0	6		Core is not available. According to log data, a reservoir of a porous-fractured-cavernous type. Porosity AL 2.5-6.4%, in some areas – up to 15-25%, porosity NL 1.7-8.7%. Based on spectral radioactive logging is oil and gas saturated, Ko based on pulsed NGL: far zone 29%, porosity-10%.

Testing Object	Period	Suite	Forma-tion	Top, m	Bottom, m	Thickness, m	Result of work	Geological and geophysical characteristics
				3505,0	3520,0	15		Core is not available. According to log data, a reservoir of a porous-fractured-cavernous type. Porosity AL 2.5-6.4%, in some areas – up to 15-25%, porosity NL 1.7-8.7%. Based on spectral radioactive logging is weakly oil and gas saturated, Ko based on pulsed NGL: far zone 4%, porosity- 6%.
				3458,0	3475,0	17		According to core, limestone, grey, the fissures are filled with calcite (2% recovery). No shows of HC. According to log data, a reservoir of a fractured-porous type. In the interval 3457.8-3475.1 m based on spectral radioactive logging is oil and gas saturated, Ko based on pulsed NGL: far zone 10%, porosity- 7%.
	Paleozoic	Garesimovskaya		3398,0	3420,0	22	Tested by perforation of intervals 3028.0-3060.0 m; 3090.0-3093.0 m	According to core, limestone, grey, the fissures are filled with calcite (2% recovery). No shows of HC. According to log data, a reservoir of a cavernous-fractured type, porosity based on AL- up to 4.0%, based on NL- up to 3.1%.
6				3358,1	3373,2	15,1		According to well logging data, porosity AL 0.63-0.7%, porosity NL 0-2.2%. Based on spectral radioactive logging is oil and gas saturated, Ko based on pulsed NGL: far zone 23%, porosity 3%.
				3347,8	3352,6	4,8		According to well logging data, porosity AL 0.63-0.7%, porosity NL 0-2.2%. Based on spectral radioactive logging is oil and gas saturated, Ko based on pulsed NGL: far zone 5%, porosity 3%.
				3335,7	3342,9	7,2		According to well logging data, porosity AL 0.63-0.7%, porosity NL 0-2.2%. Based on spectral radioactive logging is oil and gas saturated, Ko based on pulsed NGL: far zone 8%, porosity 2%.
				3174,0	3192,0	18		According to core – limestone, grey, fissures are directed at an angle of 300, are filled with calcite (19% recovery). No shows of HC. According to well logging data, the reservoir is of a fractured-porous type, porosity is up to 2.7%.
				3067,0	3090,0	23		According to core – limestone, grey, fissures are filled with calcite, clay matter (28% recovery). No shows of HC. According to well logging data, is possibly a reservoir. In the interval 3064.0—3066.2 m, 3090.1-3092.7 m based on spectral radioactive logging the data is not clear, Ko based on pulsed NGL: far zone 62-55%, porosity- 20-15%.
		Luginetskaya		3046,0	3060,0	14		According to core – limestone, grey, fissures are oriented in different directions, are filled with calcite, clay matter with a greenish tinge (4,8% recovery). In the beginning of the interval, 0.1 m has a weak odour of HC. According to well logging data, non-reservoir.
				3033,0	3046,0	13		No core is available. According to well logging data, possibly a reservoir of a fractured-porous type, porosity 1.0-1.9%.
				3014,0	3030,0	16		According to core – limestone, light-grey, fissures are oriented in different directions, up to vertical, are filled with calcite, clay matter (recovery from 4.5 to 46,8%). No shows of HC. According to well logging data, the reservoir is of a fractured-porous type, porosity NL up to 5.2, AL – up to 3.3%.

Testing Object	Period	Suite	Forma-tion	Top, m	Bottom, m	Thickness, m	Result of work	Geological and geophysical characteristics
7	Paleozoic	Weathered Crust	Weathered crust	2998,0	3010,0	12	Tested, commercial inflow of HC obtained	According to core, limestone, light-grey, fissures are oriented in different directions, up to vertical, are filled with calcite, clay matter (2.5% recovery). No shows of HC within the interval 2998-3001.2 Porosity AL 3.8-12.2%, porosity NL 2.4-15.3%, the interval 3001.2-3010 m is represented with dolomitized limestone with the porosity of 1.4-1.8%. Due to penetration of a gas formation in the top of Paleozoic, testing of lower intervals represented a too high hazard due to unpredictable consequences so the DST was not used. The interval 2989.5—2998.8 m, based on spectral radioactive logging is oil and gas saturated, Ko based on pulsed NGL: far zone 35%, porosity - 13%.
8	Jurassic	Salatskaya	J15	2975,1	2986,8	11,7	Tested, commercial inflow of HC obtained	No core available. Based on spectral radioactive logging is oil and gas saturated, Ko based on pulsed NGL: far zone 27%, porosity - 23%.
9		Tymen	J5-6	2764,5	2772,0	7,5	Tested, commercial inflow of oil obtained	No core available. Based on the results of spectral radioactive logging is oil-and-water-saturated, oil saturation factor based on spectral NGL: near zone - 37-32%, middle zone - 40-45%, porosity - 15-14%.
10		Vasyugan	J1 (3-4)	2661,0	2664,0	8,0	Tested, commercial inflow of oil obtained	No core available. Based on the results of logging is a reservoir, porosity is 12-16%, resistivity of reservoirs is 5.5-6.1ohm. Based on logging data the interval is productive.
				2656,0	2659,0			
				2641,0	2643,0			
11	Cretaceous	Pokura	PK	1560,7	1567,4	6,7	Tested, background gas saturation obtained	No core available. Based on the results of spectral radioactive logging is oil-and-water-saturated, oil saturation factor based on spectral NGL: near zone - 36%, middle zone - 37%, oil saturation factor based on pulsed NGL: far zone - 34%, porosity - 26%.
			PK	1550,0	1559,1	9,1		No core available. Based on the results of spectral radioactive logging is oil-and-water-saturated, oil saturation factor based on spectral NGL: near zone - 30%, middle zone - 37%, oil saturation factor based on pulsed NGL: far zone -30%, porosity - 24%.

3. EVALUATION OF RESOURCES BASE

The resource base of Yelley-Igaiskiy license block was initially estimated by the affiliate of OOO "GeoPrime" contractor company – "Tomsk Geophysical Company".

In 2013 reprocessing and reinterpretation of seismic, geophysical materials of the past years were carried out, the report was drawn up. Based on the results of this work, estimation of prospective resources was made and passport for Yelley-Igaiskaya trap was prepared. The status of prospective resources at Yelley-Igaiskiy license block was estimated as follows: C_3 gas - 16.5 bn m^3 within the boundaries of the license block and 19.9 bn m^3 for the whole structure; resources/reserves of condensate - 2831/1775 thsd tons.

Table 3. Resources base of Yelley-Igaiskaya prospect evaluated by OOO "GeoPrime".

Gas calculation object	Area, F, M m^2	Net pay thickness Nnp, m	NTG, unit fraction	β, unit fraction	F, unit fraction	Pin mPa	Pfin mPa	α, unit fraction	ακ, unit fraction	Gas resources, Qg, MM m^3	
	For zone for the license block									For lic. block	For zones
I	900	89	0,21	0,79	0,78	41	0,12	1,1	1	470	470
Eifel bottom (D2ef)	900										
II	21800	65	0,21	0,79	0,78	38	0,12	1,1	1	6240	7640
Eifel middle (D2ef)	17800										
III	20800	60	0,21	0,79	0,78	35	0,12	1,1	1	4230	6200
Eifel roof (D2ef)	14200										
IV	21000	58	0,21	0,79	0,78	32	0,12	1,1	1	5530	5530
Roof of Paleozoic (D2zv + D3fr+w.cr.) OGCZH	21000										
Paleozoic										**16470**	**19840**

Specialists of OOO GeoPrime – Tomsk Geophysical Company identified four intervals of development of reservoirs within Yelley-Igaiskiy carbonate mass penetrated by wells 4 and

2. Yelley-Igaiskiy carbonate mass contains four particularly spatially complex oil and gas bearing objects.

Table 4. Oil and gas promising horizons of Paleozoic deposits in Yelley-Igaiskaya prospect.

<table>
<tr><td></td><td>Well 2</td><td>Well 4</td><td></td></tr>
<tr><td rowspan="2">Int. I</td><td colspan="2">Oil and gas bearing horizon of Eifel section bottom, Middle Devonian</td><td rowspan="6">Seismic facies of probable organogenic structure that were formed, correspondingly, in lower, middle, and upper parts of Eifelian stage section of Gerasimovskaya suite of Middle Devonian.</td></tr>
<tr><td>4068-4180м
(112 m thickness)</td><td></td></tr>
<tr><td rowspan="2">Int. II</td><td colspan="2">Oil and gas bearing horizon of the middle of Eifelian stage, Middle Devonian</td></tr>
<tr><td>3746-3918m
(172 m thickness)</td><td>3718-3865m
(146 m thickness)</td></tr>
<tr><td rowspan="2">Int. III</td><td colspan="2">Oil and gas bearing horizon of the roof of Eifel section, Middle Devonian</td></tr>
<tr><td>3530-3560m
(30 m thickness)</td><td>3400-3436m
(36 m thickness)</td></tr>
<tr><td rowspan="2">Int. IV</td><td colspan="2">Oil and gas bearing contact zone horizon (OGCZH)</td><td rowspan="2">The interval correlates with carbonates of pre-roof part of pre-Jurassic formations that correspond to Luginetskaya suite of Upper Devonian, as well as carbonates of mainly pre-roof part of Gerasimovskaya suite of Middle Devonian.</td></tr>
<tr><td>3024-3233m
(209 m thickness)</td><td>2998-3191m
(193 m thickness)</td></tr>
</table>

In 2013 OOO GeoPrime specialists predicted the presence of liquid hydrocarbons in the territory of Yelley-Igaiskiy license block in the form of condensate and oil mixture that was confirmed 100% during testing.

3.1. Testing within the boundaries of oil and gas prospective horizon I in well 4.

Oil and gas prospective horizon of Eifel section bottom, Middle Devonian (interval I) was not penetrated by well 4. However, in well 2 column a reservoir zone was identified in the lower part of Eifelian section of Gerasimovskaya suite within the interval of 4068-4180 m. Reservoir presence was confirmed by the results of testing of objects IV, V and V. Downhole flow of low mineralization water was received at dynamic fluid levels of 500-1108 m with the flowrate of 0.2-0.36 m3/day, in total, 30 litres of oil were produced from the interval of object VI.

Technical conditions did not allow to test deposits of oil and gas bearing horizon I in well 4 but presence of oil in deposits of this horizon was confirmed. Hydrocarbon resources within the boundaries of this horizon were estimated by OOO “GeoPrime” as **probable (P50)**.

3.2. Testing within the boundaries of oil and gas prospective horizon II in well 4.

Gas and oil saturation of this stratigraphic level was initially confirmed by the results of cased hole testing of well 2 and multiple shows of oil in core in well 4 column. This permeable zone has a sophisticated spatial structure and, apparently, vast areal extent reaching beyond the boundaries of the license block.

It should be noted that in well 4 column, oil shows in core are identified until the depth of 3960 m, i.e., 100 m lower than the assumed bottom of the lower stage.

During the testing, evidence of gas saturation was identified in well 4 but flow stimulation through acid treatment did not give any results.

It is not possible to draw conclusions on oil and gas presence of this horizon based on the results of testing due to massive near wellbore zone damage with heavy drilling muds. Objects within the limits of this horizon are recommended for hydrocarbon fracturing with filling the fractures with proppant. Hydrocarbon resources within the boundaries of this horizon were estimated by OOO "GeoPrime" as **possible (P10)**.

3.3. Testing within the boundaries of oil and gas prospective horizon III in well 4.

Oil and gas prospective horizon of the roof of Eifelian section of Middle Devonian was penetrated (permeable section) by well 2 in the interval of 3530-3560 m, well 4 – in the interval of 3400-3436 m. The horizon correlates with bioherm carbonate structures and has the average net pay thickness in columns of wells 2 and 4 of about 30 m. It is necessary to note that the section of this horizon is insufficiently studied by core and is not studied by well test (inflow test).

Summary: In well 4 this horizon was not tested due to twist-off of external upset tubing. Hydrocarbon resources within the limits of this horizon were estimated by OOO "GeoPrime" as **possible (P10)**.

3.4. Testing within the boundaries of oil and gas prospective horizon IV in well 4.

The roof of this level of oil and gas prospectiveness is related to the weathering crust, the bottom – quite conditionally – is assumed to be about 200 m lower. In well 2 column, the level of the bottom coincides with permeable horizon in the interval of 3212-3233 m, and in well 4 – with reservoir horizon in the interval of 3174-3191 m. Overall, the hydrocarbon reservoir in the upper oil and gas bearing stage is a complicatedly constructed 200-250 m thickness of disintegrated, predominantly carbonate rocks. In well 2 column, net pay thickness according to well logs equals 45 m, in well 4 – 71 m.

Formally, rock of this stage within the limits of the license block are distributed along the whole area of the license block but the most structurally uplifted (and thus the most structurally favourable) pre-Jurassic surface is confined to central part of North-East boundary of the license block.

During the testing of well 4, commercial inflow of hydrocarbons from Paleozoic weathering crust (14 m in thickness) was obtained. The flowrate of gas condensate and oil mixture made 114 M m3/day.

Based on the results of downhole logging, hydrocarbon saturation of two intervals (3028-3060 m, 3090-3093 m) in deposits underlying the weathering crust of core Paleozoic rocks with the total thickness of 35 m was confirmed.

In December 2014 – January 2015 overflow of technical water after perforation job and lowering the fluid level to 600 m through swabbing was obtained, the well started cleaning. Due to proximity to hazardous object (Paleozoic weathering crust), a decision was made to measure injectivity in the perforated interval in order to identify possibility of killing the well in case wellhead pressures increase to abnormally high levels (300-350 ATM).

As a result, an absorbing interval was identified (3040-3046 m) having particularly high flow properties. Injectivity of this interval based on the results of downhole logging made about 230 m3/day.

Commercial inflow of hydrocarbons was obtained.

Hydrocarbon resources within the boundaries of the license block were estimated by OOO GeoPrime as follows:

Interval of Paleozoic weathering crust deposits (14 m) - **proved (P90)**

Gas saturated intervals of 3028-3060 m, 3090-3093m (35 m) - **probable (P50)**

Absorbing interval of 3040-3046 m (6 m) – **possible (P10)**

3.5.Testing of Jurassic deposits in well 4.

During testing of well 4, commercial inflow of hydrocarbons from J15 layer (perforation interval of 2975-2987 m) was obtained. The flowrate of gas, condensate and oil mixture made 40.7 M m3/day.

Inflow of oil from deposits of J5 formation was obtained (perforation intervals of 2764.0 – 2772.0 m), J1 (perforation intervals of 2641-2643 m, 2656- 2659 m, 2661-2664 m).

Hydrocarbon resources within Jurassic deposits are evaluated as **proved (P90).**

FINDINGS BASED ON THE TESTING RESULTS

The hydrocarbon field found in the territory of Yelley-Igaiskaya prospect is complex, complicated, it contains 3 types of fluids. Well 4 from which commercial inflows of hydrocarbons were obtained is old, with serious complications (during the drilling there were kick-offs that were eliminated by pumping tons of cement into the formation). Under these circumstances, it was not possible to perform the necessary set of well surveys.

The main conclusion based on the results of works performed in well 4: the presence of three types of hydrocarbons was confirmed, commercial inflows were obtained, the well was flowing.

The work done makes it possible to estimate the resource base of Yelley-Igaiskiy license block in terms of liquid hydrocarbons. Estimation

Table 5. Yelley-Igaiskaya prospect resource base of liquid hydrocarbons based on the analysis including volumetric parameters (author evaluation).

Estimated object		Area of oil saturated rocks, MM m^2	Net pay thick-ness, m	Oil saturated rock volume, MM m^3	NTG, unit fraction	Oil saturation factor, unit fraction	$1/B_0$	Oil density, g/cm^3	STOIIP, MM tons	Oil recovery factor	Recoverable reserves of oil, MM tons
IV	Paleozoic weathering crust (**P90**)	21,000	11,0	231,000	0,15	0,85	0,664	0,875	17,112	0,2	3,422
IV	2 gas producing intervals (**P50**)	21,000	27,0	567,000	0,07	0,85	0,664	0,875	19,601	0,2	3,920
IV	Absorbing interval (**P10**)	21,000	4,0	84,000	0,15	0,85	0,664	0,875	6,223	0,2	1,245
Jurassic	J15 (**P90**)	7,200	9,0	86,400	0,15	0,73	0,664	0,875	6,306	0,2	0,861
	J5 (**P90**)	12,500	6,0	75,000	0,15	0,85	0,664	0,781	4,959	0,3	1,488
	J1 (**P90**)	12,500	2,0	25,000	0,15	0,85	0,664	0,826	1,748	0,3	0,524
I	**P50**	0,900	69,0	62,100	0,07	0,85	0,664	0,875	2,147	0,2	0,429
II	**P10**	17,800	50,0	890,000	0,07	0,85	0,664	0,875	30,767	0,2	6,153
III	**P10**	14,200	46,5	660,000	0,07	0,85	0,664	0,875	22,826	0,2	4,465

Estimation of resource base was performed using a volumetric method, estimated parameters were taken from the testing results, GeoPrime report and analogous fields situated within the same region.

6,296 million tons from the forecasted resource base account for P10 category, they are confirmed by the results of testing and can be recovered in the stated volume with a probability of 90%.

Table 6. Yelley-Igaiskaya prospect resource base of liquid hydrocarbons – findings based on the results of works performed (author evaluation).

Proved (**P90**) MM tons	Probable (**P50**) MM tons	Possible (**P10**) MM tons
3.422 (IV) + 0.861 (J15)+1.488 (J5) + 0,524 (J1)	0.429(I) + 3.920 (IV)	6.153 (II)+ 4.565 (III) + 1.245 (IV)
6.296	4.350	11.963
TOTAL (P90+P50+P10): 22.608 million tons		

With the current level of knowledge, the resource base of Yelley-Igaiskaya prospect is estimated to be 22.6 million tons of recoverable liquid hydrocarbons.