Form and Content of Reports on Work Performed

Works on search and production of oil and gas are very expensive. Any information about geological strata that can help reduce unnecessary expenses on well drilling is of great value. This is especially significant at low oil prices when one wants to optimize the costs on search, exploration and development of deposits.

Such requirements are met by the innovative technology of search and exploration of hydrocarbon deposits offered by "Institute of Geophysics and Problems of Earth".

The technology is based on a combination of physical effects, the basic one of which is nuclear magnetic resonance. In accordance with this our technology belongs to direct geophysical methods and directly detects minerals instead of a geological structure. This is a definite advantage, but of course a some kind of disadvantage in terms of data interpretation of colorful 3D seismography in conjunction with geological data.

Due to the fact that we use the patented technology of processing of analogue infrared satellite images, as well as the original patented method of work on location, our services cover almost any Customer requests - from survey of drilling point to map compilation of mineral constituents of a region. In this case the high work efficiency is important in this case, as well as the speed of their execution for different areas, relatively low cost and absolute environmental friendliness.

Research strategy is always the same – achievement of result with the highest efficiency and lowest cost for the Customer.

Work tactics depends on the survey area and scope of obtained data. We believe that the stage of prompt “Diagnostics” should be applied first for large territories. The fact of presence of hydrocarbons and evaluation data on its occurrence are determined at this stage quickly and with low financial costs.

In the absence of hydrocarbons in the given area, the need for further expenses does not arise, thus providing significant savings in time and financial resources.

If hydrocarbons are detected, then the **first** stage of works takes place on considerably reduced areas - a detailed remote sounding of identified deposits. At this stage data on deposit occurrence are refined and supplemented, and expected reserves are calculated at this stage of works. Optimal drilling points are detected if required.

At this stage the Customer can use either our technology or 3D seismic. If desired, both approaches can be used jointly.

Such integrating will provide the most accurate and complete information about the surveyed deposit.

In case if the Customer has a relatively small survey area (100 - 400 sq km), we suggest to conduct the **1st stage** of detailed remote works right away.

If necessary to refine the data on location and select the optimal drilling points taking into account the infrastructure it is possible to conduct an expedition on location (**2nd stage**)..

The simplest service is survey of an individual point or points planned for drilling. This survey is conducted either remotely or directly on location.

The volume of data provided by us as a result of the survey depends on the format of territory survey and is as follows.

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1. We provide the obtainment of the following data at the stage of prompt "Diagnostics" in order to detect hydrocarbon deposits in medium and large, poorly surveyed area (areas of thousands and tens of thousands square kilometers):

- ground contours of detected oil and gas fields and individual deposits marked on location map,
- number of horizons,
- approximate occurrence depths of horizons,
- approximate thickness of horizons.

The last three points are performed on one or several control points for each oilfield (deposit).

Examples of surveys in the format of "Diagnostics" of the territory are given in Appendix 1.

2. At the 1st stage of detailed remote survey of sites (hundreds of square kilometers), we provide the obtainment of the following information:

- ground contours of detected deposits on the site (or detected earlier during the stage of diagnostics ofthe territory);
- number of horizons,
- occurrence depths of horizons,
- effective thickness of horizons,
- type of reservoir rock (coarse-grained sandstone, fine-grained sandstone, gravelite, shale);
- presence of a gas cap,
- approximate thickness of gas cap,
- approximate gas pressure in gas cap,
- calculation of expected hydrocarbon reserves by volumetric method.

It is also possible to identify the type of oil (light or heavy sulfur oil, paraffin-oil or lightly paraffin-base oil). It is also possible to determine oil temperature and type of cap rock. These data require additional work.

Additionally, we can obtain transverse and longitudinal sections of deposits with the help of pointwise survey and recommend sites for conduction of exploratory drilling.

Moreover, we can determine the presence and depth of flow of formation fluids on site, as well whether these flows feed the detected deposits.

For shale gas and "coalmine" methane we define the source (deposit) of natural gas, which serves as its "parent."

Examples of survey in the form of survey of the territory are shown in Appendixes2 and 3.

3. Remote point survey for laying of a supposed borehole. We give the following data:

- presence or absence of the sought-for hydrocarbon at depths of up to 5 km,
- number of horizons, their thickness and occurrence depths if striking a deposit,
- recommendations for correction of the drilling point in the absence of the product in the survey point,

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- analysis of presence of flow of formation fluids in the immediate radius is possible.

We would like to emphasize that in order to conduct the works we do not require geological data on the survey territory since we work directly with the sought-for mineral and not with spatial anomalies in geological structures.

It is preferred to have a sample of oil from this region to record its characteristics. This will allow to speed up the work process. However, we can work in the absence of a priori information.

Reports are done in the form of:

- location maps with marked contours of the detected deposits,

- explanatory note with survey data, their analysis and recommendations. Reports are done

inthe English (Russian - if necessary) language.

Approximate content of the explanatory note:

Introduction

Chapter 1. Aim and purpose of work.

1.1. Aim of work.

1.2 Purpose of work.

Chapter 2. Short geological characteristic of search area.

Chapter 3.

Method of work execution on detection and contouring of oil and gas sites, definition of occurrences depths and horizons thickness.

3.1. Order of work execution.
3.2. Method of determination of land contours of oil and gas sites.
3.3. Method of measurement of occurrence depths of oil and gas strata.
3.4. Sequence of work execution.

Chapter 4. Work results.

4.1 Gas-bearing site.
4.2. Survey data.
4.3. Method of calculation of expected reserves of natural gas.
4.4. Calculation of expected reserves of natural gas.
4.5. Oil-bearing site.
4.6. Data of site survey.
4.7. Method of calculation of expected reserves of oil.
4.8. Method of calculation of expected reserves of oil.
5. Analysis of received data and recommendations.

Summary

References

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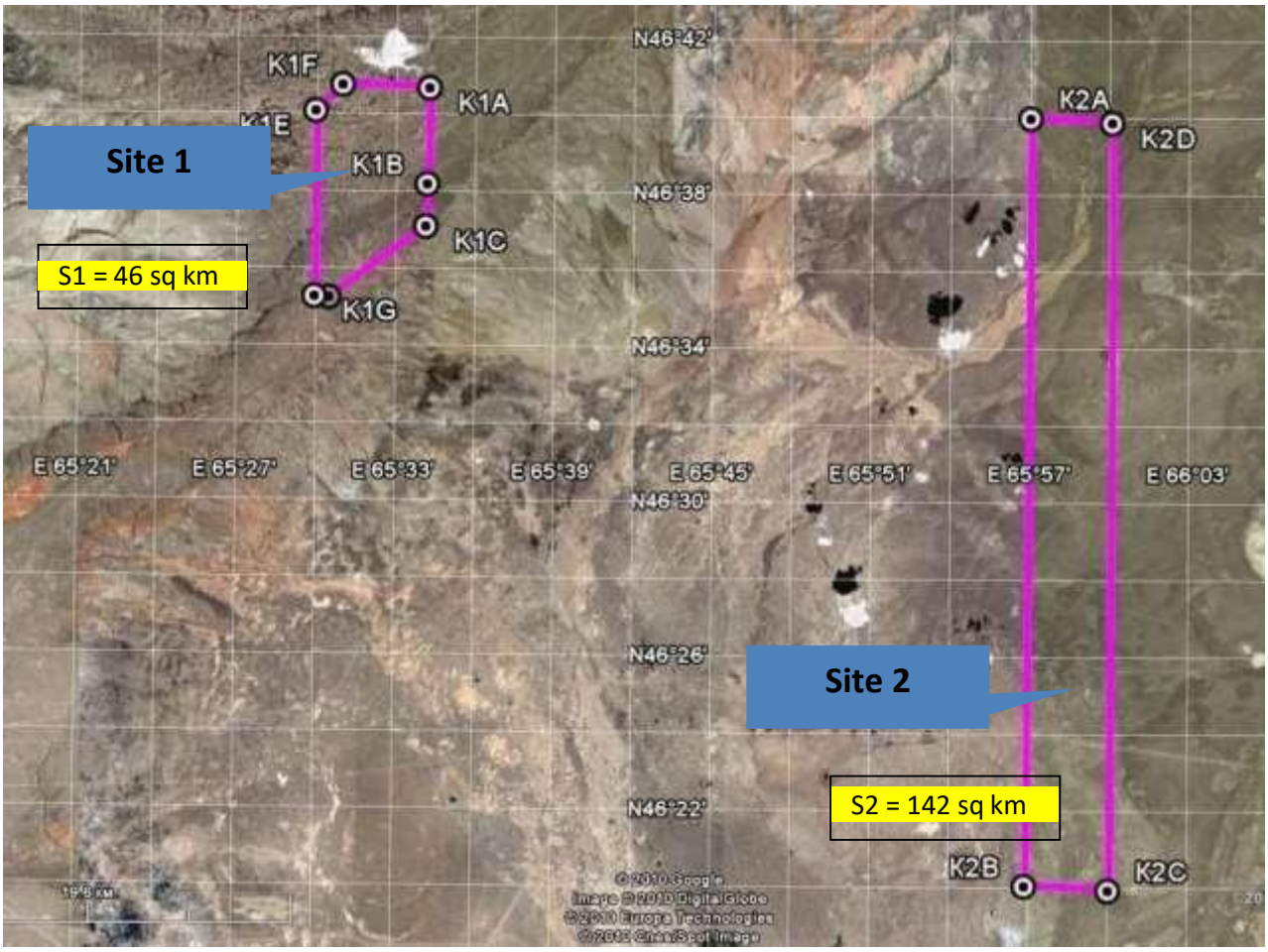
Appendix 1

1. Diagnostics of presence of oil fields in the area of 2000 sq km.



Some results of remote characterization of occurrence of oil and gas horizons inareas on sites № 1, 2

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Table 1

Name of points	Coordinates of measurement points	Occurrence depth of oil horizon, H (m)	Thickness of oil horizon, ΔH (m)
Site № 1 (upper part)			
p. 1.1. (western part)	N 46^0 39' 54" E 65^0 30' 18"	H_1=2500÷2800 m, oil H_2=3800÷4100 m, oil	300 m 300 m
p.1.2. (eastern part)	N 46^0 40' 30" E 65^0 33' 36"	H_1=2530÷2830 m, oil H_2=3830÷4130 m, oil	300 m 300 m
Site № 1 (lower part)			
p. 1.3. (south-west)	N 46^0 37' 12" E 65^0 30' 54"	H_1=2500÷2800 m; oil H_2=3800÷4100 m; oil	300 m 300 m
т. 1.4. (south-east)	N 46^0 37' 12" E 65^0 33'	H_1=2520÷2820 m; oil H_2=3820÷4120 m; oil	300 m 300 m
Site № 2 (East, upper part)			
p. 1 (northern part)	N 46^0 37' 48" E 65^0 58'	H_1=2530÷2830 m; oil H_2=3830÷4130 m; oil	300 m 300 m
p. 2 (middle part)	N 46^0 33' E 65^0 58'	H_1=2530÷2830 m; oil H_2=3830÷4130 m; oil	300 m 300 m
Site № 2 (East, lower part)			
p. 3 (middle part)	N 46^0 29' 24" E 65^0 58'	H_1=2530÷2830 m; oil H_2=3830÷4130 m; oil	300 m 300 m
p. 4 (southern part)	N 46^0 24' E 65^0 58'	H_1=2530÷2830 m; oil H_2=3830÷4130 m; oil	300 m 300 m

Short Summary

3.1. Site № 1

The site is located in the north-western part of block-I, site area for detailed survey is ~ 45.5 km2.The site may contain up to 2÷3 oil deposits (lenses).The number of oil-bearing horizons on site – two.

Occurrence depths:
1st horizon: H1=2500 ÷ 2800 m (horizon thickness Δh1 = 300 m),2nd horizon:
H2=3830 ÷ 4130 m (horizon thickness Δh2 = 300 m).

Useful total thickness of oil strata can be up to 200 m (100 m + 100 m).

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3.2. Site № 2

The site is located in the eastern part of block-I and extends from north to south in the form of a narrow band 4.8 km wide and 29 km long.

The site area for detailed survey is ~ 141,4 km2.
The northern part of the site contains accumulations of underground waters, occurrence depth of water horizon is 950 ÷ 1000 m (horizon thickness ~ 50 m).
Number of oil horizons - two, in the northern part – three.

Occurrence depths of oil horizons measured in 4 control points are:1st horizon ~
H1=2530 ÷ 2830 m (horizon thickness Δh1 = 300 m),

2nd horizon ~ H2=3830 ÷ 4130 m (horizon thickness Δh2 = 300 m),

However, 20 % of the territory of the northern part has complex extraction conditions due to presence of underground waters in a horizon at 950 ÷ 1000 m.

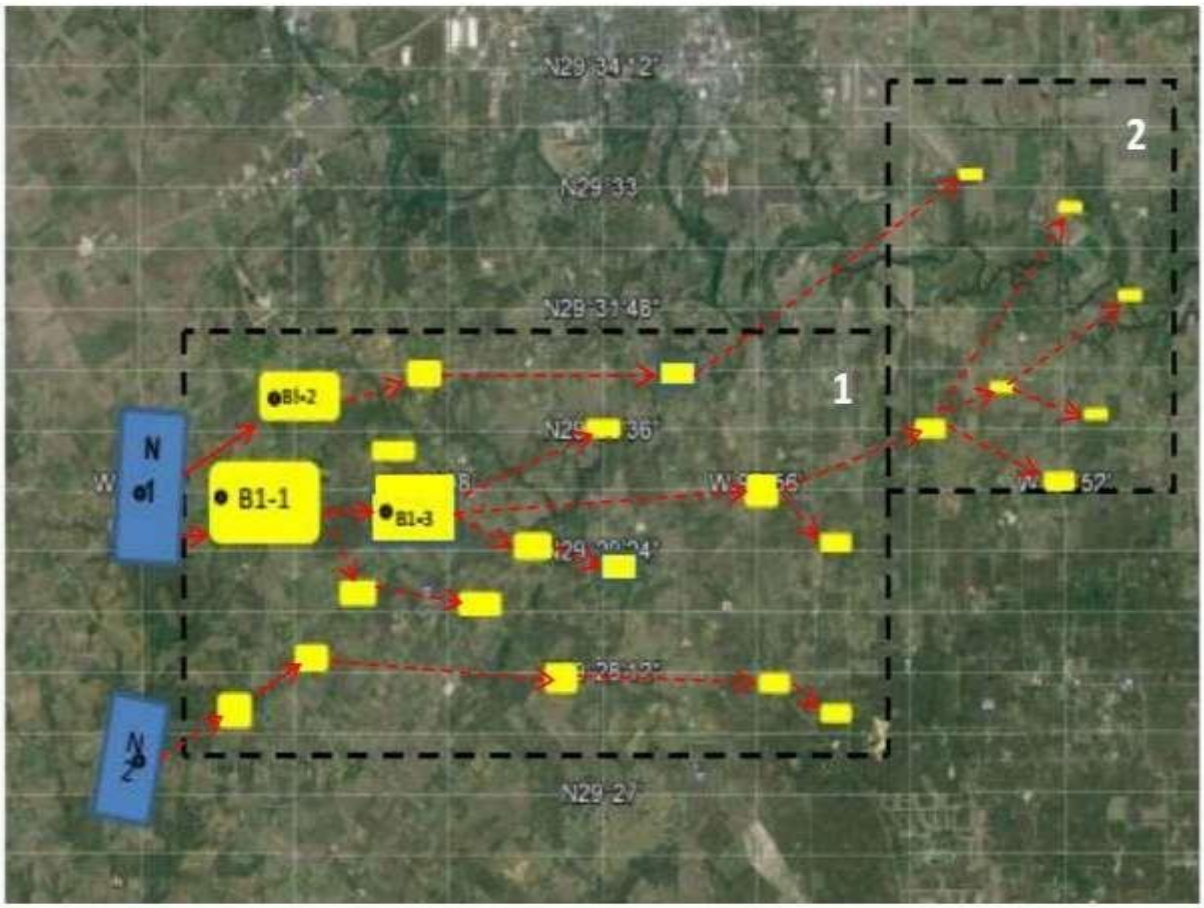
Third oil horizon is located only in the northern part of the site (constitutes 20% of site territory №2) and it has been detected with occurrence depth of horizon H=935 ÷ 443 m (oil with water), Δh = 17 m.

Moreover, in the northern part there is a gas anomaly. Occurrence depth of horizon of gas deposit is HG=2200 ÷ 2400 m, (ΔHG = 200 m). Gas is also possible at larger depths (> 3800 m).

Appendix 2

2. Detailed remote survey of two blocks with total area of 130 sq km, shale gas

Location map with marked contours of 25 detected sites of shale gas occurrence



Deposits of shale gas are shown in yellow. Two oil deposits are shown to the west of block 1 that have been detected and surveyed in the course of work.

Black dots show the offered drilling points (horizontal drilling for shale gas and vertical drilling for oil deposits).

<u>Some Points of Report Summary:</u>

1) Occurrence of shale rocks at depths ranging from 250 m to 2700 m has been detected inthe survey territory.

2) Accumulations of shale gas are present in the territory. The following has been found in total:

- in the territory of block № I – 18 gas-bearing areas;
- in the territory of block № 2 – 7 gas-bearing areas.

3) Areas of shale gas occur in six horizons with pressure of 50-60 atm within block

1. Occurrence depths of horizons range from 840 m to 2560 m (the report shows occurrence depths and thickness of all 6 horizons).

4) Areas of shale gas occur in five horizons with pressure of 30-50 atm within block 2. Occurrence depths of horizons range from 720 m to 2570 m.

5) The greatest concentration of shale gas is located in "pockets" of block №1 in site № B1-1÷B1-3, in areas of shale occurrence with maximum gas permeability (up to 6%) where there are fine-grained and medium-grained sandstones.

6) Underground gas migration was detected between areas of its concentration ("pockets"), which supposedly takes place through fractured zones in shale rocks. Lower gas-bearing horizons are connected through crack zones with gas "caps" of oil-bearing horizons N1 and N2, in which the gas pressure is ~ 300 kg / cm2.

ppendix 3

3. Detailed remote survey of a territory of 500 sq.km, natural gas
Fragment of a map for two out of the six detected deposits of natural gas

The explanatory note contains the coordinates of occurrence of deposits, occurrence data and calculated expected of each deposit.