

UDC 332.642

TYPES OF CORRECTIONS AND METHODS OF THEIR CALCULATION UNDER THE COMPARISON APPROACH TO EVALUATE HYDROCARBON FIELDS

E.D. Gosteva

*Department of Property Evaluation and Management,
Financial University under the Government of Russian Federation, Moscow, Russia
e-mail: fershal@gmail.com*

Abstract. *The methods of comparison approach applied in international practice are not used in net way in Russian conditions. However, there should be mentioned that in Russia under the comparison approach there is a modified method of comparable transactions – statistical estimation. It is aimed to analyze the results of previous auctions for further use of the results obtained for the objects estimated. The basis of statistical estimation is an assumption that market cost of the object estimated is directly related to the costs of comparable objects (hereinafter objects-analogues).*

Keywords: *valuation, estimation, evaluation, hydrocarbon deposit, field, oil, gas, comparison approach, corrections calculation, method of comparable transactions*

According to the definition provided in the Federal standards of appraisers' activity «Comparison approach is a complex of methods to evaluate the object estimated based on comparison of the object estimated with its analogues having the cost information. The analogue of the objected estimated is acknowledged to be an object similar to the objected estimated on the basis of the main economical, material, technical and other characteristics influencing its cost»¹.

There are three approaches where the comparison approach is based first of all on market information that is sales data, that's why if there is satisfactory market information it should be always applied for appraisal. In relation to appraisal goals and conditions the comparison approach may be applied as the main one as well as to prove the results obtained on the basis of income approach.

In international practice there are several methods under the comparison approach. And according to the analysis of standards and guidelines for valuation of mineral properties performed by Canadian Institute of mining, metallurgy and petroleum²

¹Federal standard of evaluation №1 «General definitions of evaluation, approaches to appraisal and requirements to evaluation process», signed by the Order of Ministry of economic development and trade of Russian Federation at 20.07.2007 №256 «About statement of Federal standard of valuation « General valuation definitions, approaches and requirements (FSV №1)», стр. 14

²CIMVAL STANDARDS AND GUIDELINES, FEBRUARY 2003

[1], under the comparison approach at rights evaluation of mineral properties development there are following methods applied to valuate hydrocarbon deposit:

– method of comparable transactions. It involves the analysis of performed transactions to sell rights for fields development comparable to the object estimated with further correction for the differences existing. As a rule it is applied to evaluate the fields at operational stage. In Russian conditions this method can hardly be applied because of the restrictions for development rights alienation, given in the Subsoil Law, art. 17.1 [2];

– method of option agreement terms. It involves the analysis of fields development rights transfer option agreements with further correction for differences in terms. As a rule it is applied at the initial stages of field development. In Russian conditions this methods cannot be applied because of the fields development rights transfer option agreements absence;

– method of net mineral value or value per unit. This method is formed on the assumption that the market cost of the field development rights is equal to net mineral in situ value. In other words, the field development rights cost is determined by multiplying resources and minerals extracted in situ for net value per unit of the mineral extracted. Net value per unit is determined as a mineral disposal cost excluding all expenses typical for this field (basin) as on appraisal date. It is applied as a rule for expert appraisal of fields at early stages as a support method as well as at the stage of field abandoning. The calculations of this method can be in significant error because of the specific calculation;

– method of value per unit area. It is similar to the method of industry ratios applied to valuate companies. It isn't applied in Russian practice for the reason of the absence of statistics necessary for calculations.

– Besides, there also the following methods:

– method of net in situ value. This method is based on the idea that current cost of resources is equal to market cost of all field. In other words, the volume of all resources is multiplied for the current cost of the resource. In Russian practice this method is not applied for the reason of significant differences in mineral resources deposits volume geological evaluation methodology, absence of statistics data, thereby no multiplier of oil and field cost, etc.

– method of gross in situ value. This method is similar to the mentioned above method of net in situ value but excludes some of its disadvantages. Under this method it is taken into account economic efficiency of mineral resources extraction, hydrocarbon in particular. In other words, under this method the calculations are based on the proved reserves, the number of which is multiplied for the cost of mineral resource as on date of appraisal. This method is supportive. It provides more precise result in comparison with previous method, but it requires more detailed analysis. Under this method it is also possible to take into account the peculiarities of each field including extraction

cost, but it leads to more complicated calculations that do not justify the final result. Thus, this method hasn't also got a wide application and is used for express-valuation or indicatively for analysis of results obtained under other methods and approaches.

Thus, none of the mentioned methods applied in international practice are not used in net way in Russian conditions. However, there should be mentioned that in Russia under the comparison approach there is a modified method of comparable transactions – statistical estimation. It is aimed to analyze the results of previous auctions for further use of the results obtained for the objects estimated. In other words, the cost of the object estimated is determined on the basis of one-time payments for the use of resources at already stated auction (tenders) results for the right to use the objects, chosen as analogues to the object estimated, after corrections made to these payments for the differences between the objects compared.

The basis of statistical estimation is an assumption that market cost of the object estimated is directly related to the costs of comparable objects (hereinafter objects-analogues).

This method includes the following stages:

1. To collect necessary information (fields put up for auction, volume of hydrocarbon, field location, etc.).

2. To make a list of similar licenses. The first stage is to determine maximum possible number of finally paid fields. The second stage is to make final list of the object-analogues. This list is formed by detailed analysis of the object-analogues and the object estimated similarity.

3. To calculate multipliers. To calculate all the costs made to buy object-analogues (final one-time payment, auction fee, license fee, geological information fee), to make all necessary corrections, both ones – up to date. Then the result obtained is divided for a number of proved, probable or possible reserves.

4. To calculate the fair market value by increasing multiplier for a number of proved, probable or possible reserves of the object-estimated.

In this article the 3rd stage – “Calculation of multipliers” is studied in terms of choosing corrections and their calculation.

In international appraisal practice to evaluate hydrocarbon fields there are following types of corrections:

- correction for financial conditions and/or transactions specific terms;
- correction for sale date;
- corrections, characterizing field location;
- corrections for field physical characteristics.

At the current moment in Russian conditions correction for financial conditions and/or transactions specific terms are not applied because of right transfer legal peculiarities to explore hydrocarbon fields.

Correction for sale date is the most popular one made by Russian appraisers. Moreover, it is the only one of all applied. The necessity to use it is infrequency of oil auctions. As a result there is a significant time gap caused by reasonable circumstances that does not let the appraiser have satisfactory up to date information. In relation to this there is a necessity to correct the value obtained on the basis of auction results as on appraisal date.

Correction for sale date is calculated by dividing the basis index characterizing market conditions as on appraisal date for the index characterizing market conditions as on sale date that is auction and/or tender date. The calculation formula is the following:

$$C_s = \frac{I_b}{I_a},$$

where C_s – correction for sale date;

I_b – index characterizing market conditions as on appraisal date;

I_a – index characterizing market conditions as on sale date that is auction and/or tender date.

There are several types of calculation indices characterizing market conditions as on this or that date. They are:

- on the basis of local market oil prices;
- on the basis of export oil prices;
- on the basis of world oil prices (e.g. Urals);
- on the basis of oil companies AK&M index;
- on the basis of other industrial indices.

The disadvantage of correction for sale date on the basis of local oil prices is MRT³ change that may lead to significant cost defect. The correction on the basis of export oil prices doesn't take into account either MRT or export tax changes. The correction on the basis of world oil prices doesn't reflect pricing in the Russian market. The correction on the basis of oil companies AK&M index as well as other industrial indices mostly characterize oil companies activity. The last two groups are calculated on the basis of VIOC⁴ capitalization that indirectly characterizes Russian market crude oil situation. Moreover, Russian companies indices take into account "blue chips" indicators and do not include non-VIOC that is medium and small extracting companies activity indicators. As for foreign companies indices it is difficult to speak about their reasonable use because of the difference between Russian and foreign accounting, tax and legal system.

Thus, all the corrections above do not indicate the current crude oil market in Russia. So in our opinion it is more correct to consider the correction for sale date on the basis of either MRT or net oil price changes.

³Mineral replacement tax

⁴Vertically Integrated Oil Company

MRT change calculation is based on the fact that it depends on the world oil prices according to current Russian law. Besides, due to current Russian law the starts one-time payment is based on MRT. It shows government income that is “seller” of hydrocarbon field. There should be mentioned that in the taken data analysis of auctions and tenders performed there has been found a correlation between hydrocarbon field rights cost and MRT where the best correlation was for MRT indicator per half year.

Alternative method of correction calculation for sale date may be calculation based net oil price.

Net oil price calculation (per month) is made by the following formula:

$$P_n = A \times \text{US dollar rate} - \text{MRT} - E \times \text{US dollar rate} ,$$

where P_n – net oil price;

A – average export crude oil price;

MRT – mineral replacement tax (according to Russian law);

E – export oil tax.

Net oil price characterizes the cost that the explorer gets after all main payments first of all MRT and export oil tax that is “buyer” of hydrocarbon field.

The analysis shows that the best correlation was between hydrocarbon field cost and net oil price indicators per half year

Thus, the more precise calculation is based on the MRT or net oil price indicator per half year.

Corrections characterizing field location.

Corrections characterizing field location may involve the following corrections:

- correction for hydrological conditions;
- correction for landscape conditions;
- correction for social and economic conditions;
- corrections for transport conditions;
- corrections for climate conditions.

This group of corrections must be determined on the basis of difference of transport expenses, oilfield construction, etc. However, such expenses calculations of object-analogues are hardly available. Therefore such corrections are rarely used in practice.

To avoid application of this corrections group it is necessary to choose object-analogues more thoroughly. If there is necessity to apply these corrections it is possible to use data developed to determine start one-time payment.

It is reasonable for it to study existing guidelines. First of all, this is officially stated «Methodic of minimum (start) one-time payment calculation for subsoil use»⁵ (hereinafter Guideline № 1). Besides, there are also the following guidelines⁶: Recom-

⁵Methodic of minimum (start) one-time payment calculation for subsoil use, stated by Order of Ministry for the Protection of the Environment and Natural Resources of the Russian Federation dated 30 September 2008 No. 232

⁶Monograph «Licensing as managing instrument of subsoil fund» by N.K. Nikitina, S.Y. Nikitin, Moscow, 2008.

mentations «For technical and economical evaluation initial (start) payments to prepare tenders and auctions for subsoil use (metal and non-metal resources)», developed by Federal state unitary enterprise of All-Russian Research Institute of Economy and Exploration of Mineral Resources in 2002 (hereinafter Guideline № 2); Guideline to determine start payment developed Federal state unitary enterprise of All-Russian Geological Research and Development Oil Institute (hereinafter Guideline № 3). The Guidelines № 1 and № 3 are based on similar background that let us determine two groups of approaches to calculate corrections. The first one is more aggregative than the second one. But the second one requires more detailed information.

The first group includes correction for infrastructure development characterizing geographical and economic conditions according to the following scale:

- the most favorable;
- favorable;
- satisfactory;
- non-satisfactory.

Fields of the most favorable geographical and economic conditions are characterized:

- remoteness from general use road (inc. railways, pipelines and other means of communication in case of their necessity to product transportation) and LEP (10 km);
- developed social infrastructure;
- labor power available;
- flat ground form with relative drops within 300 m;
- absence of territories which are the traditional place of inhabitation and economic activity and other territories that restricted by current law (e.g. military lands, specially protected territories, etc.) .

Fields of favorable geographical and economic conditions are characterized:

- remoteness from general use road and LEP – within 100 km (in case of their necessity to build railways and/or pipelines – within 50 km);
- lack of labor power available or underdeveloped social infrastructure;
- low-altitude or waterless regions;
- absence of territories which are the traditional place of inhabitation and economic activity and other territories that restricted by current law (e.g. military lands, specially protected territories, etc.).

Fields of satisfactory geographical and economic conditions are characterized:

- remoteness from general use road and LEP – over 100 km (in case of their necessity to build railways and/or pipelines – over 50 km);
- absence of labor power available or underdeveloped social infrastructure, or high-altitude, waterless, or northern and similar to such regions, or territories which are

the traditional place of inhabitation and economic activity and other territories that restricted by current law (e.g. military lands, specially protected territories, etc.).

Fields of non-satisfactory geographical and economic conditions are characterized:

- lack of roads;
- product delivery by off-road and aircraft, or by winter snow road;
- absence of general use road, pipelines and LEP within 100 km;
- medium and high-altitude;
- significantly developed river system and/or high number of bogs, territories which are the traditional place of inhabitation and economic activity and other territories that restricted by current law (e.g. military lands, specially protected territories, etc.).

In Table 1 there are correction rates provided.

Table 1. Correction for infrastructure development

Name	The most favorable	Favorable	Satisfactory	Non-satisfactory
The most favorable	0 %	-33 %	-50 %	-67 %
Favorable	50 %	0 %	-25 %	-50 %
Satisfactory	100 %	33 %	0 %	-33 %
Non-satisfactory	200 %	100 %	50 %	0 %

As it is seen from Table 1 above, the more there are differences between the object estimated and the object-analogue, the more significant the correction is, thereby the calculation defect. In relation to this, it is highly important to choose the closest analogues for appraisal. There should be mentioned that as a rule the fields located in one petroleum province, moreover in one region, do not have significant differences at «infrastructure development» category. Therefore the correction mentioned above can be used, for example, for express-appraisal of areas supposed to be explored or have just been started to explore. Moreover, in the regions developed there is enough number of auctions and/or tenders to refuse of using this correction.

The second group diversifies the corrections mentioned above that concerns more precisely differences of the rights to explore the object estimated and object-analogues. There should be mentioned that these groups of corrections should be applied separately and cannot be used in combination.

The first group should be used if there is either limited information or at aggregative calculation; the second – at more precise and detailed information.

The second group includes the following corrections:

- for hydrological conditions;
- for landscape conditions;
- for social and economic conditions;

- for transport conditions;
- for climate conditions.

Below in Table 2 there is classification of the second group corrections.

Table 2. Classification of the second group corrections

Name	Characteristics
Hydrological conditions	
Simple	The extraction is performed without special drain procedure, no need of special ground water clearing
Compound	Necessity of advance means to dry some field areas, water-disposal is performed without special clearing with use of well
The most compound	Fields of complicated factors: intensive geotectonic break, karst, close connectivity of surface and subterranean waters, necessity of special hydroengineering procedures, water salinity requires special clearing procedures
Landscape conditions	
Favorable	flat, flat-undulating and undulating land, relative drops – below 300 m
Non-favorable	Mountain landscape, relative drops over 300 m, medium and highly bogged
Social infrastructure conditions	
Favorable	Labor power available and developed social infrastructure
Non-favorable	Absence of labor power available or underdeveloped social infrastructure, or high-altitude, waterless, or northern and similar to such regions.
The most unfavorable	Combination of the following factors: absence of labor power available, underdeveloped social infrastructure, high-altitude, waterless, northern and similar to such regions
Social and economic conditions	
Favorable	Absence of territories which are the traditional place of inhabitation and economic activity
Non-favorable	Territories which are the traditional place of inhabitation and economic activity
Transport conditions (product delivery)	
Favorable	Within 100 km from general use road
Non-favorable	Over 100 km from general use road

Name	Characteristics
The most unfavorable	Absence of general use road, product delivery by off-road, by winter snow road
Transport conditions (product shipment)	
The most favorable	Close to railways, pipelines and other means of communication for product shipment.
Favorable	The necessity to build railways and/or pipelines (other means of communication) for product shipment – within 50 km
Non-favorable	The necessity to build railways and/or pipelines (other means of communication) for product shipment – over 50 km
Climate conditions	
Favorable	-
Non-favorable	Northern and similar to such regions

Below in Tables 3-9 there is classification and corrections ratio. This group of corrections is calculated on the basis of expert opinion and researches performed by Federal state unitary enterprise of All-Russian Research Institute of Economy and Exploration of Mineral Resources.

Table 3. Corrections for hydrological conditions

Name	Simple	Compound	The most compound
Simple	0 %	-7 %	-12 %
Compound	7 %	0 %	-5 %
The most compound	13 %	6 %	0 %

As it is seen from Table 3, the correction rate for hydrological conditions varies from 13 % to minus 12 %. There should be mentioned that there cannot be significant differences in hydrological conditions of the object-analogues and the object-estimated located in the same petroleum province. Thus, location in the same region may let us avoid using this correction.

Table 4. Correction for landscape conditions

Name	Favorable	Non-favorable
Favorable	0 %	-6 %
Non-favorable	7 %	0 %

Correction for landscape conditions refers to qualitative corrections and varies from 7 % to minus 6 %.

Table 5. Correction for social infrastructure

Name	Favorable	Non-favorable	The most unfavorable
Favorable	0 %	-7 %	-9 %
Non-favorable	8 %	0 %	-2 %
The most unfavorable	10 %	2 %	0 %

Correction for social infrastructure varies from 10 % to minus 9 % that corresponds to 20 percent points. This correction may depend on salary, unemployment level differences, etc. And it is applied only in cases when the object estimated and object-analogues are located in different regions.

Table 6. Corrections for social and economic conditions

Name	Favorable	Non-favorable
Favorable	0 %	-6 %
Non-favorable	7 %	0 %

Correction for social and economic conditions varies from 7 % to minus 6 % and is qualitative correction. Therefore it can be only made in expert way.

Table 7. Correction for transport conditions (product delivery)

Name	Favorable	Non-favorable	The most unfavorable
Favorable	0 %	-7 %	-9 %
Non-favorable	8 %	0 %	-2 %
The most unfavorable	10 %	2 %	0 %

Correction for transport conditions (product delivery) characterizes a possibility to deliver products, for example food, clothes, etc. for employees, as well as spare parts for equipment, etc., that is possibility to deliver related products easily. The correction ranges from 10 % to minus 9 %. This correction can be calculated by comparison of, for example, net value, product delivery cost, as well as distance and volume of one-time delivery.

Table 8. Correction for transport conditions (product shipment)

Name	Favorable	Non-favorable	The most unfavorable
Favorable	0 %	-5 %	-7 %
Non-favorable	6 %	0 %	-2 %
The most unfavorable	8 %	2 %	0 %

Correction for transport conditions (product shipment) characterizes a possibility to realize the hydrocarbon extracted quickly. The correction ranges from 8 % to minus 7 %. The value of this correction can be determined, for example, by comparison of pipeline construction cost as well as its length up to tie-in.

Table 9. Correction for climate conditions

Name	Favorable	Unfavorable
Favorable	0 %	-4 %
Unfavorable	4 %	0 %

Correction for climate conditions characterizes special climate everfrost conditions to develop and construct the object. This correction ranges from 4 % to minus 4 %.

Correction for physical characteristics of mine field

Corrections characterizing field physical characteristics include the following types of corrections:

- correction for geological content and features;
- correction for field size;
- correction for producing depth;
- correction for state of geological exploration;
- correction for geological complexity.

Since the hydrocarbon fields very often contains not only oil or gas but also a combination of these hydrocarbons, as well as condensate, there is a need of correction for geological content and features. The aim of this correction is to modify all these types in situ into united calculation base. For example, for oil-gas condensate field it is necessary to find satisfactory number of object-analogues for each type of hydrocarbon that is to find three groups of object-analogues that contain separately oil, gas and condensate, then to determine net value exactly for oil, gas and condensate, and after that to calculate the cost of the object estimated by increasing multiplied the cost of oil, gas and condensate for corresponding field size. Unfortunately, in practice such an approach is hardly realized. In relation to this there is a need to modify the indicators into one ref-

erence standard (unit of measurement). For hydrocarbon fields it may be reference fuel, oil equivalent in particular.

Reference fuel is accepted unit for calculations used to compare heat value of different organic fuel types. In USSR and Russia for reference fuel (r.f.) unit was heating capacity of 1 kg coal = 29.3 MJ or 7000 kkal. International energy agency (IEA) has accepted for unit of measurement – oil equivalent that usually called TOE (Tonne of oil equivalent). One tonne of oil equivalent is equal to 41.868 GJ or 11.63 MWh.⁷ There is also a unit – barrel of oil equivalent (BOE): 1 toe = 7.11, 7.33 or 7.4 boe. There should be mentioned that 1 toe = 1 oil tonne = 1 condensate tonne = 1.17 gas cub.m.

The next key correction is the correction for field size. From the point of classical theory, the correction for size is explained by the marginal utility theory. However, the result analysis of the auctions and tenders performed from 2006 to 2010 has shown that there is no correlation between oil equivalent cost and field size in neither any petroleum province, nor region. In relation to this, to use this correction in calculations is not reasonable.

However, the analysis mentioned above has figured out that there are different segments, and accordingly there are different potential owners of right for field development. Therefore there should be the following market segments marked as rights realization to develop:

- small deposit;
- medium size deposit;
- large-scale deposit.

Except the number of potential owners, these segments also differ in development conditions from economic and technical aspects. For example, annual average capacity is determined in percentage from mineral resource volume by the following formula:

- 3.5 % multiplied for the oil reserve of hydrocarbon field (for field with the oil reserve over 30 mln.t);
- 5 % multiplied for the oil reserve of hydrocarbon field (for field with the oil reserve from 3 to 30 mln.t);
- 6.5 % multiplied for the oil reserve of hydrocarbon field (for field with the oil reserve within 3);

Also there are segments for infrastructure construction, mining expenses, ect.

Thus, it is important to differentiate these segments to choose the object-analogues and do not apply analogues of other segments. However, the analysis shows that it is impossible to make single-valued conclusion of correlation between multiplier and hydrocarbon field size. So to apply the correction for field size is not reasonably sufficient.

⁷<http://www.aps.org/policy/reports/popa-reports/energy/units.cfm>

Another significant characteristic is producing depth. The correction for producing depth can be calculated by the formula provided to calculate start one-time payment, that adapted looks the following way:

$$C_d = \left(\frac{16000 - D_o}{16000 - D_a} - 1 \right) \times 100 \%,$$

where C_d – correction for producing depth, %;

D_o – producing depth of the object estimated, m;

D_a – producing depth of the object-analogue, m.

The appraisal practice shows that there are proved, probable and possible reserves of hydrocarbon field. Therefore there is a necessity of the correction for state of geological exploration. If there is no satisfactory information of auctions results for separate valuation, the correction for state of geological exploration can be calculated by the following formula:

$$ABC_1 = A + B + C_1 + 0,5 \times C_2 + \frac{1}{(1+E)^{t_1}} \times (0,25 \times C_3 + 0,15 \times D_{1n}) + \\ + \frac{1}{(1+E)^{t_2}} \times 0,1(D_1 + D_2),$$

where $\frac{1}{(1+E)^{t_1}}$ – index, characterizing period of geological exploration works necessary to prove and transfer reserves from the lower to higher categories (t_1 is 5 years; t_2 is 10 years);

E – the time value of money index equal to the refinance rate of the Central Bank of the Russian Federation as on date of one-time payment value determination;

$A, B, C_1, C_2, C_3, D_{1n}, D_1, D_2$ – volume of reserves of according category.

Since development conditions of each field are unique in each case, there is the correction for geological complexity. To calculate it, it is necessary to compare the drilling cost per meter of the object estimated with the same of object-analogues. The disadvantage of this calculation is that information of such kind is confidential. Usually appraiser has an access to the information of the object estimated. Therefore the territorial principle of choosing the object-analogue is of great importance. In case the correction for geological complexity is necessary it can be calculated by expert opinion based on scale provided in Table 10.

Table 10. Correction for geological complexity

Name	Simple	Compound	The most compound
Simple	17 %	10 %	0 %
Compound	7 %	0 %	-9 %
The most compound	0 %	-6 %	-15 %

In this article there were studied types and methods of corrections calculation to valuate rights for hydrocarbon fields development. There should be mentioned that the corrections are mostly of expert character. It is explained first of all by information protection characterizing such key indicators as drilling costs, product transportation, pipeline construction, etc. All these make the corrections calculation impossible on the basis of officially published information concerning these indicators. In spite of the fact that the corrections are of expert character, they can be calculated on the basis of empirical evidence with the use of stated methodologies of related industries that makes calculations more precise. The choice of the closest object-analogues to the object estimated is of no less important in the comparison approach. This is a key aspect since minimizing of the corrections applied gives more precise and adequate result. However, if this or that correction is impossible to avoid, the use of criteria and ranges of the corrections listed above increases the calculation accuracy at their right use.

References

1. CIMVAL STANDARDS AND GUIDELINES, FEBRUARY 2003.
2. The Russian Federation Law on Subsoil, dated 21.02.1992 No. 2395-1.
3. Uniform appraisal standards for Federal Land Acquisitions, published by the Appraisal Institute in cooperation with the U.S. Department of Justice, Washington, D.C. 2000.
4. Valuing Oil & Gas Properties as (if they were) Closely Held Corporations, Richard J Miller, ASA, Orlando, FL, 2002.
5. International Energy Agency (IEA), <http://www.iea.org/>.
6. James Bush and Daniel Johnston, International Oil Company Financial Management in Nontechnical Language, PennWell, Tulsa, Oklahoma, 1998. 327 p.
7. Federal law "Concerning valuation activities in the Russian Federation", dated 29.07.1998 No. 135-FZ (as revised in 07.05.2009).
8. Federal standard of valuation №1 "General valuation definitions, approaches and requirements", stated by Order of Ministry of economic development and trade of the Russian Federation dated 20.07.2007 №256 "About statement of Federal standard of valuation "General valuation definitions, approaches and requirements (FSV №1)".
9. Federal standard of valuation №2 "Aim of appraisal and cost types", stated by Order of Ministry of economic development and trade of the Russian Federation dated 20.07.2007 №255 "About statement of Federal standard of valuation «Aim of appraisal and cost types (FSV №2)".
10. Federal standard of valuation №3 "Requirements for valuation report", stated by Order of Ministry of economic development and trade of the Russian Federation dated 20.07.2007 №254 "About statement of Federal standard of valuation «Requirements for valuation report (FSV №3)".

11. Methodic of minimum (start) one-time payment calculation for subsoil use, Stated by the Order of Ministry for the Protection of the Environment and Natural Resources of the Russian Federation dated by 30 September 2008. No. 232

12. Nikitina N.K., Nikitin S.E. Licenzirovanie kak instrument upravlenija fondom nedr. Moskva (Licensing as a tool for managing fund of mineral resources). Moscow, 2008. 216 p.