ISSN : 2350-0743

www.ijramr.com

International Journal of Recent Advances in Multidisciplinary Research

Vol. 09, Issue 10, pp.8083-8090, October, 2022

RESEARCH ARTICLE

ANALYSIS OF TECHNOLOGICAL MODES OF OPERATION AND JUSTIFICATION OF THE METHODOLOGY FOR FORECASTING DEVELOPMENT FOR GAS CONDENSATE FIELDS

***Deryaev Annaguly Rejepovich**

Candidate of Technical Sciences, Senior Researcher, Scientific Research Institute of Natural Gas of the State Concern, Turkmengas", Ashgabat, Turkmenistan

ARTICLE INFO

Article History:

Received 28th July, 2022
Received in revised form
29th August, 2022
Accepted 17th September, 2022
Published online 30th October, 2022

Keywords:

Condensate, Gas, Water, Isotherms, Fitting, Bottom-Hole , Depression, Measurement Echometry, Dynamometry.

ABSTRACT

The article analyzes in detail the issues of the technological mode of operation of wells of the Altyguyi gas condensate field. Increasing the technological regime, as well as providing conditions for better extraction of fluids (condensate and water) from the bottom of wells, as a result, will increase the economic indicators of development as a whole, which should correspond to the concept of reducing the duration of field development. The analysis of the current technical mode of operation of gas condensate wells of the Altyguyi field was carried out using the gas-hydrodynamic mode of operation of wells, as well as calculated indicators characterizing the process of retrograde condensation occurring both in the well and in the bottom (depression) zone of the formation. And also, discusses the design of gas condensate wells, as well as views on measures to ensure the required operating modes of wells. The established technological regime of wells should be understood as a set of the main parameters of its operation, ensuring the receipt of oil, liquid and gas samples provided for in the technological design document for this period and compliance with operating reliability conditions. The technological mode of wells provides regulation of the development process and is characterized by the following main parameters:

a) formation, bottom-hole and wellhead pressures;
b) fluid flow rate, water content and gas factor;
c) the standard sizes of the installed operational equipment and its operating modes (elevator design, suspension depth and pump diameter, performance, number of swings, stroke length, developed pressure, etc.). When drawing up technological design documents for industrial development, the choice of design development options for comparison is made taking into account the features of the geological structure, reservoir and filtration characteristics of productive formations, the need to create conditions for maximum possible coverage of their impact and effective drainage, physico-chemical properties of saturating fluids, experience in the development of deposits with similar conditions, economic and geophysical features of the area, requirements for the protection of mineral resources and the environment. In all project documents, one of the considered development options is highlighted as a basic option. As a rule, it is an approved development option according to the latest project document, taking into account changes in the size of oil reserves. For large fields with wide water-oil and sub-gas zones containing significant oil reserves, design development options are considered with the allocation of these zones into independent development facilities. At the same time, design solutions for the systems of development, technology and techniques for the operation of wells in the oil, water and oil and gas parts of the fields should be interconnected.

INTRODUCTION

For each commercially significant oil field (deposit), according to the data of exploratory drilling, geological, geophysical and laboratory studies, tests and studies of wells in the exploration process, it should be established:

- Lithological and stratigraphic section, the position of oil and gas saturated productive layers and impenetrable sections in this section, the main patterns in the lithological variability of productive horizons of the field by area and by section;
- Hypsometric position of gas-oil-water contacts in different parts of deposits, shape and size of deposits;
- total, effective and oil and gas saturated thickness of productive formations, their changes within the oil-bearing contours;
- type, mineral and granulometric composition, porosity, fracturing (cavernosity), permeability, carbonate and clay content of rocks of productive formations;
- characteristics of tire rocks (material composition, porosity, permeability, etc.);
- initial values of oil and gas saturation of reservoir rocks, the nature of their changes in the area and section of productive formations;

Corresponding author:** ***Deryaev Annaguly Rejepovich
Candidate of Technical Sciences, Senior Researcher, Scientific Research Institute of Natural Gas of the State Concern „Turkmengas", Ashgabat, Turkmenistan.

- Values of initial reservoir pressures and temperatures of all productive formations;
- Hydrogeological conditions and regimes of deposits, geocryological conditions of the deposit and adjacent areas (during exploration in permafrost distribution areas);
- Physico-chemical properties of reservoir oil according to contact and differential degassing data to standard conditions (oil saturation pressure, gas content, density, viscosity, volume coefficient and compressibility in reservoir conditions, shrinkage coefficient);
- Physico-chemical properties of oil decomposed to standard conditions (density, kinematic viscosity, molecular weight, boiling and solidification temperatures, oil saturation temperature with paraffin, percentage of paraffins, asphaltenes, selikagel resins, sulfur, fractional and component compositions);
- Physico-chemical properties of the gas under standard conditions (component composition, air density, compressibility);
- Physico-chemical properties of condensate (shrinkage of raw condensate, amount of degassing gas, density, molecular weight, beginning and end of boiling of stable condensate, component and fractional compositions, content of paraffins, sulfur, resins);
- Physical and chemical properties of reservoir waters (density, viscosity, ionic composition, etc.);
- Oil, gas and water flow rates depending on bottom-hole pressures, well productivity coefficients;
- Wettability (hydrophilicity, hydrophobicity) of reservoir rocks of productive formations, values of saturation with bound water, residual oil saturation when oil is displaced by water and gas, corresponding values of relative phase permeability for oil, gas and water;
- Dependences of relative phase permeability and capillary pressure on the water saturation of reservoir rocks of productive formations;
- Average values of the coefficients of thermal conductivity, specific thermal resistance, specific heat capacity of rocks and their saturating liquids;

Due to the complex mining and geological conditions, the importance of selecting more suitable technological modes of operation of gas condensate wells is increasing. Therefore, the technological modes of operation are chosen in accordance with the requirements of increasing gas, taking into account the need to comply with the conditions for preventing the disturbance of formation rocks (1). Increasing the technological regime, as well as providing conditions for better extraction of fluids (condensate and water) from the bottom of wells, as a result, will increase the economic indicators of development as a whole, this should correspond to the concept of reducing the duration of field development. The analysis of the operating technical modes of operation of gas condensate wells of the Altyguyi deposit was carried out using gas-hydrodynamic modes of operation of wells, as well as calculated indicators characterizing the process of retrograde condensation occurring both in the well and in the bottom-hole (depression) zone of the formation (2).

Table introduces the calculated indicators used for the main results of the well operation mode:

- The difference between the wellhead and inter-tube pressures, which characterizes the pressure loss in the tubing string due to the movement of the gas-liquid mixture in the well elevator;
- The specific yield of stable condensate according to the information of measurements in gaz collection plant (GCP), (g/m^3);
- Bottom-hole pressure in the well, calculated as the value of the inter-tube pressure of the well operation (kgf/cm^2);
- Pressure drop in the reservoir condensation zone calculated as the difference between the initial condensation pressure and the bottom-hole pressure in the well.
- Based on the analysis of the performance indicators shown in the table, the following conclusions are made:
- The current operation of wells is carried out under the conditions of a constant flow rate (constant depression) regime, selected on the condition that the formation rocks corresponding to the operation of wells that do not violate the formation rocks (there is actually no release of mechanical mixtures) at 8-12 mm with a fitting and a buffer pressure of 140-165 kgs/cm^2.
- Also, the pressure drop during condensation in the formation has a significant value (258-278 kgf /cm^2), that is, from 68 to 63 g/m^3 of condensate condenses in the formation, which indicates a significant influence of the formation on the state of the face boundary. In the case of sufficiently significant reservoir development, this situation leads to the possibility of saturation of the porous space (limit) of the reservoir with condensate near the well column (3).
- The value of the average pressure at the bottom of the gas condensate well and the reservoir gas condensation isotherm (Figure 1) is estimated by the content of 35 g/m^3 of condensate in the reservoir gas entering the bottom of the well.

The potential condensate composition of the extracted gas entering the bottom of the well corresponds to the condensation isotherm of the average pressure in the wellbore, in contrast to the potential amount of condensate in the reservoir gas corresponding to the initial condensation pressure. Its such a paired state is understood by the specific quantity. According to the figure, it is at $P_{av.b.-h.}$ = 214kgs / cm^2 is equal to 32d/pm^3. The actual amount of condensate, determined by the actual results of measurements on the GCP, increases the potential content of condensate in the gas entering the bottom of the well (in the form of steam). This confirms the output of condensate from the bottom into the borehole, in liquid form, due to saturation with condensate in the steam space. The amount of condensate taken into account in the GCP is the total amount of condensate coming from the reservoir in liquid form separating from the gas in the case of retrograde condensation in the gas flow through the well elevator (with a decrease in temperature pressure), as well as in the case of a throttle with a decrease in pressure in the well elevator and the mode fitting.

Technological mode of operation of gas condensate wells at the Altyguyi field

Indicators	Well numbers				
	1	2	5	20	101
Depth (m)	3727	3660	3735	4060	3660
Well bottom (m)	3695	3540	3711	3963	3660
Horizon	NK-8	NK -7d	NK -7d	NK -8	NK -8
Type of operation method	fountain	fountain	fountain	fountain	fountain
Filter (m)	3616-3625	3512-3522	3618-3624	3950-3958	3564-3566
Operational column (mm)	140	140x168	140	140x168	140
Oil-well tubing (mm)	73 mm 3602 m	73 mm 3488 m	73 mm 3591 m	73 mm 3922 m	73 mm 3583 m
Fitting diameter (mm)	12	12	12	8	12
Wellhead pressure (kgf/cm^2)	152	160	160	165	145
Inter-column pressure (kgf/cm^2)	185	175	180	182	165
Bottom-hole pressure (kgf/cm^2)	222	212	217	219	202
Pressure loss in the elevator (kgf/cm^2)	33	37	37	37	37
Pressure difference of $P_{int.-col.}$-$P_{b-h.}$ (kgf/cm^2)	258	268	263	261	278
Q_{gas} (m^3/day)	260	285	300	135	315
$Q_{condensate}$ (m^3/day)	21	14	12	4	20
Q_{water} (m^3/day)	0,5	0	0	8	0
Specific condensate output $q=Q_g/Q_c$	80	49	40	29,6	63,5
Reduced gas velocity at the end of the elevator P initial (m/sec)	4,28	5	5,08	2,22	5,84

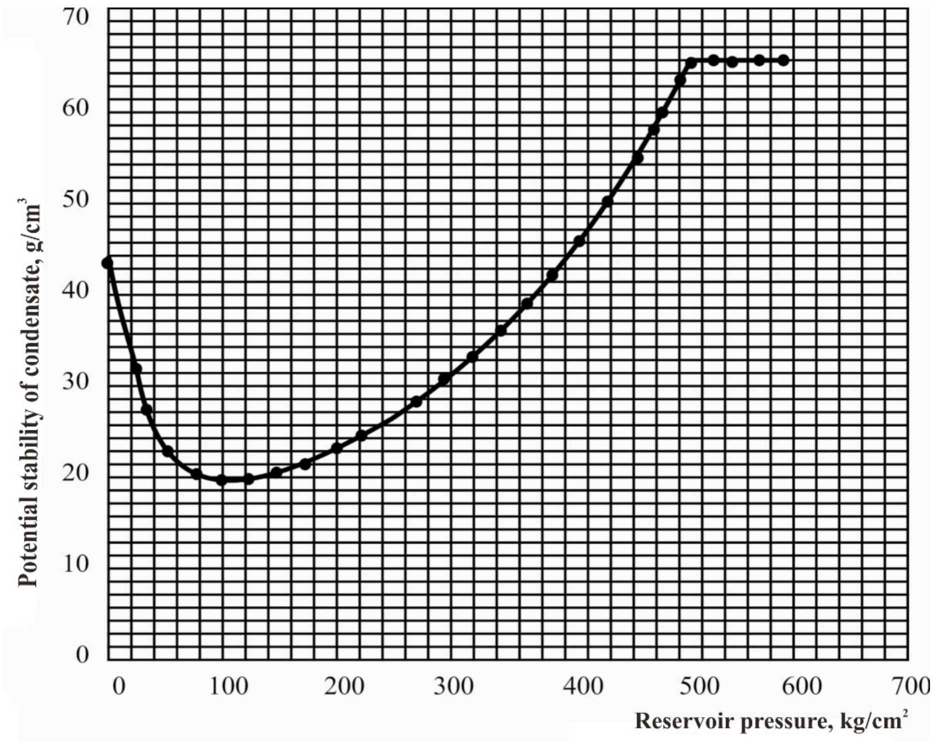

Figure 1. Isotherm of differential condensation of the gas condensate system of well № 1 (II) on the Altyguy field

In the pilot mode of production operation in the well elevator shows the average gas temperature: $T_{b.-h.}$ = 90 °C; T_p = 40 °C. With a significant drop in pressure in the regime fitting of the well (at a plume pressure of 90-110kgs/cm^2), with a significant drop in temperature (up to 15 °C), a throttling effect occurs, which requires protection of the upper equipment and the plume from hydrate formation, since a special equipped device for supplying methanol to the system tank for it is considered (4). Also, the bottom-hole pressure in the operated wells varies within 250-300 atm, that is, under existing conditions (pressure, temperature) and with a working gas flow rate of an active liquid outlet from the bottom without problems inside the elevator up to 6 m/s, accelerates the gas flow rate in the elevator shoe. In order to obtain additional data for drawing up a development project, continuous core sampling is carried out during the drilling of individual production wells in the intervals of occurrence of productive layers. The number of such wells is determined by the technological scheme and should be at least 10% of the project fund. Core sampling work must necessarily be provided for in the design and estimate documentation for the construction of wells. The selection of production (producing) wells in which core should be selected during drilling is made by the organization-author of the technological scheme (project) together with the geological service of oil and gas producing enterprises.

The designs of production (producing) wells should provide:

- The possibility of implementing the projected methods and modes of well operation, the creation of maximum depression and repression on the reservoir predicted for all stages of development;
- The possibility of simultaneous-separate oil production from several operational facilities in one well (in the case when it is provided for by project documents);
- Regulatory conditions for the production of repair and research work in wells;
- The use of technological equipment of casing columns, which allows for high-quality cementing;
- Compliance with the requirements of environmental protection.

The design of the casing string should allow the installation of shut-off valves, packers and other devices. The use of open-face well designs should be specifically justified in the design document for development and in well construction projects. The designs of wells intended for operation by the gas lift method must meet the requirements for the designs of gas wells. The design of injection wells for the injection of hot water, steam and gas must be justified in the design document for the development and in the projects for the construction of wells. The established technological regime of wells should be understood as a set of the main parameters of its operation, ensuring the receipt of oil, liquid and gas samples provided for by the technological design document for this period and compliance with the operating reliability condition. The technological mode of wells provides regulation of the development process and is characterized by the following main parameters:

- Formation, bottom-hole and wellhead pressures;
- Flow rate of liquid, water cut and gas factor;
- The standard sizes of the installed operational equipment and its operating modes (elevator design, suspension depth and pump diameter, performance, number of swings, stroke length, developed pressure, etc.).

The technological modes of operation of wells are compiled by oil production workshops, based on the approved standards for the selection of oil, liquid and gas, and are approved by the chief geologists and chief engineer of the oil and gas producing enterprise. Simultaneously with the technological regimes, a plan of geological and technical measures to ensure the standards of selection from the operational facility is drawn up and approved. Technological modes of wells are installed monthly or once a quarter, depending on the stage of development (5). The responsibility for compliance with the established regimes is borne by the master and the head of the oil production workshop (field). Control over the implementation of the established technological modes of operation of wells is carried out by the geological and production and technical services of oil and gas producing enterprises. In the order of supervision, control is carried out by higher-level organizations and bodies of State technical supervision. To monitor the operation of wells, control and measuring equipment and devices for taking wellhead samples of extracted products are installed. The binding of wells should ensure the conduct of a complex of studies: individual measurement of the flow rate of liquid and gas, waterlogging, (echometry, dynamometry, descent of deep instruments, etc.). The commissioning of new, unequipped for individual measurement of the flow rate and exploration of wells is not allowed.

Materials on the operating modes of wells are subject to analysis and generalization:

- The oil production workshop (oilfield) conducts an operational analysis of the implementation of the established regimes, outlines a plan of measures to maintain them, approved by the chief engineer and chief geologist of the oil and gas producing enterprise;
- The oil and gas production department summarizes the results of the analysis of modes for development facilities, areas, methods of operation, etc. And reflects them in the annual reports.
- In the multi-layer gas fields of western turkmenistan, standard well designs correspond to the geological and technical conditions for the construction and operation of wells of various depths in accordance with the parameters of the deposits being developed (6):

Well suspension data for the NK-8 horizon of the Altyguyi field:

- The diameter of the production column d = 140mm.
- Tubing diameter d = 73 mm.
- The depth of the descent of the tubing = 3602 m.
- The diameter of the lifting column of the tubing = 3616 – 3625 m.
- The type of fountain fittings is "Cameron".
- Well suspension data for the NK-7d horizon of the Altyguyi field:
- The diameter of the production column d = 146-168mm. (combined)
- Tubing diameter d = 73 mm.
- The depth of the descent of the tubing = 3488m.
- The diameter of the lifting column of the tubing = 3512 – 3522 m.
- The type of fountain fittings is "WOM".
- Well suspension data for the NK-9 horizon of the Altyguyi field:
- The diameter of the production column d = 140 mm.
- Tubing diameter d = 73 mm.

- The depth of the tubing descent = 4060 m.
- Diameter of the lifting column of tubing = 3950 – 3958 m
- Type of fountain fittings - "Vetca Grey".

As follows from the above well designs, the lifting columns are lowered to the level of filters, which provides the best conditions for the removal of liquid entering the bottom of the well. The diameter of the lifting pipes (73 mm) should be considered optimal, providing sufficiently high flow rates in the pipes and at the same time limiting hydraulic losses when moving in the gas-liquid flow pipes with high speeds, which ultimately ensures maximum wellhead (buffer) pressure and, accordingly, maximum use of reservoir energy for transport and gas preparation. At the current stage of the development of the Altyguyi deposit, due to the drop in reservoir pressure in the deposits, a significant number of wells are operated in modes with fluid accumulation in the boreholes, which is established on the basis of calculations made in accordance with the temporary instructions. The simplified method used in this manual for calculating fluid accumulations at the bottom of wells based on the difference between the annular and buffer pressure of the well (not taking into account the magnitude of hydraulic losses) is used to estimate fluid accumulations of various wells in gas fields (7).

The established measures to ensure the normal operation of gas condensate wells during operation are as follows

- Carrying out technical and technological operations for the removal of incoming lower and lateral reservoir waters using the use of special liquids.
- Carrying out measures to restore permeability in the face zone of productive formations.
- Measures to protect wellhead and downhole equipment from hydrates.

This gives grounds to recommend the use of surfactants for the removal of fluid from wells in order to reduce back pressure on the formation and a corresponding increase in pressure on the well buffer (8). Taking into account the significant flow rate of condensate wells and the appearance of a large amount of water in wells in some cases, a water-condensate mixture is subject to the foaming process, for which it is preferable to use compositions of various surfactants and, in particular, a mixture of ionogenic and non-ionic surfactants. The feed of surfactants into the well is considered in two ways: injection into the inter-tube space in liquid form, and is also carried out by feeding the core of surfactant lubricators to the bottom of the well. At the initial stage of the application of surfactants for the removal of liquid from the faces, a method of one-time injections of calculated volumes of surfactant solutions into the annulus of wells with a further transition to the introduction of solid surfactants into the well, with an extended period of exposure to borehole fluids. The supply of liquid surfactant into the inter-tube space is carried out using cementing units. In the situation of a decrease in reservoir productivity as a result of a decrease in permeability at the bottom of the well according to the chosen technology that determines the property of the solution, the use of acid treatment at the well is considered (9). If necessary, in order to combat hydrate formation on the boreholes, the supply of methanol using cementing aggregates through the inhibitor valves into the inter-tube space of the well is considered. With the equipment of all wells, in order to combat the formation of hydrate on the fountain fittings and the plume, an antihydrate is being developed for the addition of methanol to the extracted gas. In the process of industrial development of oil fields, the collection and use of gas, condensate and related valuable components extracted together with oil, and water in the volumes provided for in the approved technological project document must be ensured. A project for the development of an oil field for industrial development can be accepted for approval only if it solves the issues of collecting and rational use of petroleum gas. At the gas condensate fields (deposits) being developed in Turkmenistan, a mandatory complex of studies and systematic measurements for development control is carried out, corresponding to the principal complex of hydrodynamic and field-geophysical studies and measurements approved by the concerns, meeting the requirements of the approved project document for development. This complex should include studies on the timely identification of wells - sources of underground leaks and interplastic flows. The determination of well operation parameters and the forecast of development indicators was carried out on the basis of reserves of gas condensate horizons and areas for which the presence of oil rims was not detected. It should be noted that there are a number of uncertainties in the estimation of individual parameters for the field that can affect the accuracy of the final calculation results.

The main ones are:

- The degree of activity of the legal area of deposits and the prediction of its impact on the dynamics of drainage regimes in the future;
- Insufficient number of measurements of reservoir pressure, the impossibility of establishing a pattern of its change over time for most horizons;
- Insufficient number of definitions of filtration parameters "a" and "b" to average them across individual development objects;
- A small number of experimental determinations of the condensate recovery coefficient.

To maximize the use of available data on reservoir pressure measurements and to approximate the results of the forecast of reservoir pressure dynamics to real conditions, the following methodological technique was used.

$$\overline{P}_{res.} = f(\overline{Q}_{g.}) \qquad (1)$$

$\overline{P}_{res.}$ - the ratio of the current value of reservoir pressure to its initial value;

$(\overline{Q}_{g.})$ - the ratio of accumulated gas extraction to its initial recoverable reserves. Based on the analysis of field data using available practical data on reservoir pressure measurements for horizons, graphs of changes in reservoir pressure from accumulated gas extraction are constructed in dimensionless form. When determining the initial recoverable gas reserves, the expected final gas recovery coefficient equal to 0.85 was adopted. According to the experience of developing gas condensate deposits in Western Turkmenistan, it is known that during their operation, along with the gas regime, the pressure of marginal and plantar waters appears, and its share increases over time (10). In the calculations, the isotherms of differential condensate in reservoir conditions given in (11, 7) were used. These data are preprocessed with polynomials for the convenience of performing calculations on a computer.

The calculation sequence is as follows

For the lower reservoir, the annual and accumulated gas production, as well as the average flow rate of gas wells (q_1) for the future for the option of developing it by an independent grid of wells, are preliminarily calculated. With known accumulated selections (Q_1), the dynamics of reservoir pressure along the lower formation is determined by the formula:

$$P_{res.init.1} = P_{res.init.} \; f(\overline{Q}_{g.1}) \qquad (2)$$

2. Using the filtration coefficients "A_1" and "B_1", with a known gas flow rate q_1 and the value of reservoir pressure P_1, the bottom-hole pressure P_{b1} is determined.

$$P_{b1} = \sqrt{P_1^2 P - (A_1 q_1 + B_1 q_1^2)} \qquad (3)$$

3. To lift the liquid to the surface, the wellhead pressure is determined by the following formula:

$$P_2 = e^{-after} \sqrt{P_1^2 - 1.377\lambda_l \frac{Z^2{}_{av.l} T^2{}_{av.l}}{\rho_l d^5{}_{int.l}} Q^2 mix._1 (e^{2after} - 1)} \qquad (4)$$

$$S_0 = 0.03415 \frac{\overline{\rho}\rho L}{Z_{av} T_{av}} : \rho = \varphi + (1-\varphi)\frac{\rho_{liq.}}{\rho_{g.op.}};$$

$$\rho_{g.op.} = \frac{\rho_g P_{av.} T_{st.}}{P_{at} T_{av.}} : \varphi \le \beta = \frac{Q_{liq.}}{(Q_{g.op.} Q_{liq.})};$$

$$Q_{g.op.} = \frac{Q_{g.} P_{at.} T_{av.}}{P_{av.} T_{st.}} : Q_{mix.} = \frac{G_g + G_{liq}}{(\rho_{g.})}; \qquad (5)$$

$$G_g = Q_g \rho_g ; \overline{\rho} = \frac{\rho_g}{\rho_{air}} ; T_{st} = 293^0 K$$

$$\theta = 1,377\lambda \frac{(Z^2{}_{av.} T^2{}_{av.}}{d^5} (e^{2S} - 1)$$

ρ_g. ρ_{air} ρ_{liq} - density of gas, air and liquid, kg/m^3; $\rho_{g \cdot op.}$, $Q_{g \cdot op}$ - respectively, the density and flow rate of gas in the wellbore under operating conditions, kg/ m^3 and thousand m^3 day; G_{liq}, G_g, - mass flow of liquid and gas, t/day; Q_{mix},Q_{liq},Q_g - volume flow rate of the gas-liquid mixture, liquid and gas, respectively, at P_{at} and T_{st}, thousand m^3/day. The true volumetric gas content should be determined experimentally as the ratio of the true volume of gas V_t in the well to the volume of the hole $\varphi = \frac{4Vg}{\pi D^2 L}$, However, due to the great difficulties of such measurements, it can be estimated by the consumable gas content β according to the above formula (5). Since it is always φ <β, using β instead of φ leads to an underestimation of the downhole pressure as much as the difference between the amount of liquid in the well and the outflow of gas is greater. The coefficient of hydraulic resistance λ must be determined based on the results of well studies in various modes. Due to the absence of such studies, its value is assumed according to (12, 13), for the pipe λt = 0.025 and for the packer λp = 0.0815. All values (Z_{av}, $\rho_{g.op}$, $Q_{g.op}$, β, etc.) depending on the P_{av} are calculated by the method of successive approximations. When predicting the gas factor, oil and gas resources of the productive deposits of the field, characterized by very complex drainage regimes, serious problems are created. In addition, during the development of the field, there is a continuous change in specific types of energy that displace oil from the bottom of producing wells, which significantly affects the dynamics of the gas factor. At the same time, the dynamics of the gas factor was determined taking into account the experience of the development of the NK (lower red color) horizons of other fields. Based on the analysis of field data using available practical data on reservoir pressure measurements for horizons, graphs of changes in reservoir pressure from accumulated gas extraction were constructed in dimensionless form (Fig. 2 and 3). The main economic indicators characterizing the effectiveness of the proposed development options are capital investments, operating costs, total costs, as well as the cost of oil production. We take discounted annual cash flow (income-expenses) as the criterion for choosing development options.

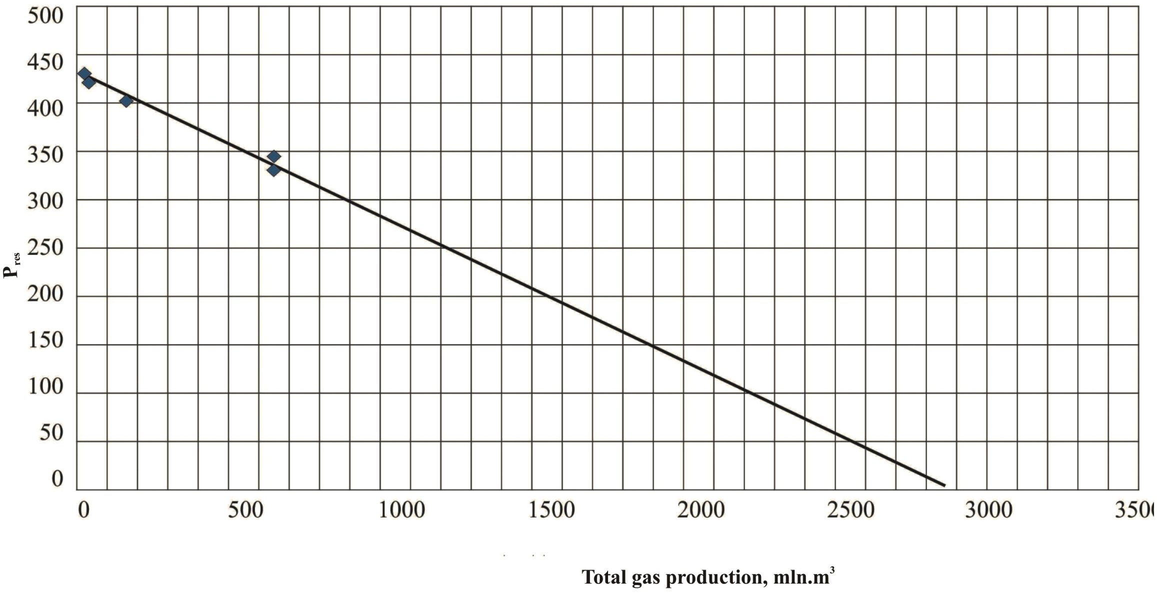

Figure 2. Graph of changes in reservoir pressure from accumulated gas extraction in the NK_8 horizon

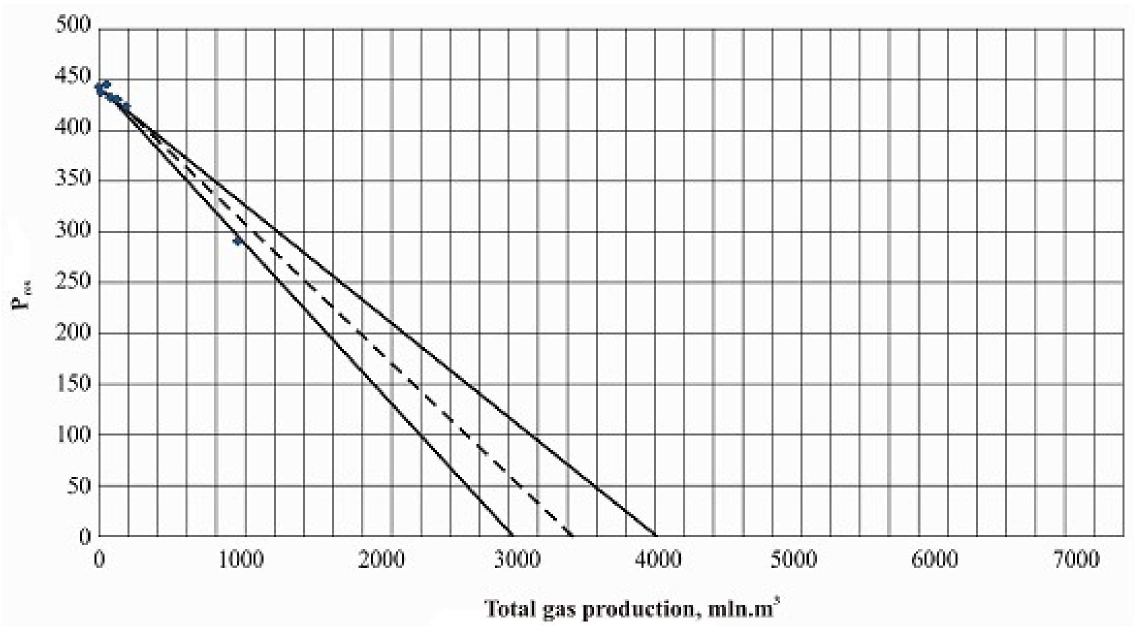

Figure 3. Graph of changes in reservoir pressure from accumulated gas extraction in the horizon of NK_{7d}.

The calculation of economic indicators was carried out in accordance with the projected levels and dynamics of technological indicators according to options using economic standards set depending on changes in technological factors. The volume and technological factors affecting the level and dynamics of economic indicators are: the volume of production drilling, the number of wells put into operation from drilling, the volume of oil, gas and condensate production, the fund of producing wells. Using technological indicators and accepted economic standards, capital investments in drilling wells and in the areas of oilfield construction, depreciation charges for new wells, operating costs by cost items are calculated.

The need for capital investments for the long-term period is due to the commissioning of new wells and their arrangement. The calculation of operating costs for the production of oil, gas and condensate for the long-term period according to the options was made in accordance with the current calculation methodology, depreciation rates and approved rates of deductions for geological exploration. The upcoming costs represent the sum of capital and operating costs in the corresponding accounting year of the inventory development period under consideration.

REFERENCES

1. Orlov V.S. Design and analysis of oil field development under oil displacement regimes by water. - M.: Nedra, 1973.
2. Gafurova M. Assessment of heterogeneity and characteristics of flooding of productive horizons of the Achak field // Express - inform. VNIIEGazprom. - 1976. - No. 10.
3. Deryaev A.R. Features of drilling technology for dual completion of several horizons at the tested wells of the Northern Goturdepe deposits. // collection of articles of the Institute "Oil and Gas" issue 8 (2014). – pp.238-248.
4. Deryaev A.R. Technological features of the opening of multilayer productive horizons and their development for dual completion. // Collection of articles of the Institute "Oil and Gas" issue
11 (2015). – Pp.183-193.
5. Kamenetsky S.G. Determination of filtration parameters by pressure recovery method if the formation is divided into separate layers. / NTS for oil production. VNII. Issue 14. – Moscow: Gostoptehizdat,
6. Ivanishin V.S. Features of the development of multilayer oil deposits with low–permeability reservoirs. - M.: Nedra, 1981.
7. Instructions for a comprehensive study of gas and gas condensate reservoirs and wells. Zotov G.A., Aliev E.S., – M: Nedra, 1980.
8. Extraction, preparation and transportation of natural gas and condensate. Help. manual: in 2 volumes / Edited by Yu.P. Korotaev, R.D. Margudova. – M.: Nedra, 1984. – Vol. 1.
9. Extraction, preparation and transport of natural gas and condensate. Help. Manual: in 2 vols. – M.: Nedra, 1987. Vol. II.
10. Oilfield equipment. Guide. / Edited by E.I.Bukhalenko – M: Nedra. 1990.
11. Ignatenko Yu.K., N.R. Hakobyan et al. Temporary instructions for the removal of liquid from gas and gas condensate wells using foaming agents. Stavropol. 1977.
12. Dzhaparov A., Ignatiev V.G. Development of proposals for the selection of technological schemes and equipment for dual completion of gas condensate reservoirs in projected gas wells at the Korpedzhe field (Final report on x/d 35/99), 2000.
13. Dzhaparov A., Ignatiev V.G. Technological scheme of pilot operation of the gas condensate deposits of the Korpedje field using the technology of dual completion of gas condensate reservoirs (copy of the final report on x/d 35/99), 2000

****