Modern state and perspectives of the gas industry development are connected with the development of such unique northern fields as Urengoy field, Medvezhye field, Yamburg field, Zapolarnoye field in Nadym-Pur-Tasovskiy region, Bovanenkovskoye, Kruzenshternovskoye and Kharasaveyskoye on the Yamal peninsula and others, where more than 85% of country gas resources are situated. For the perspective this situation will be retained till the middle XXI century. In connection with the foresaid, the high-performance development provision of large oil, gas, condensate field of the Far North which are exploiting in the hard-to-reach areas with the severe nature-climatic and difficult geological and technical conditions is all-important for economy the Russian Federation.
Effective development and maintenance of the high production level of Urengoy and other oil, gas, condensate fields of the Western Siberia are significantly determined by the technically qualified exploitation of wells and deposits, i.e. so modes of operation should be set, which are determined by the productive stratum state, the hydrodynamic factors for the wellbore from the bottom hole to the mouth and throttling characteristics (discharge of liquid and gas, shot content). One of the primary tasks is objective information gaining about the well mode of operation.

Traditional control methods and means, operation mode exploration (for oil and gas-condensate wells – exploration with the cumbersome gaging separators, for gas wells – special methods of gasdynamic researches with the gas kick into the atmosphere) are inefficient. They are oriented for considerable labour power industrial intake. These methods do not serve the modern needs of the extractive industries on operational efficiency, representativity of the accepted data, and they do not meet the environmental requirements for field development. The information about the basic wellhead parameters (production rate, pressure and temperature) and depth parameters (pressure and temperature), which determines the operation mode of wells, is succeeded to accept with the time discontinuity and the information reliability is not high.

Serious problems are connected with the measurement of discharge (separated for gas and liquid) and estimate of abrasive admixtures (sand) in flow by the on-line test. The tries of many native and foreign researches to create new technological metering means of these important parameters, particularly means which are connected with the combined usage of the classical single-phase flow metering methods and with the usage of mini-separators have not led to the demanded results because of their low reliability in actual operating conditions until very recently.

Long-term joint researches of OAO Gazprom and Gazprom dobycha Urengoy LLC specialists, the scientists of Russian State Oil and Gas University
named after I.M. Gubkin and Ufa State Oil Technical University in the fields of flowmeter many-phase medium survey, manometry and thermometry allowed to suggest the problem solving means of new non-traditional method development of well throttling and thermobaric characteristics and practically realize them on the Urengoy, Yamburg oil, gas, condensate fields and other oil, gas fields of the Western Siberia, Ural-Povolzhye and Kazakhstan as well as by the ultradeep well drilling in Antarctica.

Different models and modifications of informational and metering systems (IIS) of on-line test of ‘POTOK’ series wells operation mode which are designed for functioning in severe climatic conditions and harsh field environment were created and introduced on the basis of developed spectral method on Russia’s the gas, oil, condensate fields. These systems exceed modern foreign developments on performance specifications and at the same time they differ in moderate cost.

The informational and metering systems are developed and introduced for pressure and temperature gaging along the wellbore and well bottom of AMT, SMT, and PGA well series as well as IIS for pressure and temperature gaging on the mouth of MTU and RTP well series, which designed for the exploitation in the severe climatic conditions. The developed informational and metering systems have a world standard level on characteristics of reliability and measurement accuracy but for all that they win by cost.

The opportunities promptly to discover negative changes and promptly to make geological and technological arrangements for their elimination have been occurred with new informational and metering systems in course of field development.

Methods and technical solutions which are used in these metering systems are protected by 18 Russia’s patents on methods and devices for their modification.

Gazprom dobycha Urengoy has been developing one of the biggest in the world oil and gas, condensate fields where more than 2,5 thousand of gas, gas-
condensate and oil wells are in operation for more than 30 years. Hydrocarbon raw material treatment is carried out on twenty-one gas treatment facilities (UKPG), thirty-one workshops of booster stations (DKS), and two central oil treatment facilities.

Urengoy oil and gas, condensate field with many deposits is unique not only by the primary proven reserves which exceeds 12 tcm of gas but also by the content and development conditions variety of hydrocarbon deposits.

The exploitation of Urengoy oil and gas, condensate field at the modern development stage is accompanied by the problems which are typical for the late gas field exploitation stage.

Complex geological structure of productive stratum, considerable decline of the primary formation pressure (up to four times) and the rise of the gas-water contact on facilities, which are being in exploitation from 20 till 30 years are determinative factors for the decline of productive well characteristics. The considerable formation pressure decline on the Senomanian horizon has led to intensive selective localized flood. The stop valve hydroabrasive damage, the water and sand conservation on the well bottoms and declined loop areas occurred as a consequence of the failure of the formation critical area and of the sand production on the surface in the mouth equipment, in the gathering and treatment facilities.

The introduction of the effective repair and insulation technologies for the well bottom zone consolidation allowed reducing a quantity of wells which have sand and water seepage limitation and put out of the inactivity more than 200 production wells.

One of the main tasks during the dropping production for the gas absorption dehydration is the optimization of the thermobaric parameters of the gas dehydration process. The integrated approach for the problem solving lies in the improvement of the dehydration technological schemes, retrofit installation and workflow automation. For that the replacement of the designed mass-
exchange trays was carried out to the regular plate packing in the gas dehydration devices developed by the specialists of Gazprom dobycha Urengoy LLC and DAO CKBN (central engineering department of oil processing equipment).

The system of control and handling of rotational frequency of the air-cooling apparatus (AWO) electromotors on unstripped gas booster stations by means of the automatically change of the blast rotational frequency allow to maintain the specified temperature of the Gas-DEG contact in the gas dehydration devices developed by the specialists of Ufa State Oil Technical University. At the same time the full choking of the AWO pipes by the hydrate blocks are not permitted and the possibility of their breakdown is eliminated irrespective of gas temperature change in the AWO inlet header and winter temperatures.

The optimal problem solution of the quality gas treatment provision and effective equipment usage in the conditions of the productive capacity Senomanian UKPGs release laid in the introduction of two-stage gas dehydration. Its variants depending on gas treatment facilities productivity combined with absorber modernization in the demanded volume and AWO automatization of gas booster stations allow to provide the demanded gas quality characteristics by the energy cost minimization and environmental risk minimization.

The production problems of the Neokomian gas-condensate deposits are similar to the problem which occurs in the course of the Senomanian gas production but they have their distinctive features. The provision of the stable flow conditions of the formation fluid into the well in the conditions of the constant power budget reduction is reached by the means of different intensification methods. The most effective method of them in the conditions of Urengoy oil and gas, condensate field is layer hydraulic fracturing. Multiple increase of the well production has been reached as a result of this method application on Valanginian gas-condensate and oil wells.
As the formation pressure decreases there comes a time when designed technological scheme of the Valanginian gas treatment can not provide optimal conditions for the low-temperature separation facilities. Now the work of the low-temperature separation facilities is optimized by means of the developed in the Company technology of combined exploitation of Valanginian and Senomanian UKPGs by technological schemes application: Valanginian UKPG – booster of the first and second stage of Senomanian UKPG with the pressure reduction (throttling) of Valanginian gas in two stages. The energy efficiency of Senomanian booster stations with the optimal load simultaneously increases. As a result the discharge intensity of fuel gas is reduced two times as much and the pollutant emissions into the atmosphere are reduced by 700 ton per year.

By the oil rims exploitation of Urengoy field one of the issues of the day is the increase of the associated oil gas utilization coefficient. For its solution Gazprom dobycha Urengoy developed set of activities which include the reconstruction of the oil treatment systems and compressor stations startup. Technological solutions provide the gas treatment and compression with the next supply into the inter-field collector as well as the oil field provision with the gas lift gas. The realization of all taken decisions allows bringing the utilization level of the associated oil gas on Urengoy field up to 95%. Atmospheric emissions of combustion materials will be reduced by more than 20 times simultaneously.

Listed above scientific-technological solutions are energy and resources saving technologies and provide considerable reduction of the negative influence on the environment. Pollutant atmospheric emissions are reduced by 50% from authorized level for Company and the methanol content in the industrial drains does not exceed 3%. For that waste burial is carried out by their pumping into isolated water-bearing Senomanian stratum which has high permeability and is an ideal reservoir for the sewage pumpdown. Thereby, the pollution of the region’s rivers and lakes from the sewage was prevented and natural safety of the Far North will be guaranteed.
Key words: production, operation, gas development, new technologies.
Classification after 24th World Gas Conference themes - WOC 1 Exploration and Production
Gas exploring and production 1.D. Production and gas treatment technologies