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Analysis of Gas Collection Systems in the Fields of Uzbekistan

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Annotation: ***Giant gas fields play an important role in the development of the world natural gas industry. The major gas producers have established their positions on the world arena with the support of their discovery and development of several or more giant gas fields. In Uzbekistan, special attention is paid to oil and gas production, which is one of the sources of economic development.***

Keywords: water vapor, liquid water, carbon monoxide, sulfuric acid H_2S, nitrogen N_2, and helium He, linear, light, ring collection system, the gas ejector, hydrocarbons

I. INTRODUCTION

Natural gases occur as a separate gas field or in combination with oil (oil and gas fields). Gas fields are divided into multi-layer and single-layer fields. In the cross-section of multi-layered gas fields, there are several gas deposits stacked on top of each other at different depths in the same area. Different gas accumulations occur at different distances from the gas field cross section. Gas fields are grouped in spatially generalized gas accumulation zones and are divided into gaseous or gas-oil platforms (dome ridges, platform sediments, etc.), geosynclinal (intermountain valleys, central massifs), and transition. Multilayer gas fields produce gas from individual boreholes or from a single borehole that crosses the entire formation.

“Uzbekistan is rich in oil, gas, coal and uranium. In terms of natural gas, it ranks 11th in the world in terms of production and 14th in terms of reserves, and 6th in terms of uranium mining and 7th in terms of proven reserves. takes place. It is also a world leader in the production and supply of some minerals: gold, copper, phosphorites, and others.”[1] The level of rational gas production of giant gas fields should be determined mainly based on the types and characteristics of gas storage facilities, which should maximize economic benefits and ensure long-term stable gas supply. This is a key indicator in the development of a gas field development plan. Recognizing the role of gas field development in socio-economic development, Uzbekistan is also implementing a number of reforms in this area.

In particular, the Resolution of the Cabinet of Ministers No. 746 of November 25, 2020 "On the system of monitoring the impact of development of oil and gas fields on seismogeodynamic processes." "Monitoring of the impact of oil and gas field development on seismogeodynamic processes includes regular observations, data collection, collection and processing, analysis of the seismotectonic state of the geological environment, development of oil and gas fields and other activities." includes monitoring of geological, seismogeodynamic changes occurring in the earth's crust under cover. "[2]

Along with natural gas and oil extracted from the earth's crust, associated gases contain varying amounts of water vapor, liquid water, carbon monoxide, sulfuric acid H_2S, nitrogen N_2, and helium He. Helium is one of the most important gases for the national economy. Sulfur, industrial gas and water vapor in natural and associated gases are harmful additives. During gas collection and preparation, the working gas and sulfur in it lead to corrosion of the pipe and all separators. Water vapor in the gas and water in the form of droplets cause difficulties in its transportation and preparation. Hydrocarbons are difficult to transport and prepare. Therefore, it is planned to separate harmful additives from natural and associated gases. The following basic gas collection systems are used in gas field operation: linear; light; ring.

In a linear collection system, the main gas collection collectors, ie the pipes that make up the road from the well to the collection point, are in a straight line. This system is used when the mine is small and the number of wells is small.

[1] https://www.iea.org/reports/uzbekistan-energy-profile
[2] The Resolution of the Cabinet of Ministers No. 746 of November 25, 2020 "On the system of monitoring the impact of development of oil and gas fields on seismogeodynamic processes."

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When combined in a radiant manner, such a collection system is called a light gas collection system. This system is a bit complicated, but it has advantages over a straight line system. The radiant gas collection system allows the use of several layers with different initial layer pressure and gas composition.

In the international collection system, the gas collectors are in the form of a ring, and the advantage of this system is that in the event of an accident at a particular site, the entire system can be repaired without stopping.

In cases where the gas field occupies a very large area and the number of wells is large, the gas collection systems listed above may be used in a mixed state, e.g. linear. In all collection systems, the gas collection manifold can be connected not only to individual wells, but also to a group of wells through group collection devices. The advantage of the group collection system is that the gas collection collectors can be connected to more than one group of wells, measuring and controlling the gas and using less pipes for gas collection. The main elements of the gas collection system are pipelines, collectors, gas collection and metering points. Elements of gas collection networks are common to all gas collection systems.

If the field has several layers and wells of different pressures, in such cases, a separate method of gas collection is used through several gas collection lines.

The gas from the well is collected through gas collection networks and collectors to the gas collection point (GSP) and control-distribution point (KRP). Gas pressure changes and controls are also carried out here. At low pressures, a number of gases are transferred to a gas compressor station, where they are compressed to the required pressure and transferred to a high-pressure system. Gas ejectors are often used to save on piping and pressure.

The ejector works as follows: the high-pressure gas enters the outer chamber and passes through the nozzle in it to the mixing chamber, while the low-pressure gas enters the annular space, the higher pressure gas passes through the central nozzle and the low-pressure gas enters the nozzle. swells. The velocity of the gases added to the mixing chamber is equal to that of the diffuser. The gas velocity in the diffuser decreases. Much of the kinetic energy of the gas is converted into pressure energy, the pressure is restored.

“The gas ejector is also useful for using different pressure layers of gas at the same time.

Mining gas is collected in GSP and KRP. The following equipment will be installed in GSP and KRP:

1) *Separators:* The number of separators for cleaning solid or liquid parts is determined by calculation, but they must be at least two, one in operation when the other breaks down. Each separator must be equipped with devices for removing water, condensate and various particles, as well as safety valves that are 10-15% higher than the working pressure.
2) *Control Measuring Instruments:* These include thermometers, manometers, and flow meters.
3) *Pressure Acting:* On the principles of "before" and "after" controllers (regulators).
4) *Methanol Devices:* Are installed to prevent the formation of hydrates in gas pipelines and to eliminate the formation of hydrate clogs.
5) *Special Fragrances:* Used to immediately detect leaks in appliances and pipes.”[3]

The collection and processing of oil and gas in the field also results in a sequential change in the condition of the oil well products and their separation into separate components, as well as the acquisition of raw materials. Thus, the technological process separates the well products from two raw material flows: oil and gas.

The technology of collection, treatment and use of formation water is considered as a special process. This process consists of three steps in a row: separation; collection; to bring the established oil and gas for commodity raw materials to the standardized properties. In the third stage, the oil stream is cleaned of formation water and mineral salts, and the hydrocarbons contained in the oil are separated to stabilize it, thus preventing the loss of oil for refining. During this stage, hydrocarbons (for degassing) are separated from the gas streams and commercial gas is also converted into liquefied hydrocarbons. Thus, the third stage is the final stage of oil and gas production - the stage of oil and gas processing. When oil and gas are refined, its chemical and physical properties change dramatically. Under such conditions, processing should not be confused with processing.

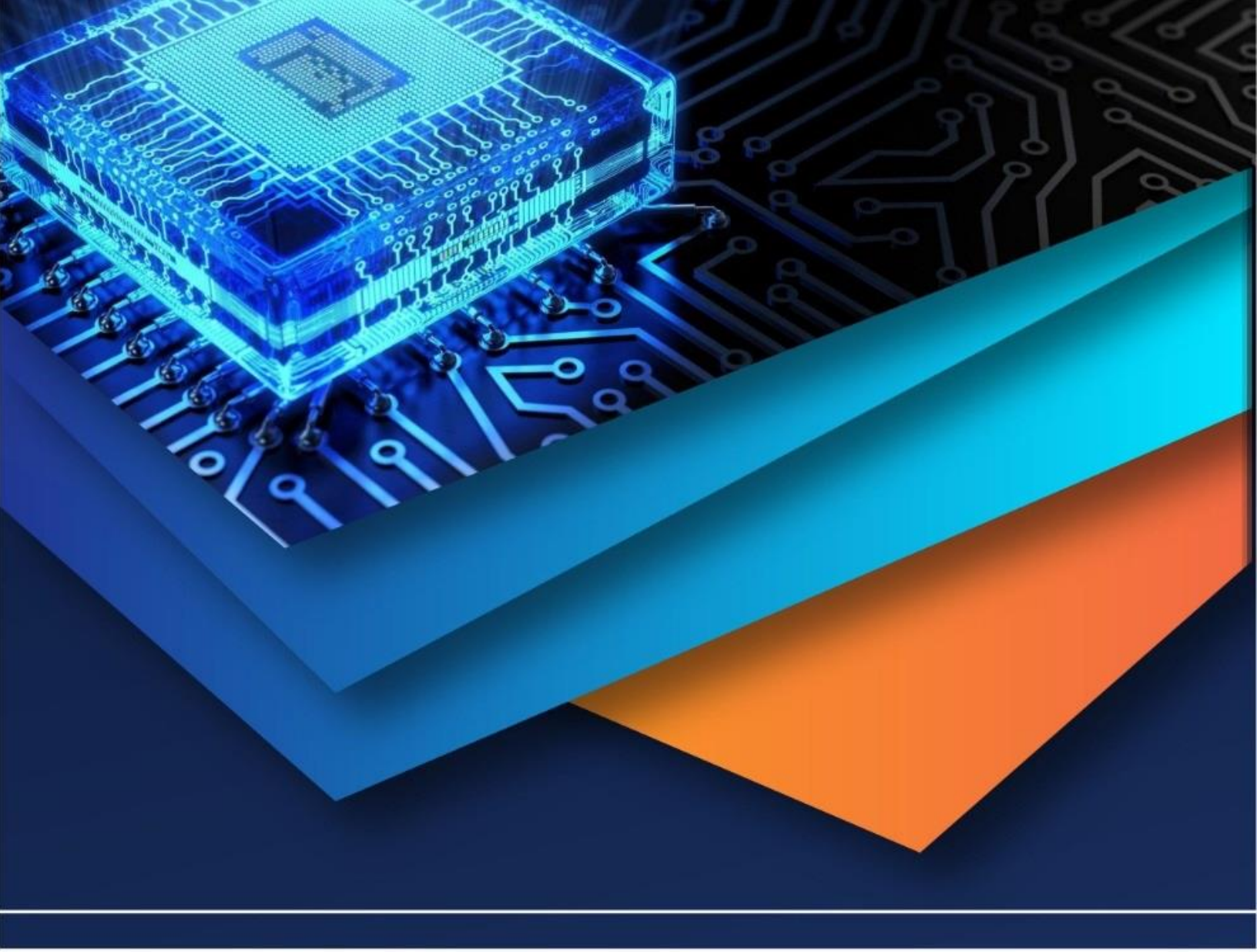
China's gas fields are far ahead in terms of the development of gas fields and the effective use of the integration of innovative technologies. The continuous innovation and advancement of giant gas field development technology has supported the increase of China's gas output. In the past half-century period, China's natural gas development objects have transited from a single type of gas reservoirs to gas reservoirs with complex lithology, and from conventional gas reservoirs to unconventional gas reservoirs.[4]

[3] N.Kh. Irmatov, D.G.Azizova and others. Collection, preparation and transportation of oil, gas and water in the field. –T. 250 pages.
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