

СЕКЦІЯ «SPE STUDENT SECTION. PETROLEUM ENGINEERING»

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**Askerov I.K., student of the group 183m-23n-1 IP**

**Scientific supervisor: A.O. Ihnatov, Ph.D., Assistant professor of Oil-and-gas Engineering and Drilling Department**

*(Dnipro University of Technology, Dnipro, Ukraine)*

**PROBLEMS OF DEEP WELL CONSTRUCTION**

Oil and gas wells are high-value fundamental structures designed to be a reliable object of relevant works for a significant period of time. The bore wells act as a connecting channel between productive formations and surface equipment. Above all, they must be characterized by air-tightness, strength, reliability and durability. However, under real-life conditions, the drilled wellbore is not such a channel due to the compound action of the following factors: poor ground condition; the presence of formations saturated with different fluids (water, oil, gas and mixtures thereof), which are subject to different pressures; circulating processes of washing liquid; motion of drilling tool and devices. These circumstances require the use of sophisticated and labor-intensive techniques and methods aimed at the prevention or complete elimination of the manifestation of mining and geological complications [1]. The cycle of well construction begins with the preparation of the drilling site and ends with the disassembly of drilling equipment, transportation of equipment to the new point and land reclamation (Fig. 1) [2].

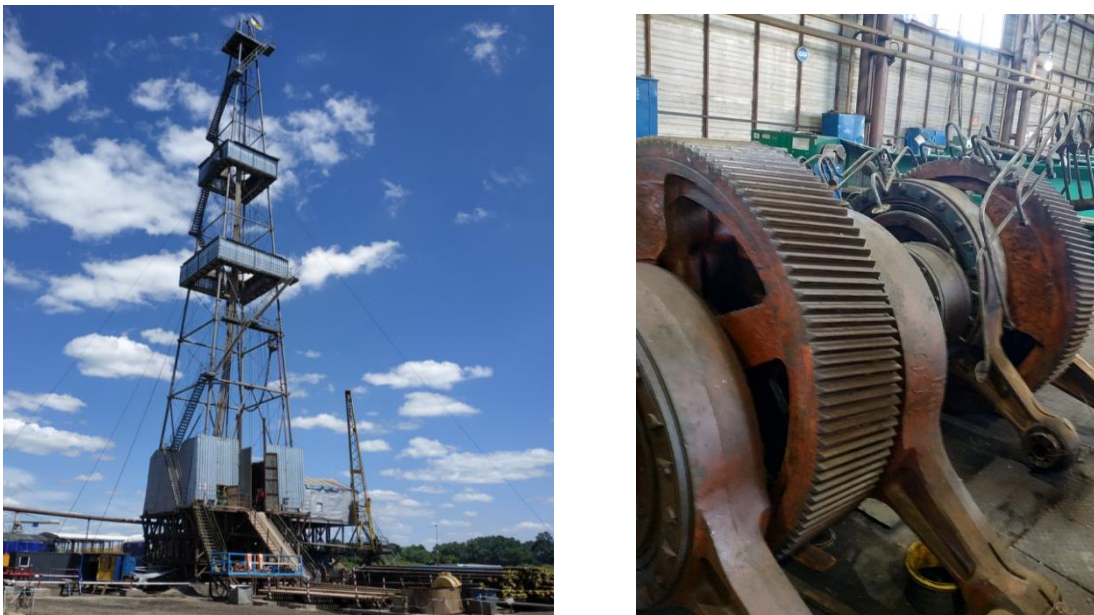


Fig. 1 – Well drilling

All types of work included as a compound of the cycle of well construction are as follows: pre-erection works for drilling equipment (drilling site layout, setting of access roads, water supply, power lines); installation of the drilling equipment (laying of the foundation and installation of the equipment components on the foundation, piping and valving of the equipment, protection of towers and equipment, erection of tanks and construction of amenity premises); pre-drilling work (steering tool orientation; fitting-out of the block-and-tackle arrangement; shot pit drilling and tubing; installation and test of small tools and equipment that speed up and facilitate the work process; connection of the drilling hose to the hoisting swivel and standpipe; suspension of rotary tongs; adjustment of instruments, tower alignment and rotor

levelling); well drilling, wall lining with casing and delimitation of layers; secondary drilling of productive strata (when the productive strata is covered by a column), testing, development and commissioning of the well; disassembly of drilling equipment; transportation of equipment to a new point (Fig. 2). The main technological solutions with a view to ensuring trouble-free hole drilling and minimizing the negative impact on the subsoil are as follows: the choice of the downhole arrangement according to the schedule of combined pressures, which corresponds to the geological conditions of drilling; calculation according to the norms of drilling mud density across the drilling intervals; calculation and selection of casing columns appropriate for the maximum possible formation pressures; casing cementing with high-quality backfill materials; installation of centralizers, scrapers and turbolizers on casings for the creation of a reliable cement sheath [3].



Fig. 2 – Drilling equipment and tools

For the prevention of the contamination of the soil with drilling waste, closed metal containers or waterproofed barns should be provided for waste collection [4]. Domestic wastewater is discharged into a closed container through domestic sewer system and sand-gravel filter and periodically taken to treatment plants.

### References

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