RINGKASAN

Pemboran Sumur ERK-03 di Lapangan TBN, Cekungan Sumatera Utara, direncanakan sebagai sumur pengembangan untuk meningkatkan jumlah titik serap reservoir. Sumur ini memiliki target yang tidak segaris vertikal terhadap wellhead, sehingga diperlukan metode pemboran berarah. Berdasarkan kondisi geologi, data *subsurface*, dan parameter pemboran. Selain itu, keberadaan sumur-sumur eksisting di sekitar lokasi juga menimbulkan potensi risiko *collision* yang harus diantisipasi sejak tahap perencanaan.

Analisis perencanaan pemboran dilakukan menggunakan perangkat lunak *DD Plan*, yaitu *C Software* untuk merancang *well trajectory profile* yang optimal serta *WP Software* untuk menganalisis *torque and drag* dan dinamika BHA. Proses ini didukung oleh studi literatur serta pengumpulan data lapangan berupa *lithology and stratigraphy basin map* dan *well and site map location*, serta data sumur berupa data sumur usulan, PPFG *prediction chart*, dan *offset well*. Data tersebut digunakan untuk merancang lintasan sumur yang meliputi KOP, BUR, *maximum inclination*, dan *horizontal displacement*, serta perencanaan *drillstring* dan BHA yang kemudian disimulasikan dari aspek mekanis. Hasil perencanaan dan simulasi selanjutnya dievaluasi dari aspek *safety* dan *efficiency* guna memastikan desain *wellbore*, lintasan sumur, *drillstring*, dan BHA telah aman, optimal, serta mampu mencapai target reservoir, dan apabila masih ditemukan permasalahan *buckling* dan *collision,* maka dilakukan evaluasi ulang hingga diperoleh rancangan pemboran yang sesuai.

Hasil perencanaan menunjukkan bahwa lintasan sumur tipe J (*build and hold*) dengan KOP pada 797 ft TVD dan azimuth 203,54° mampu mencapai target pada kedalaman 3067,6 ft MD secara optimal. Analisis *collision avoidance* menunjukkan bahwa lintasan sumur berada pada jarak aman terhadap sumur eksisting di sekitarnya. Desain BHA menggunakan *steerable mud motor* pada *hole section* 17-1/2” serta *Rotary Steerable System* (RSS) pada *hole section* 12-1/4” dan 8-1/2” untuk mendukung pengendalian arah pemboran. Berdasarkan hasil analisis beban, *torque and drag*, dan dinamika BHA, seluruh parameter masih berada dalam batas aman operasi sehingga desain pemboran berarah Sumur ERK-03 dinyatakan optimal, aman, dan layak diterapkan di lapangan.

Kata kunci: *Perencanaan Pemboran Berarah, Collision Avoidance, Bottom Hole Assembly, Torque dan Drag*

ABSTRACT

The drilling of Well ERK-03 in the TBN Field, North Sumatra Basin, is planned as a development well to increase the number of reservoir drainage points. The well has a subsurface target that is not vertically aligned with the wellhead, requiring the application of directional drilling techniques. The well trajectory is designed based on geological conditions, subsurface data, and drilling parameters. In addition, the presence of existing wells in the surrounding area creates a potential collision risk that must be anticipated from the planning stage.

The drilling planning analysis was conducted using DD Plan software, consisting of C Software to design the optimum well trajectory profile and WP Software to analyze torque and drag as well as Bottom Hole Assembly (BHA) dynamics. This process was supported by a literature review and field data collection, including lithology and stratigraphy basin maps, well and site location maps, and well data such as the proposed well data, PPFG prediction charts, and offset well data. These data were used to design the well trajectory, including the Kick-Off Point (KOP), Build-Up Rate (BUR), maximum inclination, and horizontal displacement, as well as to plan the drillstring and BHA, which were subsequently evaluated through mechanical simulations. The planning and simulation results were then assessed from safety and efficiency perspectives to ensure that the wellbore design, well trajectory, drillstring, and BHA were safe, optimized, and capable of reaching the target reservoir. If issues such as buckling or collision were identified, the design was re-evaluated until an appropriate drilling plan was obtained.

The results show that a J-type trajectory (build and hold) with a KOP at 797 ft TVD and an azimuth of 203.54° successfully reaches the target depth of 3,067.6 ft MD. Collision avoidance analysis indicates that the well trajectory maintains a safe distance from nearby existing wells. The BHA design utilizes a steerable mud motor in the 17-1/2” hole section and a Rotary Steerable System (RSS) in the 12-1/4” and 8-1/2” hole sections to support directional control. Based on load analysis, torque and drag, and BHA dynamics, all parameters remain within safe operational limits, indicating that the directional drilling design for ERK-03 Well is optimal, safe, and feasible for field implementation.

Keywords: *Directional Drilling Planning, Collision Avoidance, Bottom Hole Assembly, Torque and Drag*