Drilling operation expanded through deep water environments starting from mid-1980s. As drilling operations are expanded through deep water environments, hydrate forming problem is occurred as a result of low temperature and high pressure profile. This case is generally faced during production from the deep water gas wells, since during the production phase, pressure and temperature distribution through the wellbore falls on hydrate stability interval. On the other hand in the drilling & completion phase, gas generated from the shallow sediments may form hydrates in down-hole equipment like; subsea well heads, hanger profiles, subsea wellhead hanger pack-offs, subsea BOP stack & BOP funnel. Moreover in case of drilling through sediments including in-situ hydrates, as drilling goes deeper, heat transfer from well target-depth through the upper well sections, with drilling fluid circulation, will occur and temperature profile through the wellbore will change. As a result of heat transfer, overheating of the shallow well bore sections become possible. In such cases wellbore stability will decrease with the dissociation of the hydrate bearing sediments for the conductor or surface casings. Also, mentioned hydrate dissociation and gas migration through the surface may cause buoyancy problems in the location and lead to the failure of the floating drilling unit, since volumetrically 1ft³ of in-situ hydrate contains as much as 170scf of gas.

When considering drilling operations, hydrate forming risk can be eliminated via using kinetic or thermodynamic inhibitors in the drilling fluid system. However, at the wellbore and behind cemented casings, changes on pressure and temperature will also lead to dissociation of shallow hydrate bearing sediments. When considering regular drilling operation, severe changes on pressure profiles are not expected but heat flux from deeper sections of the well through shallower section is the major parameter which will affect hydrate stability condition on downhole. In order to mitigate the risk mentioned above, in this study, Black Sea is taken as a reference drilling environment and wellbore temperature simulations are conducted. Hydrate stability curve is determined by using the data gathered from wells drilled in the region and experimental studies conducted on hydrate existence of the Black Sea. Effect of regional parameters such as geothermal gradient of the region, target depths and operation parameters and well bore geometry changes including; hole sizes, casing shoe depths, casing specifications, circulation rates, mud weights, mud type, mud inlet and outlet temperatures are interpreted. As a result, hydrate dissociation risk for deep water well is mitigated by optimizing well geometry and operation parameters.