Providing a Sustainable Water Source for Operational Excellence in a Selected Oil Field in Kuwait

Mohamed Al-Senafy
Innovation & Technology Group, Research &Technology Subsurface Team, Kuwait Oil Company

B. Al-Mal
Innovation & Technology Group, Research &Technology Subsurface Team, Kuwait Oil Company

T. Al-Mutairi
Innovation & Technology Group, Research &Technology Subsurface Team, Kuwait Oil Company

A. Bushehri
Innovation & Technology Group, Research &Technology Subsurface Team, Kuwait Oil Company

M. Al-Bader
Innovation & Technology Group, Research &Technology Subsurface Team, Kuwait Oil Company

H. Al-Saeed
Innovation & Technology Group, Research &Technology Subsurface Team, Kuwait Oil Company

A. Al-Sagheer
Innovation & Technology Group, Research &Technology Subsurface Team, Kuwait Oil Company

Abstract:

Future development plans of the Kuwait Oil Company (KOC) propose an increase in the production and utilization of brackish groundwater reserve in the northern oil fields (NK). This project was executed in accordance with KOC operational excellence standards through enhancing the potential of utilizing the usable brackish groundwater of northern Kuwait as a strategic reserve by minimizing water quality deterioration and maximizing the field life. The main objective of the project is to evaluate the efficiency of the existing 7 water wells, which were drilled in 2014 to set a production schedule to produce 33,000 barrel per day with a salinity of less than 10,000 mg/l.

The scope of the project included 1) the collection of the available data on the study area, site hydrogeology and existing groundwater,2) identification of needed analysis, , 3) preparing technical specifications and program procedures for development and testing the water wells, 5) conduction of well development by pumping procedures, 6) performing short pumping tests, 7) evaluation and interpretation of the tests and laboratory analyses, and 8) recommendation of the specifications of submersible pumps to be installed in selected wells and providing the sustainable production rate of water.

It was recommended to install submersible pumps with a capacity of producing 350 bbl. /h at depth below the perforated screen intervals of four existing wells B, C, F and G.

If more than 33,000 bbl./d of brackish water is required, the existing well E can be also utilized and connected to water gathering centre. It is recommended not to use well A unless for emergency to avoid up coning of saline water quality. Well D not to be used in order to protect the strategic groundwater reserve where the salinity is less than 4,000 mg/l. Finally, the maximum pumping rate of each well should not exceed 350 bbl. /h and if more water is requested, then new wells to be designed, drilled and completed in in new locations.

Based on the above and former projects, a comprehensive project that should bring solutions to the groundwater utilization and establish a design for future sustainable brackish utilization scheme for the oil fields become necessary.

Keywords:

Brackish, production, water quality, water wells.