

AWAKENING A SOUTH ASIAN SLEEPING ENERGY GIANT - Technological Solutions to Un-lock the Vast Unconventional Reserves of Pakistan:

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INTRODUCTION

Production from numerous oil fields across the world becomes restricted because of pressure depletion in the reservoir, thus improving total recovery from a mature oil field, require implementation of artificial lift mechanisms. Compared to other alternative techniques of re-perforating the well or modifying completion's and other sub – surface jewelry can require huge capital cost which compels the operators to shut the well's, however, the use of jet pump technology is one of the cost effective method to maximize the production performance and enhance the economic life of a well in cost effective manner. A great many oil wells have been produced with hydraulic pumps, and the number of new hydraulic installations is increasing yearly. As several parameters like volume, depth, and deviation of producing wells continue to increase, the implementation of hydraulic lift installations will also continue to increase.

This paper presents a trial jet pump application in the dead well of a mature oil field. The well was completed with dual strings of size 2-3/8 in. in a 7 in. casing and was producing from two separate formations. Both formations, despite of having produced for a considerable amount of time, have high reservoir pressures at present. The upper formation being produced independently via short string was loaded up for almost three years, because the API and Gas Oil Ratio (GOR) from the formation were very low along with high water cut. The lower formation had a substantial amount of gas with no water cut and was producing at significant oil rates. However, the formation being produced through the long string did not flow after shutting in for a Bottom Hole Pressure (BHP) survey. The well was unloaded by reducing surface back pressure, but it exhibited slugging behavior and an increased oil API and therefore was abandoned.

The test with hydraulic jet pump was justified by the need to revive production without a work-over. Thus, a jet pump was installed in the short string in a Sliding Side Door (SSD), and the short string was tested first with the long string being isolated. After the testing of short string independently, an SSD connected to the long string in the middle of two packers, was opened so that both formations can be produced from the same short string. Jet Pump (JP) comprised of nozzle and the throat. The ratio of these two parts is referred as the area ratio of the pump. Power fluid is pumped at a given rate to the down-hole jet pump where it reaches a nozzle with a total pressure P_N as shown in Fig. 1. This high-pressure liquid is then directed through the nozzle, which converts the fluid from a low velocity, high static pressure flow to a high velocity, low static pressure flow (PS). The low static pressure (PS) allows well fluids to flow from the reservoir at the desired production rate (QS) into the well bore and pump and eventually to the surface.

AIM: Simulating reservoir & production data set for proposing suitable lift mechanism for oil and gas well.

Reviving the production of dead wells in a cost effective manner

Evaluating well test data and conducting evaluations for selecting suitable candidate well for designing artificial lift method and surface production equipment's.

Evaluating the shift in IPR/VLP curves by NODAL Analysis to assess the production profile for maximizing Hydrocarbon recovery

MATERIALS AND METHODS: A prospective study was conducted from a dead well of a mature oil field. The well had 2 completion strings i.e. 2-3/8 in. in a 7 in. casing and was being produced from 2 different zones. The well was revived by reducing the back pressure from surface.

RESULTS: Based on the results, a dead well was successfully revitalized with the cumulative production of 380 BPD i.e., an average of 100 BOPD and 280 BWPD, which was higher than the targeted production rates evaluated for this well

CONCLUSIONS:

With the oil prices being low, the operating companies are reluctant to invest huge capital cost to revive wells again. The technological advancement of reviving production of dead wells will allow E&P operators to maximize the production in a cost effective manner. . **KEYWORDS:**

Production; Pressure; Well Flowing Pressure; Pump; API, SSD, Inflow Performance Relationship, Vertical Lift Performance, Nodal Analysis, Liquid Loading, Cavitation

BIOGRAPHY: Clifford is a Master's in Petroleum Engineering from University of Calgary and is in constant strive to introduce innovative techniques in Oil & Gas Industry. He is also working as an Editor in Chief for Friday's for Future – Pakistan where he is frequently giving talks and webinars covering the segment for Carbon Capture and Storage. He is also working as a member in advisory board for SPE – NED – Pakistan. He has earlier worked as a Field Engineer for Weatherford Oil Tools and currently working as Production Engineer – Intern for one of the E & P companies in Calgary.

