



Supplementary Figure S1. Plan Polarized Light (PPL) and Cross Nicol Polarize Light (XPL) thin sections for Nubia sand stone from hand dug well 11 and 18: **(a)** at PPL and **(b)** at XPL represent fine sand subarkose arenite according to [1] classification with ferruginous cement and cross micro-lamination from iron oxides is significant that reduce permeability (taken from well11); **(c)** at ppL and **(d)** at XPL represent medium sand quartz arenite according to [1] with secondary coating with iron oxide on some grains(taken from well18); **(e)** at PPL and **(f)** at XPL represent quartz overgrowth cement (taken from well18).

References

1. Folk, R.L. *Petrologie of Sedimentary Rocks*; 1974; ISBN 0-914696-14-9.