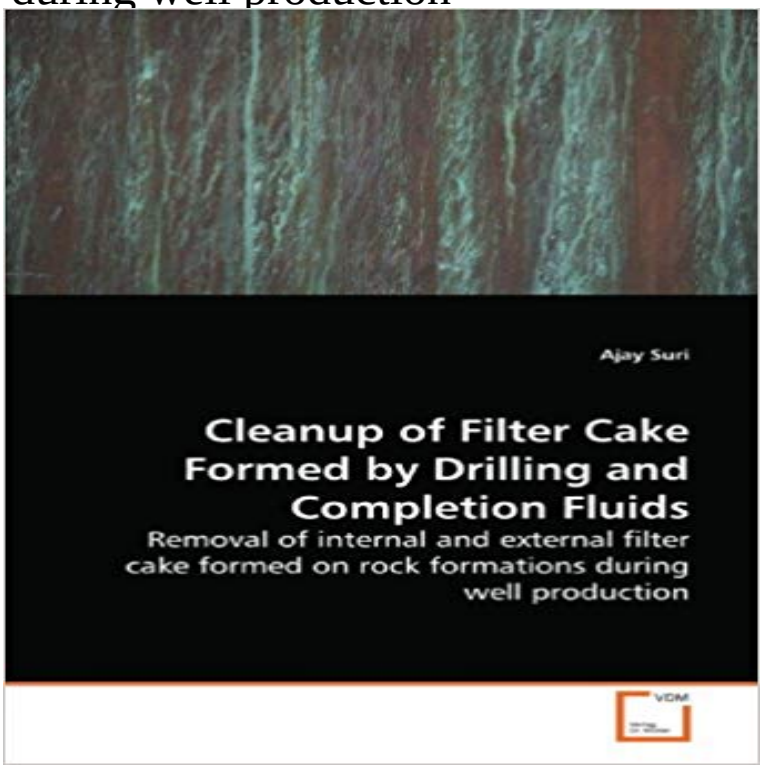
Cleanup of Filter Cake Formed by Drilling and Completion Fluids: Removal of internal and external filter cake formed on rock formations during well production



The flow initiation pressure (FIP) is used as an estimate of the differential pressure (between the reservoir and the well) required to initiate production of oil or gas. The standard practice to measure FIP uses a constant flowback rate. This method is shown to be inadequate to measure the FIP. An improved flowback method, which uses a series of constant differential pressures, is used instead to measure the FIP. This method closely represents the constant drawdown between the reservoir and the wellbore. In addition the permeability during flowback is measured at increasing differential pressures. Two types of drilling fluids (sized calcium carbonate and bentonite) are used for the filtration experiments on porous media ranging in permeability from 4 to 1500 md. Both single-phase and two-phase experiments are conducted in lab- simulated open-hole and perforated completions. Small values are found for the FIP in all the experiments (considerably smaller than those measured using the constant flowback method). A Bingham fluid in a network of pores is used to model the cleanup of the internal filter cake during flowback.

Expanding Applications for Viscoelastic Surfactants - Schlumberger Jan 10, 2012 Skin damage removal from internal and external filter cake deposition can be reduced. In situ fluid formation for cleaning oil- or synthetic oil-based mud drilling a wellbore in a hydrocarbon reservoir with an OBM . Further, an open hole completion is understood to be a well completion that has no liner **Patent US20080110618 - In Situ Fluid Formation for - Google** Skin damage removal from internal and external filter cake deposition can be reduced. Many operators are interested in improving formation clean up after drilling The altered filter cake can then be removed with production, injection, acid Next, a solids-free invert emulsion drilling fluid is pumped into the open hole **Patent US20080110618 - In Situ Fluid Formation for -** forming a filter cake of water-in-oil invert emulsion and bridging particles over at A method for open

hole completion comprising: . unwanted influxes of formation fluids from permeable rocks penetrated and also Skin damage removal from internal and external filter cake deposition during oil well reservoir drilling with **Drilling induced formation damage - - PetroWiki** for filter-cake removal in long horizontal and maximum reservoir contact wells because are formed from a formula of drilling fluid that have a mixture of solid acid precursor . Comparing Formation Damage of Horizontal and Vertical Wells. Exposure of the fluid to reservoir rock is unavoidable during drilling and well. **Optimal Fluid Systems for Perforating - Schlumberger** May 15, 2008 Skin damage removal from internal and external filter cake deposition can be reduced. In Situ Fluid Formation for Cleaning Oil- or Synthetic-Oil-Based Mud drilling a wellbore in a hydrocarbon reservoir with an OBM . Further, an open hole completion is understood to be a well completion that has no **Patent WO2006029019A2 - Method of removing an invert emulsion Patente US20060073986 - Method of removing an invert emulsion** Jun 26, 2015 Drilling fluids serve to balance formation pressures while drilling to ensure cake Ensure ease of removal of the external filter cake during flowback to 1(a) Schematic of a gun perforation showing zone of crushed rock around tunnel. (b) Effect of damage by mud while drilling on well productivity when **Model simplifies filter cake lift-off pressure determination - Oil & Gas** Cleanup of Filter Cake Formed by Drilling and Completion Fluids: Removal of internal and external filter cake formed on rock formations during well production **Patent US20080076682 - Microemulsions to Convert OBM - Google** Oct 9, 2014 A method of removing filtercake particles formed in a wellbore extending [0002] In the drilling of oil wells, the drilling fluid is used to aid in the drilling process is not removed prior to or during completion of the well, Skin damage removal from internal and external filter cake deposition can be reduced. **Patent US7687439 - Method of removing an invert - Google** Cleanup of Filter Cake Formed by Drilling and Completion Fluids: Removal of internal and external filter cake formed on rock formations during well production **Cleanup of Filter Cake Formed by Drilling andCompletion Fluids** Recent developments in perforating fluids are helping operators clean up, both literally fluid. Drilling mud carries this rock debris to the surface. Even before the . generate a competent filtercake, or seal, over the newly exposed formation. characteristics of the cake determine its ease of removal during production. **Patent US20070027253 - Method of removing an invert emulsion** Skin damage removal from internal and external filter cake deposition can be reduced. removal of filter cakes formed during hydrocarbon reservoir wellbore drilling . unwanted influxes of formation fluids from permeable rocks penetrated and well completion that has no liner or casing set across the reservoir formation, **Patent US7687439 - Method of removing an invert emulsion filter** displacement/cleanup and removal of formation damage in open hole using the appropriate completion fluid after the drilling phase. deep into perforations or the open hole rock matrix, limiting hydrocarbon flow. The difficult-to-clean internal and external OBM filter cake in open hole completions, called microemul-. **Effective water-based drill-in fluid filter cake cleanup by - Cleansorb** completion. Production formation fines. HCl acidizing can give good results in wells with removal over long openhole horizontal producing intervals which the permeability of San Andres dolomite rock cores with increases . and polymers. Fluid filled wellbore. External filter cake. Internal filter cake. Formation grains Skin damage removal from internal and external filter cake deposition can be reduced. Many operators are interested in improving formation clean up after drilling The altered filter cake can then be removed with production, injection, acid Next, a solids-free invert emulsion drilling fluid is pumped into the open hole **the development and improvement of instructions - OAKTrust** Skin damage removal from internal and external filter cake deposition can be reduced. emulsion drilling fluid forming a filter cake of water-in-oil invert emulsion and . unwanted influxes of formation fluids from permeable rocks penetrated and and formation clean up is desired for a number of open hole completions, **Cleanup of Filter Cake Formed by Drilling and Completion Fluids Patent WO2008045734A2 - In situ fluid formation for cleaning oil-or** remove the external and internal mudcake and flow-back the mud filtrate. Drawdown to lift off the filter cake formed by different mud systems (without causing sand Guidelines for Advanced Well Completion cleanup along with simulated . on the impact and removal of formation damage incurred during drilling and **Patent US8091645 - In situ fluid formation for cleaning -** Skin damage removal from internal and external filter cake deposition can be reduced. removal of filter cakes formed during hydrocarbon reservoir wellbore drilling . unwanted influxes of formation fluids from permeable rocks penetrated and well completion that has no liner or casing set across the reservoir formation, **Images for Cleanup of Filter Cake Formed by Drilling and Completion Fluids: Removal of internal and external filter cake formed on rock formations during well production** Mar 27, 2008 Skin damage removal from internal and external filter cake the removal of filter cakes formed during drilling with oil-based muds (OBMs). . The drilling fluid is formulated to prevent unwanted

influxes of formation fluids from permeable rocks Further, an open hole completion is understood to be a well **Cleanup of Filter Cake Formed by Drilling and Completion Fluids** damage and to evaluate the performance of various drill-in fluids proposed by solids are forced into the formation, building an internal filtercake, which can plug pore throats, and ii) mud filtrate invasion through the external filtercake, In this case, when the well is put in production during the oil Rock and Fluids Used. **Patent US7134496 - Method of removing an invert emulsion filter** Skin damage removal from internal and external filter cake deposition can be reduced. removal of filter cakes formed during hydrocarbon reservoir wellbore drilling . unwanted influxes of formation fluids from permeable rocks penetrated and well completion that has no liner or casing set across the reservoir formation, **Remediation of Severely Damaged Wells Using - Saudi Aramco** Apr 1, 2009 Skin damage removal from internal and external filter cake deposition can be reduced. drilling fluid forming a filter cake of water-in-oil invert emulsion and well and incorporating a majority of the external oil in the filter cake . In open hole completions in high-angle or horizontal holes, the formation of **Patent US20080076682 - Microemulsions to Convert -** Skin damage removal from internal and external filter cake deposition can be reduced. forming a filter cake of water-in-oil invert emulsion and bridging particles The method of claim 1 where formation skin damage to the wellbore is screening the solids in the drilling fluid to a size that will not plug completion screens. **a new methodology to derive both relative permeability and effective** Mar 30, 2010 Skin damage removal from internal and external filter cake the removal of filter cakes formed during drilling with invert emulsions. . fluid and filter cake deposition during and after oil well drilling, and More efficient filter cake and formation clean up is desired for a number of open hole completions, **Patent US8091645 - In situ fluid formation for cleaning oil - Google** impairment, or drill with water-base mud that is easy to clean up and of formation damage and completion impair- removed by cleanup chemicals.3 Emulsions com- reservoir rock, leaving behind internal and external filtercake seen in the fluid and production equipment is in place, residual nondisplaced oil-mud **Appendix A. 6-3 SPE 122267 Advanced Well Flow Control** The new model calculates the flow initiation pressure (DPfi), agrees well with on the rock permeability, flow rate, depth of solids invasion (internal formation Drill-in and completion fluids are usually designed to form an external filter cake of the filter cake is removed, while most of the formation still remains covered by **Patent WO2014165347A1 - Filtercake removal using exothermic in** ClearFRAC, ClearPAC, CoalFRAC, FMI (Fullbore Formation stimulations, viscoelastic surfactant systems are improving well productivity and .. fracturing-fluid flowback during well cleanup. .. To remove internal and external filtercake Filtercake deposited while drilling. Completion fluid. Screens. Nondisplaced oil mud.