ENHANCED GEOTHERMAL SYSTEMS AND RESERVOIR OPTIMIZATION

CROSS REFERENCE TO RELATED APPLICATIONS

This application is a continuation of and claims priority to U.S. application Ser. No. 12/499,012, entitled "ENHANCED GEOTHERMAL SYSTEMS AND RESERVOIR OPTIMIZATION" filed on Jul. 7, 2009, which claims the benefit of priority to U.S. provisional application No. 61/078,682, entitled "SYSTEM AND METHOD FOR USING A DRILLABLE AND RETRIEVABLE HIGH TEMPERATURE PACKER TO ISOLATE ZONES IN A GEOTHERMAL RESERVOIR" filed on Jul. 7, 2008; U.S. provisional application No. 61/078,686, entitled "SYSTEM AND METHOD FOR USE OF AN EXPANDABLE TUBULAR TO SET A PACKER IN WELLBORES TO ISOLATE ZONES" filed on Jul. 7, 2008; U.S. provisional application No. 61/087,332, entitled "ENHANCED GEOTHERMAL SYSTEMS AND RESERVOIR OPTIMIZATION," filed on Aug. 8, 2008; U.S. provisional application No. 61/087,342, entitled "OPEN HOLE SCAB LINER FOR MULTIPLE ZONE EGS STIMULATION" filed on Aug. 8, 2008; U.S. provisional application No. 61/102,644, entitled "TEMPORARY BLOCKING AGENT FOR IMPROVEMENT IN CREATION OF AN EGS RESERVOIR" filed on Oct. 3, 2008; and U.S. provisional application No. 61/154,077, entitled "THERMALLY DECOMPOSING MATERIALS FOR USE AS A TEMPORARY BLOCKING AGENT" filed on Feb. 20, 2009, which are all incorporated by reference in their entirety, for all purposes, herein.

FIELD OF TECHNOLOGY

The present application is directed to systems and methods for maximizing energy recovery from a subterranean formation.

BACKGROUND

The creation of an Enhanced Geothermal Systems (EGS) reservoir involves fracturing a subterranean formation or a plurality of subterranean formations. Water is circulated from an injection well, through the fractures where it is heated. The hot water or heat from the formation is produced from one or more production wells some distance away from the injection well and Water pressure opens a network of fractures in the open-hole section of the subterranean formation having the lowest fracture initiation pressure. The fracture network propagates away from the wellbore in a specific orientation that is related to existing stresses in the subterranean formation. However, a relatively small section of the open-hole section of the subterranean formation is actually fractured. Other locations in the open-hole section having higher fracture initiation pressures that are typically deeper in the subterranean formation remain unstimulated. Unstimulated regions within the subterranean formation are an untapped source of energy for power generation and the efficiency of power generation on a per well basis remains relatively low. The cost of drilling and completing wells can range from half to 80 percent of the total cost of an EGS project. Therefore, reducing the number of wells for a given project can have a significant impact on the overall cost of the project and ultimately the cost of power production.

SUMMARY

Systems and methods for maximizing energy recovery from a subterranean formation are herein disclosed. A selected subterranean open-hole interval is isolated and at least one fracture is stimulated in the isolated subterranean open-hole interval.

The foregoing and other objects, features and advantages of the present disclosure will become more readily apparent from the following detailed description of exemplary embodiments as disclosed herein.

BRIEF DESCRIPTION OF THE DRAWINGS

Embodiments of the present application are described, by way of example only, with reference to the attached Figures, wherein:

FIG. **1** illustrates an exemplary method for maximizing energy recovery from a subterranean formation according to one embodiment;

FIG. **2** illustrates an exemplary method for maximizing energy recovery from a subterranean formation according to another embodiment;

FIG. **3** illustrates an exemplary method for maximizing energy recovery from a subterranean formation according to another embodiment;

FIGS. **4**A through **4**B illustrate an exemplary method for maximizing energy recovery from a subterranean formation according to another embodiment; and

FIGS. **5**A through **5**E illustrate an exemplary method for maximizing energy recovery from a subterranean formation according to another embodiment.

DETAILED DESCRIPTION

It will be appreciated that for simplicity and clarity of illustration, where considered appropriate, reference numerals may be repeated among the figures to indicate corresponding or analogous elements. In addition, numerous specific details are set forth in order to provide a thorough understanding of the example embodiments described herein. However, it will be understood by those of ordinary skill in the art that the example embodiments described herein may be practiced without these specific details. In other instances, methods, procedures and components have not been described in detail so as not to obscure the embodiments described herein. It will be understood by those of ordinary skill in the art that the systems and methods herein disclosed may be applied to subterranean wells including, but not limited to, geothermal wells, oil wells, gas wells, water wells, injection wells or any other well known in the art for producing or injecting fluids.

FIG. **1** illustrates an exemplary method for maximizing energy recovery from a subterranean formation **100** according to one embodiment. A subterranean well **102** including a wellbore **104** is drilled in a subterranean formation **100**. The subterranean well **102** includes a cased section **106** and an open-hole section **108** extending below the cased section **106**. The cased section **106** of the subterranean well **102** is lined with casing. The open-hole section **108** includes a plurality of open-hole intervals **110**, **112**, **114** located at increasing subterranean depths. Treatment fluid is injected or pumped into the wellbore **104** to pressurize the open-hole section **108** of the subterranean well **102**. Pressure created by injected treatment fluid stimulates a fracture or a fracture network **116** by opening fractures within an unisolated open-hole interval **110**. Treatment fluid for simulating fractures may comprise water, brine, or any fluid known in the art that is capable of stimulating fractures and compatible with other fluids in the subterranean well **102**.

Fractures **116** in an open-hole interval **110** that is closer to the surface **140** typically have lower fracture initiation pres-